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ANTARCTIC

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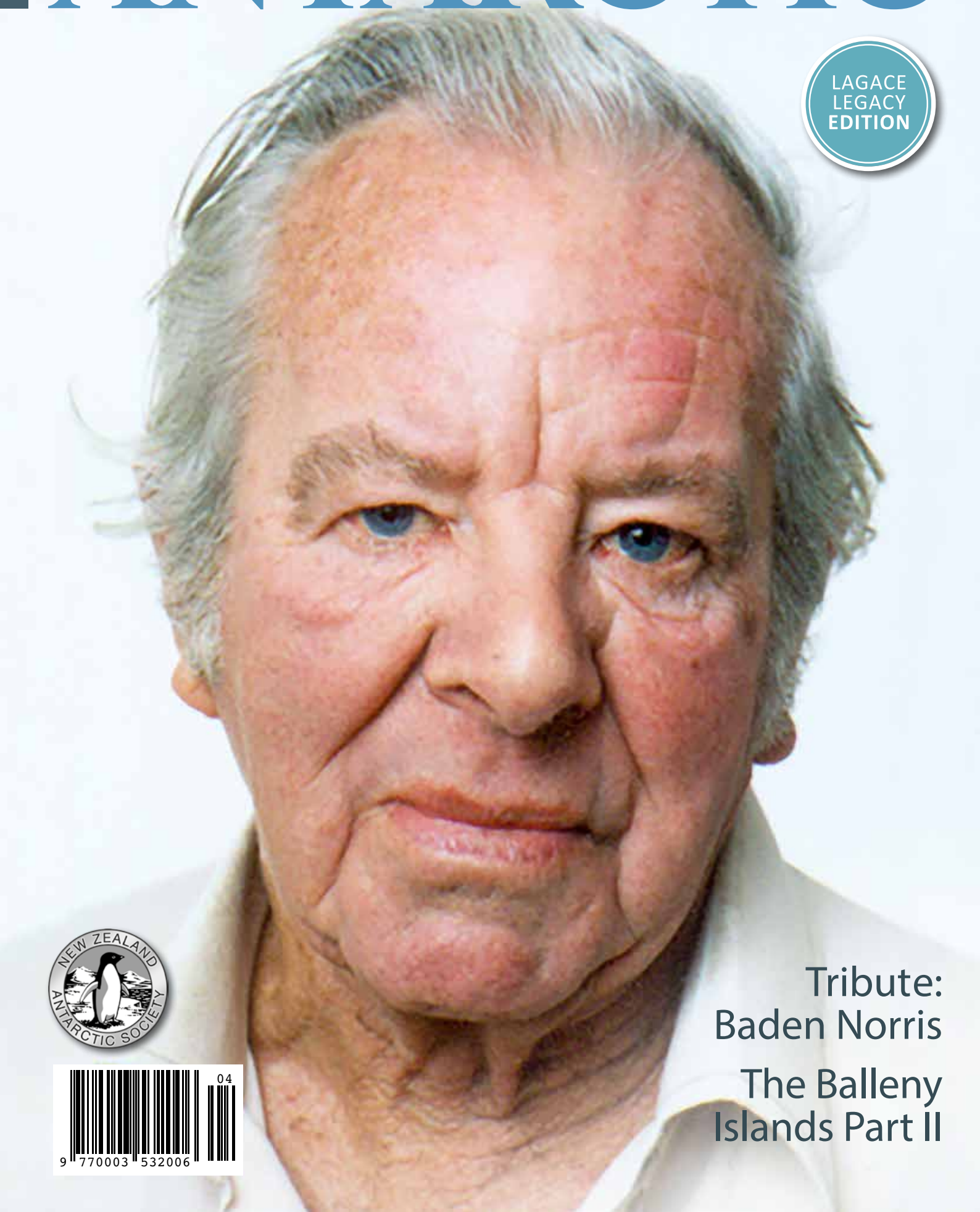

NEW ZEALAND ANTARCTIC SOCIETY

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Tribute: Baden Norris

The Balleny Islands Part II

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The deadlines for submissions to future issues are 1 February, 1 May, 1 August and 1 November.

POLAR WHISPERS, POLAR LOG, AND POLAR SIGNALS

In December 1993, the Society commenced an irregular newsletter called *Polar Whispers*, "designed to keep members in touch with the Society, and to provide snippets of Antarctic information". In all there were 20 issues of *Polar Whispers*, ending with the October 2003 issue. As well, *Polar Log* commenced in December 1994, running until December 2003 (five issues). The object of *Polar Log* was "to report to the wider membership on the proceedings of the AGM and Council Meeting[s]". Finally, *Polar Signals* (two copies, 1997–8) existed to bring "Branch Newsletters and Head Office Notices" to members. These publications have now all been scanned and are being progressively indexed, and will be added to the members-only archive of Society publications that includes the *Antarctic News Bulletin* (1950–55) and all copies of *Antarctic* magazine from 1956 to now.

Cover photo: Baden Nolan Norris, 16 April 1927–8 August 2018. *Photo courtesy of Peter McCarthy.*
Photo above: Baden Norris with Ferguson TE20 Tractor from Hillary's TAE, in Canterbury Museum. *Photo courtesy of Peter McCarthy.*

From the Editor

We commence this issue with an extended tribute to former Life Member of the Society, Baden Norris, including remembrances from many former colleagues. Some of Baden's stories are recorded in *Antarctic Reflections: An anthology of Antarctic articles written originally for the Christchurch Press*, which is available from our website, and in *Antarctic* 31(2), June 2013. Sadly, another Life Member has also passed – Ray Dibble. Ray had over 50 years of experience in the field of seismology, both in seismic research and in instrumentation development, and he was awarded Life Membership of the Society in 2008. A tribute will follow in a future issue of *Antarctic*.

There are several Antarctic Gateway Cities around the world, of which Christchurch, New Zealand is one. Fred Davey gives us a brief update on another Gateway City in *Major Developments Proposed for the Australian Antarctic Program, and Hobart*. Australia, via the AAD, has committed major funding to their Antarctic and Southern Ocean programme.

Most of us know about "the poles" – North Pole and South Pole – and occasionally Mount Everest is referred to as the third pole. These are all geographic poles – fixed to a single location. In *Antarctica and the Wandering South Magnetic Pole*, Fred Davey and Margaret Bradshaw introduce us to yet another pole (and there are more).

Previous issues of *Antarctic* have had articles about the Society's Mount Erebus oral histories. The interviews have now commenced, and in *Crucial Antarctic Oral History* you are invited to join an exclusive group of benefactors to make sure the Mount Erebus Disaster is never forgotten.

I am pleased to introduce the Council of the Society, with brief bios of each member. These are the Council members appointed by the members at the AGM, held most recently in Christchurch in October. In particular a warm welcome to new councillors Bill Nye, Nicholas O'Flaherty, and Pantelis Roussakis. Other positions within the Society, such as Membership Secretary, Oral History Co-ordinator, and Editor are appointed by Council.

In this issue we conclude David Harrowfield's article *Inhospitable Coasts: The Balleny Islands*. Part I of the article ran in *Antarctic* 36(2), June 2018. Copies of that issue are available from our website.

You may have noticed fewer book reviews in *Antarctic* of late. They're not off the list, but there's not always space for them. This month our back cover has some offerings, which may just make your Christmas shopping list.

Lester Chaplow

From the President

Our AGM this year was held in Christchurch, hosted by Canterbury Branch. A good number of members attended. I am pleased to report that following the election of Officers, we now have full Council representation again. Margaret Bradshaw stepped down from being the South Island Vice-President, but continues to co-ordinate the NZAS Oral History Programme. Thank you, Margaret. Gigi Green continues as National Secretary. Thank you, Gigi. Thank you too to Peter Barrett (Patron) for his consistent toiling on our behalf, and also to Rebecca Pyne, Robin Falconer, and Shirley Russ for their solid support too, and to John Rogers for stepping up as well to join the team. Please welcome our new South Island Vice-President, Bill Nye from Canterbury, and our new North Island Vice-President, Nicholas O'Flaherty from Auckland. I am also delighted to confirm that Pantelis Roussakis is now our official National Treasurer. All are very keen to help the Society carve out a sustainable future, to grow our membership, and to finalise a new Strategic Plan for the Society.

On behalf of the Council, I am delighted to announce that Kevin O'Malley – a builder and contractor from Kaiwaka – was selected by Antarctica New Zealand as the 2018 NZAS volunteer to go to Scott Base. Congratulations, Kevin. There were 18 applicants, of which four were shortlisted to be interviewed by Antarctica New Zealand. Kevin flew to Antarctica on 5 November, and returned to New Zealand on 27 November – an earlier timeline than usual. One of the jobs they had lined up for him was helping with the installation of a new water tank. He is a member of the NZAS, as well as the New Zealand Alpine Club. We look forward to his report and article for the *Antarctic* magazine when he returns.

As this will be the last *Antarctic* for the year, I would like to take this opportunity to wish you all a safe and happy holiday break over the Christmas–New Year period. Any ideas for Antarctic projects, unique member events, and/or how to achieve increased diversity of members are always welcome – please contact your Branch Committee in the first instance.

All the best for 2019.

Linda Kestle

Tribute – Baden Nolan Norris 16 April 1927–8 August 2018

By Kerry McCarthy and Peter McCarthy

Baden Nolan Norris was born in Lyttelton on 16 April 1927. He passed away on 8 August 2018 in Christchurch Hospital after a short illness. In the intervening 91 years he had lived a life too rich and varied to describe in a few paragraphs.

He left school at 13 to work in a shoe factory and spent most Saturdays at Canterbury Museum. At 15 he went to sea, working on coastal traders, and he heard stories of the Antarctic from local seamen of the Heroic Era. At 16 he signed up in the Merchant Navy and saw active service during World War II.

