The Antarctic Treaty

Measures adopted at
the Forty-sixth Consultative Meeting

Kochi, 20 – 30 May 2024

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MEASURES ADOPTED AT THE FORTY-SIXTH ANTARCTIC TREATY CONSULTATIVE MEETING

Kochi, India 20 - 30 May 2024

The Measures[1] adopted at the Forty-sixth Antarctic Treaty Consultative Meeting are reproduced below from the Final Report of the Meeting.

In accordance with Article IX, paragraph 4, of the Antarctic Treaty, the Measures adopted at Consultative Meetings become effective upon approval by all Contracting Parties whose representatives were entitled to participate in the meeting at which they were adopted (i.e. all the Consultative Parties). The full text of the Final Report of the Meeting, including the Decisions and Resolutions adopted at that Meeting and colour copies of the maps found in this command paper, is available on the website of the Antarctic Treaty Secretariat at www.ats.aq.

The approval procedures set out in Article 6 (1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty[2] apply to Measures 1 to 17 (2024).

The approval procedures set out in Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty apply to Measure 18 (2024).

Measures Adopted at the XLVI Consultative Meeting held at Kochi, India 20 - 30 May 2024

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[1] As defined in Decision 1 (1995), published in Miscellaneous No. 28 (1996) Cm 3483
[2] Treaty Series No. 15 (2006) Cm 6855
The texts of the Antarctic Treaty together with the texts of the Recommendations of the first three Consultative Meetings (Canberra 1961, Buenos Aires 1962 and Brussels 1964) have been published in Treaty Series No. 97 (1961) Cmnd. 1535 and Miscellaneous No. 23 (1965) Cmnd. 2822. The text of the Environmental Protocol to the Antarctic Treaty has been published in Treaty Series No. 6 (1999) Cm 4256. The text of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty has been published in Treaty Series No. 15 (2006) Cm 6855.

The Recommendations of the Fourth to Eighteenth Consultative Meetings, the Reports of the First to Sixth Special Consultative Meetings and the Measures adopted at the Nineteenth and the Measures adopted at the Twenty-sixth, Twenty-seventh, Twenty-eighth, Twenty-ninth, Thirtieth, Thirty-first, Thirty-second, Thirty-third, Thirty-fourth, Thirty-fifth, Thirty-sixth, Thirty-seventh, Thirty-eighth, Thirty-ninth, Fortieth, Forty-first, Forty-second, Forty-third, Forty-fourth and Forty-fifth Consultative Meetings were also published as Command Papers. No Command Papers were published for the Twentieth to Twenty-fifth Consultative Meetings.

Measure 1 (2024)

Antarctic Specially Protected Area No 116 (New College Valley, Caughley Beach, Cape Bird, Ross Island): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XIII-8 (1985), which designated Caughley Beach as Site of Special Scientific Interest ("SSSI") No 10 and annexed a Management Plan for the Site;
- Recommendation XIII-12 (1985), which designated New College Valley as Specially Protected Area ("SPA") No 20;
- Recommendation XVI-7 (1991), which extended the expiry date of SSSI 10;
- Recommendation XVII-2 (1992), which annexed a Management Plan for SPA 20;
- Measure 1 (2000), which expanded SPA 20 to incorporate Caughley Beach, annexed a revised Management Plan for the Area, and provided that thereupon SSSI 10 shall cease to exist;
- Decision 1 (2002), which renamed and renumbered SPA 20 as ASPA 116;
- Measures 1 (2006), 1 (2011) and 1 (2016), which adopted revised Management Plans for ASPA 116;

Recalling that Recommendation XIII-8 (1985) was designated as no longer current by Measure 13 (2014);

Recalling that Recommendation XIII-12 (1985) was designated as no longer current by Decision 1 (2011);

Recalling that Recommendation XVI-7 (1991) did not become effective and was designated as no longer current by Decision 1 (2011);

Recalling that Recommendation XVII-2 (1992) did not become effective and was withdrawn by Measure 1 (2010);

Recalling that Measure 1 (2000) did not become effective and was withdrawn by Decision 3 (2017);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 116;

Desiring to replace the existing Management Plan for ASPA 116 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 116 (New College Valley, Caughley Beach, Cape Bird, Ross Island), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 116 annexed to Measure 1 (2016) be revoked.