On his return to New Zealand, Baden worked for a period in Rotorua, where he met Alice. They married and set up home back in Lyttelton with daughter Daphne. There, Baden worked on the waterfront, later "retiring" to become a busy local historian and wildlife warden, amongst other things.

Somewhere along the way Baden fell in love with Antarctica and Antarctic History. He also picked up several awards, which he almost never talked about. As a Merchant Navy seaman he received the Commonwealth War Medal 1939–45, the 1939–45 Star, the Pacific Star, and the New Zealand War Service Medal. He was awarded the Conservation Trophy of the New Zealand Antarctic Society in 1974 and the Queen's Service Order for Community Service in 1977. Baden was made a Life Member of the New Zealand Antarctic Society in 2003, received the Rhodes Medal of the Canterbury History Foundation in 2006, and was presented with a Christchurch City Council Civic Award in 2009. He was deeply humbled by the award of the New Zealand Antarctic Medal for services to Antarctic history and conservation in 2013. This last award he talked about. Just a little.

The common denominator in Baden's long journey, as evidenced by the personal tributes that follow, is not what Baden did, so much as what he learned, combined with a unique gift for passing on that learning in a captivating and accessible way to people of all ages and origins. He was known to begin his talks, or comment wryly when he heard someone else repeating an inaccurate account of a historical event, with the following: "Never let the truth get in the way of a good story." In Baden we found the perfect combination of the good story and the thirst for truth. It is fitting, then, that we honour Baden with some stories of our own.

Baden Norris at Lyttelton Harbour wharf. *Photo courtesy of Peter McCarthy.*

I met Baden almost 30 years ago on a tour of the Canterbury Museum Antarctic collection. He mentioned he had been born in Lyttelton, where there was a small museum where we could also see some of the region's "unique Antarctic history". I was about to sail with Greenpeace to Antarctica but was delayed for several weeks. I started hanging around at the museum, pestering Baden. This was the beginning of our long-term friendship, one that was all about stories of Antarctica and New Zealand – tales of the men of the *Terra Nova* manhauling in a parade in Lyttelton, of Baden exploring the *Discovery* hut at Hut Point, Ross Island, finding bits of manuscript from a play.

Baden's life and fierce sense of story made that world for me and for thousands of others who came through the Canterbury and Lyttelton museums. My book, *The Entire Earth and Sky: Views on Antarctica*, has, at its heart, Baden and his stories. Baden was very clear in articulating his vision of an Antarctic history that privileged the "colonials" and his intention to create a system of stories that privileged and celebrated the simple seamen who made those voyages of discovery possible, as well as the impossibly beautiful, scrappy port town called Lyttelton where he made his stand for a great, populist history of place.
Leslie Roberts – Author and academic.

In 2005 we visited Ripapa Island with Baden on a Lyttleton Harbour cruise. Going inside the fort was like entering Pandora's box – the stories and anecdotes came from Baden in rapid fire. His enthusiasm for the island from its earliest use through to the present day expanded as we progressed around the site. The ties that bind the island to Lyttleton are diverse – from early Māori occupation, to quarantine and prison. Count Felix von Luckner, the Sea Devil, who was imprisoned there, made quite an impression on Baden, as he related this story with relish.

Heritage Expeditions announced a *Nimrod* centenary voyage, departing from Lyttelton on 1 January 2008, 100 years to the day since Shackleton had left on the *Nimrod*. We held the New Year's Eve pre-departure dinner at Stark Bros, with the bow of a partially built boat becoming the backdrop of a temporary stage.

Baden accepted the challenge of delivering the dinner speech. Concentrating on Shackleton, his history, his passion, his exploits and successes, Baden comprehensively presented the man, the mystery, and the legend to an enthralled audience. Baden never used notes. His recall of details, interconnecting facts, figures, people, and stories was flawless and gave insights to so many layers of the history of Shackleton, and of Baden himself.
Shirley Russ – Co-owner of Heritage Expeditions.

Baden Norris was internationally renowned for his expert knowledge of Antarctic history, and the generous way in which he would quietly and enthusiastically offer information and insights. As students, we benefited greatly from his knowledge, expertise, and experience.

In addition to his endeavours at the Canterbury and Lyttelton museums, he contributed to an exhibition at the Arts Centre of Christchurch about Professor Robert Julian Scott, cousin of Captain R. F. Scott, as well as enhancing the care of the Antarctic artefacts at Ferrymead Heritage Park.

In a life well lived, Baden earned the respect of all those who had the good fortune to have known him.
Dr Bryan Lintott – Research Associate, Scott Polar Research Institute, Cambridge University, UK.

Baden gave amazing service to the Canterbury Museum for over 60 years and was a much-loved and respected part of our Museum family.

In 1958, the Canterbury Museum Archaeology Society was formed, and Baden was elected its inaugural Secretary/Treasurer – a post he held until 1984 when the Society became a part of the wider New Zealand Archaeological Association. He took part in the Museum's digs over a long period, including such important excavations as Moa Bone Point Cave, Wairau Bar, Fyffes at Kaikoura, and Pyramid Valley. In 1965, Baden was appointed Honorary Curator of Antarctic Relics at the Museum, a position he held until 1989 when he was employed as Curator of Antarctic History. Baden gave nearly 15 year's service in this role, retiring in 2002.

We salute you Baden, and thank you for a life of loyal service to the Museum and the people of Canterbury.
Anthony Wright – Director, Canterbury Museum.

In 2017 members of the New Zealand Antarctic Society's Canterbury Branch acknowledged a long-term commitment to the Society of Baden Norris by celebrating his ninetieth birthday. Fittingly the event was held in the Canterbury Museum's Antarctic Wing. We heard of Baden's exploits at sea, his work within the Lyttelton community, his passion for archaeology, conservation, and education, and his work in the Ross Sea Region. These contributions are without peer.

Baden Norris with Sno-Cat *Able*, in Canterbury Museum. *Photo courtesy of Peter McCarthy.*

Baden threw a challenge to the Antarctic Society going forward: the need for personal and group commitment to keep societies such as ours relevant, and their memberships strong – against a tide of distractions, slim resources, and competition from alternative information sources. He singled out the selfless efforts of people, including Harold Griffiths, Roger Duff, and Alf Brustad, who were influential not only in forming the Canterbury Branch, but also in motivating wider interest and keeping it on track through challenging years. ***Grant Hunter – Canterbury Branch of the NZ Antarctic Society.***

While Baden's knowledge of the Heroic Era of Antarctic history was always obvious to cruise ship passengers, it took the tourists a little while to notice him. At the start of a trip his soft-spoken modesty meant few passengers knew there was a master raconteur in their midst, but as the voyage progressed, more and more discovered his charms and he developed a substantial following. By the end of the cruise he would have scarcely had a moment to himself while in public areas, and the full complement of passengers would be enthralled by Antarctic history. ***Dr Peter Carey – Zoologist, lecturer, and founder of SAFER (SubAntarctic Foundation for Ecosystems Research).***

At 16, I made my first August school holiday journey from Oamaru to Christchurch to gain experience at Canterbury Museum. I was introduced to Baden, by Dr Roger Duff, then Museum Director, and this began a life-long association.

I met Baden for a second time in 1958, while fishing in Lyttleton. He had an elderly man with a large silvery moustache beside him, and I was introduced to Mortimer McCarthy. He was the first early Antarctic explorer I had met, and it left an enduring impression on me.

In 1975 I became Assistant Curator, Antarctic Collections at Canterbury Museum. We were encouraged to write short articles for *The Press* and I recall being pulled up by Baden one morning, on a spelling mistake in an article I had written. Scott's motor tractor was made by Wolseley and the expedition woollen clothing was of Wolsey manufacture. I thanked Baden and never again made the same error.

Baden was a special person and we must be very grateful that he entered our lives and for what he did, not only for us as individuals, but for the greater community as well. This will be Baden's enduring legacy. ***Dr David Harrowfield NZAM – Antarctic historian and author, Life Member.***

Baden Norris with Ferguson TE20 Tractor from Hillary's TAE, in Canterbury Museum. *Photo courtesy of Peter McCarthy.*

I first met Baden in 1973 while we worked on Canterbury Museum's new *Hall of Antarctic Discovery.* Baden was tremendously pleased to have acquired *Able*, one of the Tucker Sno-Cats from the 1957–58 Commonwealth Trans-Antarctic Crossing Party. It travelled 3,000 km from the Filchner Ice Shelf, via the South Pole to Scott Base. *Able* had the distinction of having fallen picturesquely into a crevasse on the journey.

Able was used at Scott Base until 1970, then HMNZS *Endeavour* carried it to Lyttelton and Baden acquired it for the Museum. *Able* was so large, over 3 tons in weight, that it had to be moved into the display hall before the roof and windows were completed. Baden stood watching anxiously as the huge machine was slowly lifted and swung into the hall by an enormous crane. He wasn't worried about damaging the building; he was more concerned about damage to the precious Sno-Cat.

Later, Baden acquired a Ferguson Tractor and restored it to the form it had in Hillary's depot-laying days, with a green canvas "cab" and metal tracks over the tyres. Authenticity was Baden's middle name! ***Dr Margaret Bradshaw PM – Antarctic geologist and colleague, Life Member.***

My favourite recollection of Baden is of him sitting in an armchair in the basement of the British Hotel, Lyttelton, delivering a talk on Scott's *Terra Nova* Expedition of 1910–13. It was from this very port that Scott had departed for his Antarctic journey, never to return. Baden had the crowd mesmerised by this retelling of the historic tale. It was as if we had been transported with Scott and his men to the Antarctic.

Only Baden could weave the facts of history with the fiction of our imagination and he made us feel like we were all part of the story. He was an excellent historian and archaeologist, but it was his ability to tell the story in a way that was engaging and interesting that excited people of all ages and drew them in, yearning to learn more. ***Michelle Rogan-Finnemore – Executive Secretary of the Council of Managers of National Antarctic Programs (COMNAP).***

I first met Baden in 2000 when I became Director of Gateway Antarctica, at the University of Canterbury. I was immediately impressed with his knowledge of Antarctic history which was not gained from text books but from his personal experience of having lived

Baden Norris unveiling the plaque at the grave of Harry McNish in Karori Cemetery, Wellington. *Photo courtesy of Peter McCarthy.*

in Lyttelton, of having worked in Antarctica restoring the historic huts, and of having interacted with Antarctic personnel across many generations.

His knowledge was imparted with personal stories and anecdotes that enriched the experience for the many students. Our graduate students often cited visits to the museum as a highlight of the programme thanks to the enthusiasm and personal interaction from Baden.

On behalf of the University of Canterbury I wish to pay tribute to the contribution that Baden Norris made to Antarctic studies. ***Prof Bryan Storey – Former Director, Gateway Antarctica (UC).***

I am deeply sorry to read about the death of Baden Norris, a good friend and a committed Antarctic Society member. He was a valuable committee member when I was the Canterbury Branch President. He had a tremendous knowledge of early Antarctic history and together we devoted much time and effort to promoting the Antarctic Wing proposed for the Canterbury Museum. ***Randal Heke, NZAM, Life Member.***

Baden was acknowledged as one of the world's foremost Antarctic historians. His contribution over more than six decades to consistently support education and knowledge about Antarctica, and the preservation of the remaining tangible legacy of early Antarctic exploration, was outstanding.

Baden made his wealth of knowledge freely available and in doing so helped to preserve, protect, and educate people about Antarctic's heroic expedition heritage.

On his last trip to Antarctica, Heritage Expeditions said Baden was so excited to go south again, that he reportedly packed his bags, and was ready to be picked up … three months early. ***Nigel Watson – Director, Antarctic Heritage Trust.***

In the team that made New Zealand's Antarctic Heritage Trust's campaign to save the huts, Baden Norris was unquestionably a key player. We appointed Baden to our Special Advisory Group, recognising the value of his considerable knowledge and experience. He was then curator of Antarctic History at Canterbury Museum.

Baden's great strength was his support to the group's research capacity, and his contribution to the success of the project can't be overstated. Had we not been able to provide the depth of accurate research that captured the imagination of our international donors and sponsors, we would not have raised the funds to complete the task.

Baden was a huge enthusiast for the Trust's ambition. He generously gave his time and knowledge to the NZAHT cause for more than 20 years. We will miss his gentle humility. ***Sir Rob Fenwick – Former Chairman, Antarctic Heritage Trust.***

In the 1980s, when seeking a position in the New Zealand Antarctic Programme, I realised that, in addition to the required technical skills, I needed to acquire as much general Antarctic knowledge as possible. Sources would say, "If you want to know more about that, you need to ask Baden Norris." Baden was the go-to man for Antarctic information – he was a veritable encyclopaedia. His enthusiasm for Antarctica and polar history was contagious. It kindled my own interest in these things and often guided me during my work in that field.

Despite his lack of a formal tertiary education he had become the recognised and respected source of information and advice for many in the academic field. ***Paul Chaplin – Former Executive Director, Antarctic Heritage Trust (1993–99) and Secretary General of the International Polar Heritage Committee (2000–12).***

Baden Nolan Norris QSO, NZAM, Merchant Navy, is survived by his daughter Daphne and her family in the US. Both Norris Glacier in Antarctica and Baden Norris Reserve on Sumner Rd, Lyttelton bear his name.

Major Developments Proposed for the Australian Antarctic Program and for Hobart

By Fred Davey

In 2016 the Australian Antarctic Division adopted an ambitious Australian Antarctic Strategy and 20-year Action Plan (www.antarctica.gov.au/about-us/antarctic-strategy-and-action-plan) to develop and expand Australian activities and capabilities in Antarctica and to support the development of Hobart as a major Antarctic hub and gateway. In December 2017 the Tasmanian Government released a strategy document for the development of Hobart as an Antarctic gateway (www.antarctic.tas.gov.au/strategy).

Recently in Hobart the newspaper *The Mercury* (19 June 2018) noted that "The Final Report of the Federal Government Joint Standing Committee on the National Capital and External Territories inquiry into Australia's Antarctic Territory" had been handed down on 18 June 2018. This report inquired into and reported on the adequacy of Australia's infrastructure assets and capability in Antarctica.

In releasing the report, committee chair, Ben Morton MP, said that Australia has only begun to recognise the potential of its Antarctic programme and, in turn, the international engagement and scientific collaboration opportunities that Australia's presence on the continent can bring. He also highlighted the potential that Hobart has as an Antarctic gateway. The committee's report proposed improvements to Australia's leadership, infrastructure development, and scientific capabilities in support of Australia's national interests in Antarctica.

Major planned expenditure on Antarctic capability was noted: (a) the new 160-metre Australian icebreaker – RSV *Nuyina* – that is currently being built in Romania and will come into service in 2020–21 (AUD$1.9b) (www.antarctica.gov.au/icebreaker/updates); (b) a replacement for Macquarie Island station, due for completion in 2022 (AUD$50m) (www.antarctica.gov.au/news/2018/tasmanian-based-company-to-manage-new-macquarie-island-research-station-build); (c) a new overland traversing capability comprising a fleet of heavy tracked vehicles to support deep field operations, and the development of a new drill design capable of extracting ice cores 3000 metres deep (AUD$45m) (www.antarctica.gov.au/news/2018/ancient-ice-quest-harnesses-heavy-horsepower); and (d) a paved runway at Davis Station (www.antarctica.gov.au/news/2018/Building-Antarcticas-first-paved-runway). In addition, it was noted that RV *Investigator* will continue to provide marine research capability to the ice edge, and that *Aurora Australis* will continue operating until 2020 (www.antarctica.gov.au/news/2018/aurora-australis-contract-extended).

Air linkages to Antarctica would be improved by an extension of the runway at Hobart and the construction of a paved airstrip at Davis Station (noted earlier). The major addition to Hobart port facilities would be the provision of a fuel barge to allow re-fuelling of ships too large to pass under the Tasman Bridge (AUD$6–8m). These facilities could also be of interest to Antarctic programmes of other nations. The report also proposed the development of an Antarctic science hub with relevant agencies (including CCAMLR, Tasmanian Polar Network, parts of the Bureau of Meteorology, CSIRO, and Australian Antarctic Division) co-located at an Antarctic Precinct on Macquarie Point in Hobart, adjacent to the deep-water port, to give a world class Antarctic and science hub.

Addendum

A Chinese expedition to Antarctica in November 2018 will finally begin building China's first permanent airfield. It will be located on an ice cap 28 km from Zhongshan Research Station on the East Antarctica coast in the Larseman Hills by Prydz Bay. The runway will be 1,500 m long and 80 m wide (29 October 2018). (www.scmp.com/news/china/diplomacy/article/2170735/china-begin-building-first-permanent-airfield-antarctica).

Please find this article on our website under the news tab www.antarcticsociety.org.nz/news. Ed

Photo above: The RSV *Nuyina* will provide a state-of-the-art platform to conduct multidisciplinary science in sea ice and open water, and deliver personnel, cargo and equipment to and from Australia's Antarctic and subantarctic stations. *(Image: Damen/DMS Maritime/Knud E Hansen A/S).*

Antarctica and the Wandering South Magnetic Pole

By Fred Davey and Margaret Bradshaw

From early times, navigators were aware that the North and South magnetic poles, as defined by a compass, were in different positions to the geographic or rotational poles, as defined by the stars. In more modern times, as the magnetic field of the Earth has become better known, a third pole has been added – the Geomagnetic Pole.

In the days when sailing ships were exploring the Southern Hemisphere, there was a great interest in locating the South Magnetic Pole to help with navigation. When James Clark Ross explored the Victoria Land coastline of the Ross Sea in 1841, one of his objectives was to locate the South Magnetic Pole. Expecting to sail over it, Ross instead found his way blocked by a substantial range of mountains. His magnetic measurements indicated that the South Magnetic Pole lay somewhere on the Polar Plateau well inland from the head of what is now known as the Mawson Glacier (Figure 1).

During Scott's 1901–1904 *Discovery* Expedition, Bernacchi's magnetic measurements showed a location much further north on the Polar Plateau. In 1909 Mawson, with David and Mackay on the first Shackleton Expedition (Figure 2A), located the South Magnetic Pole at 71.6°, 152° (corrected) on the Polar Plateau in George V Land. Mayaud on the 1952 French South Polar Expedition established that the pole had shifted towards Terre Adélie. By 1962 two Kiwis – Burrows and Hanley (Figure 2B), working from US icebreaker *Burton Island* in Commonwealth Bay – located the pole at 67.5°, 140°, further to the northwest.

By 1986 continued measurements showed the South Magnetic Pole moving northwest offshore from Dumont d'Urville Station. Thus, the South Magnetic Pole has steadily moved with time (Figure 1), and is still moving, getting further away from the South Geographic (rotational) Pole. The same is true for the North Magnetic Pole, and there are differences between the two that indicate the Earth's magnetic field is complex.

The magnetic poles are points on the surface of the Earth where the dip of the magnetic field is 90 degrees.

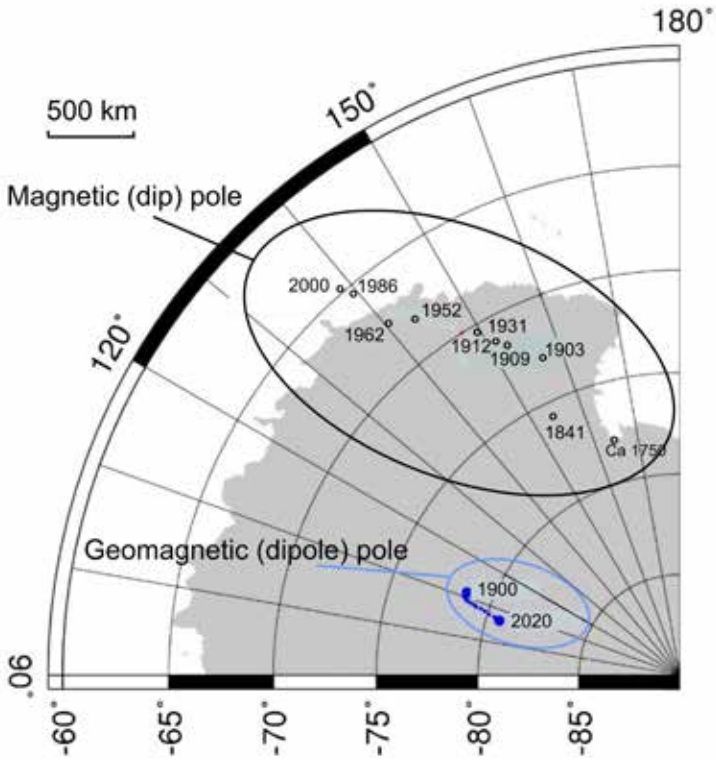

Figure 1. Location of the South Magnetic (dip) Pole with time (year annotated). Historical expeditions are: 1841, Ross (Sabine) Exp.; 1903, Scott (Bernacchi) British Antarctic Exp.; 1909, Shackleton (Mawson) British Antarctic Exp.; 1912, Bage et al. Australasian Antarctic Exp.; 1931, Kennedy, Brit/Aus/NZ exp.; 1952, Mayaud, French South Polar Exp.; 1962, Burrows and Hanley Exp.; 1986, Aust. Bureau of Min. Resources MV *Icebird*; 2000, Barton. *Based on information from British Geological Survey and Woods Hole Oceanography Institute (WHOI).*

These poles are not antipodal (diametrically opposed). Observatory measurements show that the positions of the poles vary with time (Figure 1) and that the difference between geographic north and magnetic north (magnetic declination) changes with time and with position on the Earth. Although this wandering is slow enough that a simple compass remains useful for navigation, updating and forecasting of magnetic declination became an important requirement for navigation. The geomagnetic poles (north and south), however, correspond to where the axis through the centre of the Earth of the simple bipolar magnet field, that most closely matches the observed magnetic field, intersects the Earth's surface

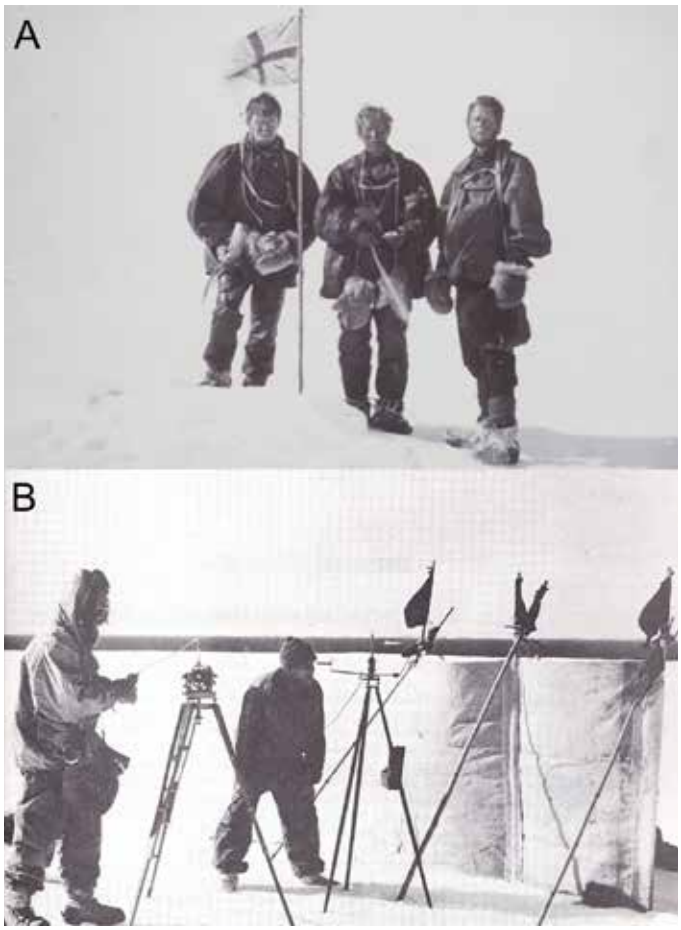

Figure 2A. (L–R): Mackay, David, and Mawson at the South Magnetic Pole, 16 January 1909. *Photo by Edgeworth David, from Shackleton 1910.*
Figure 2B. Burrows and Hanley observing on an iceberg off Cape Denison, February 1962. *Photo by A. L. Burrows, from Burrows 1963.*

(Figure 3A). They are antipodal. The dipole (equal and oppositely charged or magnetised poles separated by distance) is roughly equivalent to a powerful bar magnet, with its south pole pointing towards the Geomagnetic North Pole. The dipolar field accounts for 80–90% of the Earth's magnetic field in most locations, and the poles lie close (about 9°) to the Earth's spin axis (Figures 1 and 3A).

The Earth's magnetic field (shown in Figure 3A) is believed to be generated by electric currents in the fluid iron alloys of the outer core, between 1,220 km and 3,400 km from the centre of the Earth (Figure 3B). This field is modified by the rotational forces of the Earth (the Coriolis effect). Natural inhomogeneities result in modifications in the circulation with time and hence the changes in the magnetic field at the surface. However, the process is complex and computer models that reproduce some of its features have been developed only in the last few decades.

The Earth's magnetic field was first recognised in China between 300 and 200 BC by using a lodestone, a form of the mineral magnetite that is a naturally occurring magnet, creating the world's first type of magnetic compass (Figure 4).

When free to rotate, the lodestone aligns itself with the Earth's magnetic field. Originally used for geomancy (feng shui) and fortune telling, the lodestone compass allowed some road patterns in Chinese villages, for example, to be aligned with magnetic north. Early compasses were first used for navigation in China between the ninth and eleventh centuries AD. In Europe they have been used since the twelfth century, and in the Muslim world since the thirteenth century.

How does the Earth's magnetic field change with time? Changes occur over different time scales. The Earth's magnetic field extends from the core out into space, and over short periods of time (seconds to days) it is affected by the solar wind, a stream of charged particles emanating from the Sun and its larger flares. This modifies the magnetic field observed at the surface and gives rise to related phenomena such as auroras and changes to the ionosphere that can affect radio communication and power transmission. This influence of the Sun causes diurnal (daily) changes in the magnetic field that result in the magnetic poles tracing out an oval track at the Earth's surface of kilometres to tens of kilometres in dimensions during a day.

Changes in the magnetic field on a time scale of a year or more are referred to as "secular variation", and these are more important for navigation. Over hundreds of years, magnetic declination is observed to vary over tens of degrees as a result of a westward drift at a rate of about 0.2 degrees per year in the non-dipolar part of the secular variation. This drift is not the same everywhere and has varied over time. The globally averaged drift has been westward since about 1400 AD but eastward between about 1000 AD and 1400 AD. In Antarctica, the resultant South Magnetic Pole position has moved about 8 km per year over the past 100 years (Figure 1). The Earth's total magnetic field strength also changes. Over the last two centuries the dipole strength has been decreasing at a rate of about 6 per cent per century. At this rate of decrease, the field would be negligible in about 1,600 years. However, the change varies with time and this strength is about average for the last 7,000, and the current rate of change is not unusual.

Averaged over periods of several thousand years, the North and South geomagnetic pole positions are

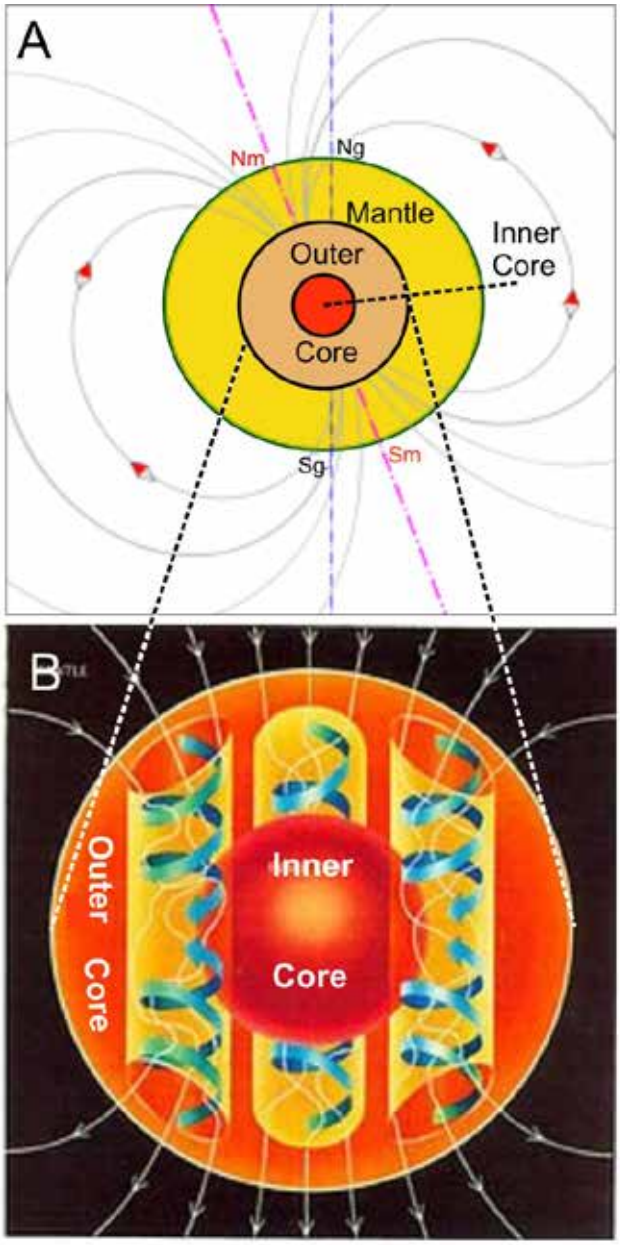

Figure 3A. Earth's magnetic field showing poles of rotation (Ng, Sg) and the inclined magnetic dipole poles (Nm, Sm) and dipole magnetic force lines. *Image from https://en.wikipedia.org/wiki/Earth%27s_magnetic_field#/media/File:Geomagnetisme.svg.*

Figure 3B. Schematic model of the circulation in the Earth's liquid iron alloy outer core due to convection, and the roll motion, or Coriolis forces, caused by the Earth's rotation (broad helical blue arrows). *Image from https://en.wikipedia.org/wiki/Earth%27s_magnetic_field#/media/File:Outer_core_convection_rolls.jpg.*

Figure 4. Early Chinese compass, 200 BC. *Image from https://commons.wikimedia.org/wiki/File:Model_Si_Nan_of_Han_Dynasty.jpg.*

located at or near the geographic poles, but their measured position at any particular geological time in the past suggests they can apparently wander widely. The geomagnetic field leaves a record in rocks of the direction and strength of the geomagnetic field when they were formed. Although this is of value to researchers in palaeomagnetism for calculating geomagnetic fields in the past, the apparent wander can also be used in studying the relative motions of continents. At irregular intervals averaging several hundred thousand years, the Earth's geomagnetic field also reverses and the North and South magnetic poles relatively abruptly switch position. Evidence for these geomagnetic reversals can be found in rocks such as basalts, and in sediment cores taken from the ocean floors, documenting the process of plate tectonics. Reversals occur nearly randomly in time, with intervals between reversals ranging from less than 0.1 million years to as much as 50 million years. The most recent geomagnetic reversal occurred about 780,000 years ago. As noted above, the intensity of the dipole also changes over time.

Detailed studies of the Earth's magnetic field with position and time are therefore essential and formed a large component of international scientific studies, such as during the International Polar Years, in which New Zealand has participated.

Sources

British Geological Survey. "Magnetic poles": http://www.geomag.bgs.ac.uk/education/poles.html. Accessed 7 October 2018.

Burrows, A. L., 1963. Location of the south magnetic pole, New Zealand Journal of Geology and Geophysics, 6:3, 454–464.

NOAA National Geophysical Data Center. " Wandering of the geomagnetic poles": https://www.ngdc.noaa.gov/geomag/GeomagneticPoles.shtml. Accessed 1 August 2018.

http://deeptow.whoi.edu/southpole.html. Accessed 29 June 2018.

Shackleton, E. 1910. *The Heart of the Antarctic*, Heinemann.

Wikipedia, "Earth's magnetic field". https://en.wikipedia.org/wiki/Earth%27s_magnetic_field. Accessed 31 July 2018.

Crucial Antarctic Oral History

Many members will recall the shock and sadness left by the impact of Air New Zealand flight TE 901 on the northern slopes of Mount Erebus. Media reports, books, and a Commission of Enquiry have extensively covered the event and its causes. The contribution of one key group has, however, been overlooked. This group comprised the Scott Base search and rescue team and additional surveyors and mountaineers, who were mobilised immediately after the discovery of the crash site. Their task was to build a helicopter pad, survey the site, and establish a grid for searchers. In addition, they had to establish a camp to house police and technical investigators, and a kitchen to feed up 25 people. Once the camp was established there was an ongoing need to ensure the health and safety of a recovery team made up of people with no mountain or Antarctic experience working on an exposed and heavily crevassed glacier.

The Society has contacted the nine surviving members of the initial search team and five individuals who were at Scott Base during this traumatic time, and has arranged to interview and record their experiences and memories. The project has been supported by a grant from the Lotteries Commission of $20,000 to cover two-thirds of the cost, provided that the Society can find the remaining third ($12,000).

Photo: Nigel Roberts.

Become a recognised supporter of the Mount Erebus Disaster Oral History Project 2018–20. The project needs the help of Society members and others to help raise this sum. The objective is to run the campaign for a short period only (until the end of February 2019) with the aim of raising a further $10,000, additional to a Canterbury Branch donation of $2,000. You are invited to join a group who would each contribute either $1,000+ (Platinum Contributor), $500 (Gold Contributor), $250 (Silver Contributor) or $125 (Bronze Contributor). All will be acknowledged in *Antarctic* magazine, unless a donor wishes to remain anonymous. The resulting resource will be of enormous value to future Antarctic and aviation historians, and to those interested in the social history of New Zealand.

We invite you to support this project by making a donation towards the cost. As the Society is a Registered Charity (CC27118), your donation is tax-deductible in New Zealand with up to 33% refunded by IRD. In the event that we receive more funds than our current programme requires, we intend to continue with related interviews. Donations may be made on our website from the Donations Tab – shown on every page on our website (please add a note in the "Other Information" box at checkout) – or by cheque directly to the Treasurer, New Zealand Antarctic Society, PO Box 404, Christchurch 8140.

Photo above: Associated Press.

See our website www.antarcticsociety.org.nz

Meet Your Council…

Emeritus Professor Peter Barrett – Patron (2008–)

Peter grew up on a Waikato dairy farm and in his teens took up caving in the Te Kuiti district. He went on to study the Te Kuiti Limestone for his master's thesis at Auckland University. By chance in 1962 he joined a US expedition to the Ellsworth Mountains. This led to a PhD at Ohio State University on the Gondwana strata of the Transantarctic Mountains, where he discovered the first tetrapod fossil in Antarctica, leading to the confirmation of the theory of plate tectonics.

Returning to New Zealand he was a geology lecturer and Director of the Antarctic Research Centre at Victoria University of Wellington (1972–2007). After joining the *Glomar Challenger* for the first Antarctic drilling, he went on to lead university expeditions and multinational offshore drilling for a history of Antarctic climate and ice sheet behaviour since its inception 34 million years ago.

He is fascinated with climate change on geological time scales and the view it gives us of Earth's future climate. This has led to his work with Simon Lamb and others to produce the award-winning feature documentary "Thin Ice – the Inside Story of Climate Science".

In 2006 Peter was inaugural recipient of the SCAR President's Medal for Outstanding Achievement in Antarctic Science, and became Patron of the New Zealand Antarctic Society in 2008. In 2011 he was elected an Honorary Fellow of the Geological Society, London.

Dr Linda Kestle – President (2017–), Auckland Branch Chair (2012–)

Linda has been an active member of the Society since 2000 after her first visit to Antarctica. She was a member of the inaugural University of Canterbury Graduate Certificate course, which included camping out by White Island for a week in 1999. She completed her PhD at the University of Canterbury on Antarctic project management in 2009.

In 2011–12 Linda was selected as one of the two people to be on the Antarctica New Zealand–NZAS volunteer programme, with five weeks scraping, sanding, and repainting Scott Base windows. She enjoyed discovering and being a part of Scott Base life and the community there.

She then became Auckland Branch Chair (2012–) and in 2014 North Island Vice-President. She continues to be passionate about all things Antarctic, whether scientific, sociological, educational, getting others enthused, or simply being an ambassador for Antarctica. Her professional background is in Construction Project Management and Architecture consultancy practice, research, and academia based at UNITEC, Auckland.

Gigi Green – Secretary (2017–)

Gigi has been a member of the Society since 2014, and has recently joined the National Council as National Secretary. She is passionate about the Antarctic and in particular advocating on behalf of protecting and preserving its environment, its ecosystems, and especially its wildlife.

Gigi is yet to visit this remote and uninhabited continent, but looks forward to participating in activities to ensure the preservation of this magnificent place for future generations. Her professional background is primarily in financial services, and she is currently working as an Internal Audit and Risk Manager.

Pantelis Roussakis – Treasurer (2018–)

I've always had a fascination with Antarctica. A handful of friends and colleagues have travelled to "the Ice" over the years. I've held chunks of Antarctic bedrock in my hands and yearned to go. In life I've been fortunate enough to have experienced other pristine environments on Earth and attempted to live sustainably because of it. Given the opportunity I think others would too.

Fine Arts, Cinema, TV and Advertising is my pedigree. I moved from Melbourne to Auckland in mid-2017 for work. A colleague introduced me to Gigi in late July this year. I subsequently joined the Society and feel that I could be of some service. I've held a variety of roles in volunteer

and community organisations since the early 80s. As Treasurer I'll try to be fair and proactive about finding future funding and revenue streams for the Society.

Nicholas O'Flaherty – North Island Vice-President (2018–)

Nicholas O'Flaherty is a communications professional, having run his own public relations business in Auckland for the last 20 years. He has a passionate interest in Antarctica. In 2014 Nicholas managed the public outreach for the biennial conference of the Scientific Committee on Antarctic Research, held in Auckland that year. He has since presented at SCAR conferences in Malaysia and Switzerland.

In 2016 he launched an online news and information site, The Antarctic Report, which is dedicated to all things on Antarctica and the Southern Ocean. In particular, the site showcases the hard science which underlines the importance of Antarctica as a bellwether of global climate change. Nicholas partnered with the Royal Society of New Zealand and AUT university to hold a high-level conference in 2016 on the impact of sea-level rise in New Zealand, featuring a number of New Zealand scientists with an interest in Antarctica.

Nicholas has participated in two Winter Schools organised by Antarctica New Zealand, and is one of the organisers of the Auckland Antarctic Science Meet Up, a series of free monthly presentations for the public, which was founded by Stuart Grayson.

Bill Nye – South Island Vice-President (2018–)

Reading and collecting books within the literature of adventure led to a fascination with the Historic Age of Antarctic and polar exploration. Following an eventful career as a Fluids Engineer working on all seven continents, I started up a bookshop in Christchurch. Timing didn't work out, as the shop was destroyed in the February 2011 earthquake. Since then I've been operating in Oamaru the only Antarctic and Mountaineering specialist bookshop in New Zealand.

The highlight of my career was working as Fluids Engineer for both ANDRILL seasons in Antarctica: 2006–7, and 2007–8. It was a co-operative project and I loved the Antarctic experience. Like many who return from the Ice I've tried to be an ambassador for the continent, and have sponsored many lectures at the bookshop. So I'm interested in contributing to public awareness of science news and environmental causes from an Antarctic perspective, especially through the Society's excellent journal, *Antarctic*. Through the bookshop I find it fulfilling to be a venue for Antarctic talks, and in helping distribute information and knowledge about Antarctica.

Shirley Russ – Canterbury Branch Chair (2017–)

Hidden in Antarctica are the stepping stones to the life we currently have. Each person who lands on the continent returns changed. For me this change presents as a passion which has grown for over 30 years from voyages south to the Ross Sea, Commonwealth Bay, and the Antarctic Peninsula. Based in Christchurch, New Zealand's gateway city to Antarctica, I am privileged to be a part of the diverse Antarctic community and welcome you to join us for Antarctic events through the Antarctic Society. How we tell the Antarctic stories and science of today and the past will be our future for the understanding of the continent and its surrounding Southern Ocean.

Dr Robin Falconer – Wellington Branch Chair (2015–)

Robin is a semi-retired/independent consultant in marine geophysics. He first went south in 1965 on the HMNZS *Endeavour* to gather geophysical data to document sea-floor spreading patterns between New Zealand and Antarctica for his pioneering PhD (1974) with Prof. Christoffel at Victoria University. Since then he has worked internationally as a marine geophysicist in a variety of research and commercial projects, leading to positions in science management for GNS Science from 1995 to 2008. Since then he has been a reviewer of research proposals for CRIs and the New Zealand Government and a consultant for offshore mineral exploration, and he is currently a member of the Guiding Committee of GEBCO (General Bathymetric Chart of the Oceans).

Inhospitable Coasts: the Balleny Islands

By David L. Harrowfield

This is Part II of the article. Part I was included in our June 2018 issue. References for both Parts I and II are included here.

Scientific expeditions with landings

USARP Expedition 1959

On 26 February 1959 the icebreaker USS *Staten Island* AGB4, after visiting Cape Adare, arrived at Sturge Island. An ocean station was established and the islands were photographed from helicopters. The ship then headed along the west coast of Sturge Island to the south coast of Buckle Island.

On the 27th about eight were landed by helicopter on the spit at Sabrina Island, and Sir Raymond Priestley, veteran geologist of Shackleton's 1907–9 and Scott's 1910–3 expeditions reported: "[We] ranged over the beach and collected as many varieties of the tuff as I could find and a little more assorted lava. We must have brought out several hundred weight of rock".[22] The *Staten Island* then headed along the east coast of Buckle Island to the north-east corner, where on 28 January three Adélie penguin colonies were investigated, a census done, photographs taken, and further rocks collected.

Here, according to Don Thompson, who landed with a second New Zealander, Murray Robb, "the place was unsuitable for a camp and totally unsuitable for a base".[23] The landing from an LCM (landing craft mechanised) took place on the shingle beach, and about 12 went ashore. In the process, the vessel was caught between two large blocks of ice, a side was stoved in and the propeller badly damaged. Rainer Goldsmith, formerly medical officer with the Commonwealth Trans-Antarctic Expedition support party 1955–7, observed: "in the heavy swell, the whole operation nearly came to grief [when] the rocks that litter the shore-line, just below the water, all but tore the bottom out of the boat without incurring a considerable risk".[24]

A trawl resulted in a good collection of brittle stars, an echinoderm, and some brachiopods. The ship departed later that day and New Zealand now planned for an expedition in 1965.

New Zealand Reconnaissance 1963–4

Now with access to extensive aerial photographs, on 8–10 March 1964 a preliminary expedition, arranged courtesy of the United States Navy and National Science Foundation, had the following objectives:

- To assess operational and scientific desirability of mounting in a subsequent season, an extended expedition to these islands for a period of up to two months for geological, zoological, biological and oceanographic studies and oceanographic surveys
- To obtain as much scientific data as possible during the course of the reconnaissance so that should a subsequent expedition prove impracticable, the maximum scientific value is derived from the operation.[25]

Quartermain, Information Officer for the Antarctic Division of the DSIR, considered "the reasons for an expedition … are chiefly concerned with their geographical position. The islands are more Antarctic than sub-Antarctic, but are likely to have a biological significance which reflects their continental and sub-Antarctic zones".[26]

The expedition was led by Scott Base IGY Leader, Trevor Hatherton (Geophysics Division, DSIR). Other participants were Fred C. Kinsky and T. L. Riggert (biologists, Dominion Museum; now Te Papa Tongarewa), Elliot W. Dawson and R. J. Singleton (oceanographers, New Zealand Oceanographic Research Institute), and George Mannering (photographer).

A landing by helicopter from the icebreaker USS *Glacier* AGB5 took place on the c200 yard [c183 m] spit at Borradaile Island, where 12 seals, including one elephant seal, were seen, a macaroni penguin was observed, the two species of skua were recorded, and further rocks were collected. A landing was also made on Sabrina and Sturge islands, where collections

included algae, lichen, moss, and rocks. In all, about 10 landed on Sturge, Borradaile, and Sabrina. Offshore, five oceanographic stations included dredging, trawling, soundings, and sampling. Birds were sampled using the ship searchlights, when they were blinded and fell into the sea or on the ship's decks. Gravity and total magnetic force observations were made on the beaches of Sabrina and Borradaile islands.

On return the reconnaissance party made it clear that any "extended occupation of a land station, would be difficult, hazardous and of little value".[27] Although, about Sabrina Island, Hatherton, Dawson, and Kinsky suggested "the slopes above the beach do have possibilities as a camp site", and decided the only suitable base site was on a saddle. However, they also maintained:

> *The utter impregnability of the islands, the access to, and along, beaches preclude the extended land studies, of flora, fauna and geology that were at first envisaged. At no time has the putting of camps on the ice caps been considered, because of their many crevasses and the virtual impossibility of making descents from ice cap to shore level.*[28]

The following season as part of a broader survey of Ross Sea islands, a Joint New Zealand–United States programme involved 13 New Zealand scientists and eight American scientists, led by Elliot Dawson.

Joint NZ–US Expedition 1964–5

Landings during 28 January–17 February 1965 were made by helicopter, from USS *Glacier* (Commander Vie Vaughan USN). The first was on Sturge Island, never previously landed on and mid-way along the west coast. Surveyor Malcolm Ford (New Zealand Department of Lands and Survey) report that, with the helicopter wheels precariously balanced on rocks below a sheer rock cliff, "I slipped out and grabbed a few specimens, taking no more than 20 seconds altogether" .[29]

That evening, between snow showers, photographer Frank O'Leary and biologist Chris Robertson (both of the Dominion Museum) flew to the southern extremity of the island. With the helicopter hovering above "as a precautionary measure against snow showers", two harness and winch landings were made, by geologist Barry Waterhouse (New Zealand Geological Survey),[30] near an ice tongue and on a small islet east of Cape Smyth on Sturge Island, linked by a shingle tombolo. Six in total landed on Sturge Island.

On 3 February three parties were landed by helicopter on a wind-swept saddle at 320 feet (97.5 m), near the southern end of Sabrina Island. At the suggestion by the previous expedition, camp was set up by Malcolm Ford and Maurice Sheehan on the saddle, with a high cliff on one side and an ice cornice along the other.

Crampons and step-cutting were needed to access the beach below. By evening, a storm with wind recorded on the ship as gusting to 90 knots (167 km/hr) destroyed the polar tent anchored with a climbing rope and "rocks from the cowering penguins to strengthen [the] defences".[31] The tent was collapsed, and it was impossible to make a hot drink. Two days later, having had biscuits and a drink from two tins of preserved figs, the party was collected. The outcome could have been far worse. They had made, however, a successful observation for longitude, and the party had, along with observations of wildlife, compiled a valuable record of species.

The collecting parties were then landed on Borradaile Island spit, where "a fine collection of algae, birds and an unusual marble specimen was made".[32] Numerous whales were seen, as well as a Russian whaling fleet, with 13 catchers and the factory ship, *Sovetskaya Ukraina*.

On 17 February a rendezvous between USS *Glacier* and HMNZS *Endeavour* "in difficult seas"[33] with a 20 knot (37 km/hr) south-easterly, took place between Young and Buckle Islands. With an LCVP (landing craft vehicle personnel) from *Glacier*, eight American scientists and two USN ratings were conveyed to *Endeavour*, which Commander Peter Silk considered "was handled well, but the civilian passengers were rather white-faced as occasionally the boat would rise on a crest above the guardrails and threaten to come inboard before dropping back with a sickening lurch".[34]

The *Endeavour* transferred mail and departed next day for Ross Island. The *Glacier* then carried out a survey of the Macquarie Ridge and continued to Macquarie Island then Lyttelton, where it docked on 5 March. The expedition had been very successful and returned with collections and survey data.

Australian Oceanic Research Foundation Antarctic Expedition 1978

Englishman David Lewis, who had been raised in New Zealand, used for his private expedition a 17 m yacht. The *Solo* then became the first such vessel recorded as visiting the Ballenys for the purpose of science. Lewis, already an experienced Antarctic yachtsman, had a specialist team of seven, which included two scientists, Peter Ariens and Peter Donaldson. He wrote: "It took an effort of will, in a field so dominated by the big

battalions, to hold to the belief that independents, operating on a small budget to conduct low-key research, had any part to play".[35]

On 13 January 1978, landings were made on a four-metre-high shingle tombolo, south of Cape Smyth on Sturge Island. Geological specimens were collected for magnetic properties, including average values for direct intensity and magnetic susceptibility.

In addition to geological samples, benthic organisms were obtained by dredging, and on the 15th further landings were made on the beach at Sabrina Island. Rock specimens for magnetic analyses and soil samples were collected, and counts of penguins and seals were made. Offshore, sediment samples were collected.[36]

This was the first landing by sea on Sturge Island, with six people including New Zealander Dot Smith who wrote:

> *I had a certain amount of trouble landing. Had to jump onto a small ice floe, which began to surge in and out to sea with me on board … However under their insistence, I did jump into quite deep water so that I was wet and my camera full.*[37]

United States Antarctic Program Expedition 1986–9

The USAP returned over two seasons in 1986–7 and 1988–9, when, from an icebreaker, an AWS (automatic weather station) from the University of Wisconsin-Madison's Antarctic Meteorology Unit Research Centre was installed at an elevation of 760 m at 66° 49.59' S, 163° 11.59' E on Buckle Island. Data would be transmitted three hourly and each 10 minutes for a variety of research purposes.

During the New Zealand Antarctic Programme in 1992–3, biologist Peter Carey (University of Canterbury) hoped to lead a team, which would be put in by helicopter from a US icebreaker and camp for two weeks in January on Sabrina Island. A comprehensive science programme, including the diet of penguins and petrels, was approved. However, in spite of considerable preparation, owing to logistic support problems the programme did not proceed.[38]

RV *Tiama* Antarctic Expedition 2006

Early surveys around the islands in 2001 and 2004 had already focused on deep-water research and laid the foundations for a Balleny Islands marine protection proposal. Now a new scientific party, supported by the New Zealand Ministry for Primary Industries (MPI) Fisheries Biodiversity Programme and the New Zealand Department of Conservation, arrived in February 2006, on the 15 m yacht RV *Tiama*, skippered by the competent Henk Haazen.

The expedition prior to a Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) meeting including, with shore landings, counts of sea birds, seals and whales, and to obtain further bathymetric data, was intended to complement previous work by NIWA.

The experienced team included Nick Shears (diver and videographer), Rebecca McLeod (marine ecologist), Clinton Andrews (geologist, surveyor, and mountaineer), Mike Delamore (first mate), Steve Parsons (second mate), and Henk Haazen (skipper). They arrived at the Ballenys on 14 February and remained for 10 days, mindful that if marooned ashore rescue would be difficult.

Landings on, and circumnavigations of, Borradaile, Sabrina, and Sturge islands were made, and, for the first time, diving was undertaken to collect and record benthic organisms. In contrast to "a wild mass of black and white" on land, ecologist Rebecca McLeod found "a world of intense colour" with a mass of sponges, tunicates (sea squirts), cushion stars, pycnogonids (sea spiders) and undescribed corals, anemones, polychaetes (bristle worms), and bryozoan lace corals, which she described as a "biological treasure trove", along with a variety of seaweeds.

The work entailed cataloguing and photographing, at 10–80 m, shallow benthic communities across a range of habitats "that would later lead to better understanding the dynamics of the area's food web and its impact on the wider ecosystem".[39]

Geological and algal specimens were also collected, nesting petrels were observed on most headlands, and previously recorded penguin colonies were visited. On Sabrina Island a significant increase in chinstrap penguins was recorded, with 203 more adults and 109 more chicks since 2000 noted.[40] In addition, a new chinstrap colony, with 26 adults and 18 chicks, was found on Cape McNab on the south-east of Buckle Island, and biopsies and photos were obtained of humpback whales for identification. A valuable monograph was subsequently published.[41]

Swiss Antarctic Circumnavigation Expedition (ACE) 2016–7

The Swiss Polar Institute (EPEL) expedition headed by David Walton attracted scientists from six countries, with 22 projects. Using the RV *Akademik*

Treshnikov, the focus was on the marine, terrestrial, and atmospheric environments, from which 20,000 samples were obtained.

At the Ballenys, where two days were spent, three landings were achieved. On 4 February 2017, five landed from two Zodiacs on a beach on the north-east coast of Young Island. This was possible as the beach was protected from surf by a wide band of brash ice. A first-ever landing was then done on 60° steep rock on a small island shown on the chart as a "pillar" south-east of the beach.[42]

The following day, 12, including an experienced ice team with guides and the pilots from two helicopters, landed on the ice cap of Borradaile Island. Because the glaciologists considered the altitude too low for a satisfactory ice core, the team relocated to a glacier on Young Island, where about 20 people landed during snow flurries. An impinger was used to sample aerosols, coordinated by Elizabeth Thomas, principal investigator of the glaciology project; ice coring was done by Frederick Paulson.

In addition to glaciology, trawling was undertaken to sample invertebrates, water, and micro-plastics, and an aerial survey of the islands with aerial photographs was taken and GPS coordinates, maps, and the first 3-D models of the islands will be made.

For education and adventure

For over 50 years, fare-paying guests from around the world on ships, all anxious to extend their knowledge on the human and natural history of sub-Antarctic islands, the Southern Ocean, and Antarctica, have occasionally seen the Balleny Islands. It is important to note that, for most visits, landings have not been possible or considered, with reasons including the presence of ice, the state of the sea, and adverse weather.

The hardship associated with voyages by early sailing ships, the romantic wild grandeur of the rugged, glaciated and mostly black and white landscapes, along with superb viewing of wildlife, including whales, seals, penguins, and numerous species of petrels and other flying birds, make the Ballenys a special place.

The first such visits were made by Lars Eric Lindblad with the Lauritsen Lines MV *Magga Dan*, in 1968 and 1971. These were followed in 1973 by the *Lindlad Explorer* (later renamed *Explorer*). After a break of six years, visits resumed in 1979–80, with, this time, in addition to the *Lindblad Explorer*, the *World Discoverer* and Captain Heine Aye. Both ships returned in 1980–1 and again in 1983–4.

Visits took place with Sea Quest Cruises MV *Frontier Spirit* (now MV *Bremen*) in 1992–3, and, the same season, Quark Expeditions with the icebreaker IB *Kapitan Khlebnikov* also visited the Ross Sea region. Next season the *KK*, as it was affectionately known, landed by helicopter about 80 passengers on Sturge Island, and the following season around the same number again were landed on the island from the *KK*.[43] The following season, a further two vessels visited, including the *Akademik Shokalskiy* of Southern Heritage Expeditions (now Heritage Expeditions), which had visited the Ross Sea.

Interest in the islands was steadily increasing with two visits in 2003–4, when 51 landed. The following season during a further visit by the *KK*, 91 landed (again on Sturge Island), and in 2005–6 three landed by Zodiac on Borradaile Island from the *Spirit of Enderby* (*Professor Kromov*).

Since then, indefatigable Canadian ornithologist Adam Walleyn from the *Spirit of Enderby* in 2014 became the first recorded solitary landing. And the same season, IAATO recorded a further 10, possibly on Sturge Island, from the *Arctic Pioneer*.

In the following four seasons, during visits by the *Spirit of Enderby* and *Akademik Shokalskiy*, Zodiac cruising has taken place in February 2014 and 2018, off the south-west end of Buckle and Sabrina Islands. With occasionally less ice around the islands, it has been possible for visitors to observe and study wildlife, including orca, seals, penguins, and flying birds, and at a closer distance than previously. In 2017 the large, private, 196 m residential yacht with 165 residences, *The World,* following a Ross Sea cruise, passed the islands on 15 January. Geologist Margaret Bradshaw recalled "the ship took all night and more to sail past them, from just beginning to pass Young Island as the sun went down to only being as far as Sturge Island by dawn … I was very impressed with the height of the islands and the steepness of the slopes, as well as the massive snow and ice cover … These volcanoes are big!"[44]

The most recent landing, in rare excellent conditions with a light swell, occurred early in the day on Borradaile Island on 25 January 2018, from the *Akademik Shokalskiy*. This was perhaps the ninth time for a landing on the island and comprised fewer than 100 persons.

As the sun rose over Young Island to the north and with the ship only 700 m north of the Antarctic Circle, 52 guests and expedition staff alighted from Zodiacs, on the west side of the Borradaile Island spit. It was a still, brisk

Photo above: 2017 *Spirit of Enderby* Scholars Ellen Rykers (Dunedin) (L) and Lucy Arrowsmith (Melbourne), on the shingle spit, Borradaile Island, January 2018. *Photo: David L. Harrowfield.*

and pristine morning of -2 °C. Using a marked route, 31 Weddell seals, an Adélie penguin, and a chinstrap penguin were enjoyed, and the rare landing experience was savoured for an hour. A group photograph was taken by Samuel Blanc and photographs and descriptive information relating to the geomorphology of the spit were obtained by the author. Biosecurity measures were carefully adhered to. However, finding a large plastic container was unexpected and disappointing.

For those on the *Spirit of Enderby,* when approaching Sturge Island off the starboard bow under a "clear starlit sky", at 1.30 a.m. on 1 February 2018, a unique experience was enjoyed. Antarctic historian and guest Bill Alp recalled:

> *There was an early morning glow reflected from the snow and glaciers of Sturge Island. The sky was navy blue and the water was a murky black. It really was quite wonderful, even when viewed as a simple landscape. The lunar eclipse bought a whole new dynamic to the scene [and] it was all over in just a few minutes, as the moon disappeared behind the summit of Sturge Island.*[45]

Today, there is the advantage of generally accurate wind forecasting, satellite imagery for ice, modern communications, and, when conditions are good, also having efficient means for access. However, extreme caution is required in some areas, where unchartered waters conceal dangerous rock pinnacles.

A marine and islands sanctuary

Sabrina Island and the smaller adjoining, Sabrina Islet, were in 1966 designated SPA (Specially Protected Areas),[46] within the Antarctic Treaty System. They have since been re-designated in 2002, ASPA (Antarctic Specially Protected Area) 104, and are currently subject to a Management Plan (2015). Landing may be undertaken only by permit.

The Balleny Islands have assumed new significance. The islands and surrounding ocean were key elements in the New Zealand case for a United States–New Zealand submission to CCAMLR in 1999–2000. This case was made on the basis of presumed ecological significance in the Southern Ocean ecosystem and the potential for the region as a breeding area for tooth fish; but it also took into account the greatest biodiversity for any locality in the Ross Sea region, including seven species of birds.

On 1 December 2017, a new General Protection Zone for the Balleny Islands and adjacent seamounts was adopted by governments represented on CCAMLR, as part of the Marine Protected Area for the Ross Sea. There is a 10 nm (18.5 km) Exclusion Zone around the islands, and for New Zealand vessels this zone extends to 50 nm (92.6 km).[47]

In addition to numerous sightings, an estimated 35 landings have taken place up to February 2018. Shown below are totals, from north to south, for known expedition landings, together with estimates for individuals (a total of 529), along with when the first landing was made and by which nation.

Since 1949, there have been only 12 landings by scientific parties, including France in 1949, for observations, undertaking surveys, collecting, and to install equipment.

From the expeditions listed, there have been at least 48 marine surveys, including eight for science with four by NIWA; four ground surveys; five aerial surveys; 24 (and likely more) for education and adventure travel; 11 (and likely more) for sealing, whaling, and fishing.

As shown above and in particular for Sturge Island, landings by sea and air for education and adventure make up most persons who have landed (315) and comprise 59.55% of the total 529 recorded as landing. Of the few scientific parties when extensive collection and observations have been made, only one has camped on shore and two have lived on yachts.

With no human habitation and, occasionally, conditions whereby the islands are often partly or completely obscured, the region has a mysterious aura. In perfect weather one can see dramatic glacial geomorphology in action, with new landforms such as cirques and arêtes, being carved by ice, which enshrouds most rock surfaces. There is, however, further scope for science, including glaciology, for which little work has been done; the last being in 2017.

The few expeditions to the Ballenys have added greatly to our knowledge of these comparatively little known islands, and it is hoped the above will be a useful reference. The author accepts that this is not necessarily a complete and accurate record.

Location	Landings	People Landed	Comment	Date	Country
Buckle Island	5	24	First landing – for all the islands	1839	Britain
Borradaile Island	8	78	First landing – during ANARE	1948	Australia
Sabrina Island, Sabrina Islet, and The Monolith	7	30	First landing – during Expéditions Polaires Françaises	1949	France
Young Island	4	50	First landing – during whaling voyage	1958	USSR
Sturge Island	9	341	First landing – by helicopter First landing – by sea	1965 1978	New Zealand, US, Australia
Island off Cape Smyth – Sturge Island	1	1	By helicopter	1965	New Zealand
Island north-east end of Young Island	1	5	First landing – by sea	2017	Switzerland
	35	**529**			

Table 1. Recorded landings at the Balleny Islands

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References

1 Headland, R. K. A *Chronology of Antarctic Expeditions*. London: Quaritch, 2009.
2 Quartermain, L. B. *The Balleny Islands. A descriptive and historical outline*. Wellington: Department of Scientific and Industrial Research, 1963 and revised 1964.
3 Bradshaw, M. A. personal communication 5, 6 April 2018.
4 Johnson, G. Leonard, Kyle, P. R., Nanney, J. R. and Campsie, J. "Geology of Scott and Balleny Islands, Ross Sea, Antarctica, and morphology of adjacent seafloor." *New Zealand Journal of Geology and Geophysics* 25 (1982): 427-436. Page 432.
5 Simonsen, J. LINZ Data Service personal communication 5 March 2018. Most recent chart is LINZ Chart NZ 14912 Balleny Islands Scale: 1:1,250,000.
6 Quartermain, L.B. *New Zealand and the Antarctic*. Wellington: Government Printer, 1971. Page 40.
7 Templeton, M. *A Wise Adventure*. Wellington: Victoria University Press, 2000. Page 90.
8 McNab, J. Diary 9 February 1839. London: Royal Geographic Society. In Quartermain, 1964. Page 6.
9 Jones, A. G. E. 1984. "Captain John Balleny and the Balleny Islands 1839." In *FRAM: the Journal of Polar Studies*. 1:2 (1984): 497–504.
10 Jones, A. G. E. 1984. "Captain John Balleny and the Balleny Islands 1839." In *FRAM: the Journal of Polar Studies*. 1:2 (1984): 501.
11 Jones, A. G. E. "New light on John Balleny." In *Polar Portraits*. Caedmon of Whitby, 1992. Page 69.
12 Bernacchi, L. C. Diary 12 January 1899. In *That First Antarctic Winter*. Janet Crawford. Christchurch: South Latitude Research Ltd, 1998. Page 74.
13 Stenhouse, J. R. Ships Log SY *Aurora* Volume 4.22 September 1915. Cambridge: Scott Polar Research Institute. MS 1590/5/4; D.
14 Bernacchi. Ibid, page 74.
15 Quartermain, 1964. Page 19.
16 Harper, P. personal communication 27 March 2018.
17 Headland, R. K. *A Chronology of Antarctic Expeditions*. London: Quaritch, 2009.
18 Campbell, S. Diary 29 February 1948. In Quartermain, 1964. Pages 14–16.
19 Dubard, M. and Bayle, L. M. In Quartermain, 1964. Page 17.
20 Quartermain, L. B. *The Balleny Islands. A descriptive and historical outline*. Wellington: Department of Scientific and Industrial Research, 1963 and revised 1964.
21 Quartermain, L. B. The Balleny Islands. A descriptive and historical outline. Wellington: Department of Scientific and Industrial Research, 1963 and revised 1964.
22 Priestley, R. In Quartermain, 1964. Page 24.
23 Thompson D. In *Antarctic* March 1964 Vol. 3, No. 9. Page 383.
24 Goldsmith, R. In Quartermain, 1964. Page 26.
25 Interim report of the Balleny Islands Reconnaissance Expedition 1964 RDRC 265 14 April 1964.
26 *Antarctic* March 1965 Vol. 4 No. 2. Page 75.
27 Quartermain, 1971. Page 236.
28 Hatherton, T., Dawson, E. W., Kinsky, F. C. "Balleny Islands Reconnaissance Expedition 1964." *New Zealand Journal of Geology and Geophysics* 8 (1964): 164–179. Page 168.
29 *Antarctic* March 1965 Vol.4 No. 1. Page 11.
30 Waterhouse, B. and Nemec, S. *Antarctic Adventure*. New Zealand: First Edition Publishers, 2012. Page 102.
31 Quartermain, 1971. Page 236.
32 *Antarctic* March 1965 Vol. 4 No. 1. Page 11.
33 *Antarctic* June 1965. Vol. 4 No. 2. Page 74. With Borradaile Island between Young and Buckle Islands and largely uncharted, and with dangerous conditions in the vicinity, the transfer was probably made south of Borradaile Island and some distance offshore.
34 Silk, P. R. H. Commander RNZN. Report of the Proceedings for February dated 10 March 1965. Devonport: National Museum of the Royal New Zealand Navy. File 2/4. Page 17.
35 Lewis, D. *Voyage to the Ice. The Antarctic Expedition of Solo*. Sydney: Australian Broadcasting Commission and William Collins, 1978. Page 18.
36 Oceanic Research Foundation Ltd. Unpublished Preliminary Report 1977–78 Antarctic Research Expedition in yacht *Solo*. Pages 1–3. Author archive, Oamaru, New Zealand.
37 Lewis, D. 1978. Ibid, pages 62–63.
38 Carey, P. personal communication 25 February 2018.
39 Biswell, S. F. "Balleny Islands; End of the Line." *New Zealand Geographic* 84 (2007): March–April.
40 Smith, F. "Beyond the Furious Fifties." *Forest and Bird Magazine*, February 2007. Page 4.
41 Nelson, W., Cumming, V., D'Archino, R., Halliday, J., Marriott, P., Neill, K. "Macroalgae and benthic biodiversity of the Balleny Islands." *New Zealand Aquatic Environment and Biodiversity Report No. 55*. Wellington. Ministry of Fisheries, 2010. Page 99.
42 de Marliave, C. personal communication 28 March, 4 April 2018.
43 Headland, R. K. personal communication 2 June 2017.
44 Bradshaw, M. A. personal communication 5 April 2018.
45 Alp, W. personal communication 26 March 2018.
46 Simonsen, J. LINZ Data Service personal communication 5 March 2018.
47 Waterhouse, E. J. Ed. *A State of the Environment Report for the Ross Sea Region of Antarctica*. Christchurch: New Zealand Antarctic Institute, 2001. Pages 3.43, 5.30.

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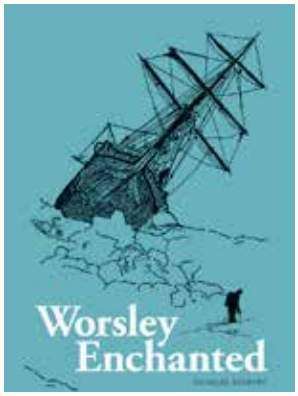

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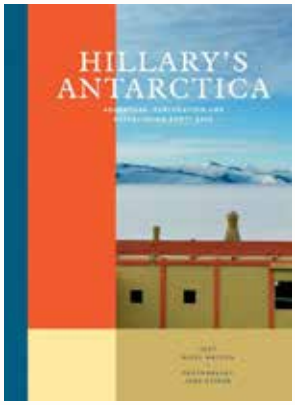

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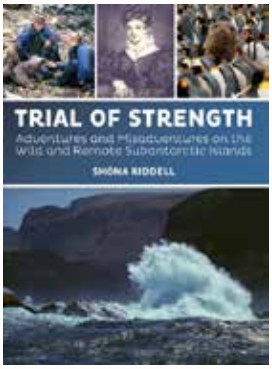

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