Management Plan for Antarctic Specially Protected Area No 116

NEW COLLEGE VALLEY, CAUGHLEY BEACH, CAPE BIRD, ROSS ISLAND

1. Description of values to be protected

An area at Cape Bird, Ross Island was originally designated as Site of Special Scientific Interest (SSSI) No 10, Caughley Beach by Recommendations XIII-8 (1985) and Specially Protected Area (SPA) No 20, New College Valley by Recommendation XIII-12 (1985) after proposals by New Zealand on the grounds that the area contains some of the richest stands of moss and associated microflora and fauna in the Ross Sea region of Antarctica. This is the only area on Ross Island where protection is specifically given to plant assemblages and associated ecosystems.

SPA No 20 was originally enclosed within SSSI No 10 in order to provide more stringent access conditions to this part of the Area. SSSI No 10 was incorporated into SPA No 20 by Measure 1 (2000), with the former Area of SPA No 20 becoming a Restricted Zone within the SPA. The boundaries of the Area were revised from the boundaries in the original recommendations, in view of improved mapping and to follow more closely the ridges enclosing the catchment of New College Valley. Caughley Beach itself was adjacent to, but never a part of, the original Area, and for this reason the entire Area was renamed as New College Valley, which was within both of the original sites. The Area was redesignated by Decision 1 (2002) as Antarctic Specially Protected Area (ASPA) No 116 and a revised Management Plan was adopted through Measure 1 (2006), Measure 1 (2011) and Measure 1 (2016).

The boundaries of the Area closely follow the ridges enclosing the catchment of New College Valley and cover approximately 0.33 km². Moss in this Area is restricted to localised areas of water-flushed ground, with cushions and carpets up to 20 m² in area. A diverse range of algal species also inhabit streams in the Area, and springtails, mites and nematodes are plentiful on water surfaces and underneath rocks. The Area was previously characterised by an absence of lichens, making the species assemblage in this Area unique on Ross Island. More recently, in 2023, a low abundance of lichen encrustations on moribund moss has been noted.

The susceptibility of mosses to disturbance by trampling, sampling, pollution or introductions of non-native species is such that the Area requires long-term special protection. Designation of this Area is intended to ensure examples of this habitat type are adequately protected from visitors and overuse from scientific investigations. The ecosystem at this site remains of exceptional scientific value for ecological investigations and the Restricted Zone is valuable as a reference site for future comparative studies.

2. Aims and objectives

Management of New College Valley, Caughley Beach, Cape Bird aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- preserve a part of the natural ecosystem of the Area as a reference area for the purpose of future comparative studies;
- allow scientific research on the ecosystem, in particular on mosses, algae and invertebrates in the Area, while ensuring protection from over-sampling;
- allow other scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere;
- prevent or minimise the introduction to the Area of alien plants, animals and microbes;
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities are to be undertaken to protect the values of the Area:

- Copies of this Management Plan including maps of the Area shall be made available at adjacent operational research/field stations and at the nearby Cape Bird hut.
- Rock cairns or signs illustrating the location and boundaries, with clear statements of entry restrictions, shall be placed at appropriate locations on the boundary of the Area and the Restricted Zone to help avoid inadvertent entry.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer required.
- Visits shall be made as necessary (preferably at least once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- National Antarctic Programmes operating in the Area shall consult together with a view to ensuring the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: New College Valley, Caughley Beach, Cape Bird, Ross Island – Regional overview. Topographic data source SCAR Antarctic Digital Database v7.3 (2021) / REMA DEM, Coastline, glaciology and ice-free ground from LINZ 1:50K digital data (edited ERA 2024 using satellite imagery). Map specifications: Projection – Lambert conformal conic. Standard parallels – 1st 77° 15'S; 2nd 77° 30'S. Central Meridian – 166° 58'E. Latitude of Origin – 78° 00'S. Spheroid and horizontal datum – WGS84.

Map 2: ASPA No 116 New College Valley – Topography and air access. Data sources: ASPA boundary, hut, contours: Gateway Antarctica (2012); Helicopter landing sites / flight route: Antarctica NZ (2024); Coastline / streams / ice-free ground / glacier extent: digitised ERA from WV3 (23 Dec 2022) / high resolution orthophoto G. Ballard pers. comm. (Nov 2023); Penguin sub-colonies: G. Ballard pers. comm. (Nov 2023). Map specification as for Map 1 except: Standard parallels 1st 77° 14'S; 2nd 77° 16'S. Central Meridian – 166° 25' E.

Map 3: ASPA No 116 New College Valley – Facilities and access. Data sources as for Map 2. Map specification as for Map 2 except: Standard parallels 1st 77° 13'S; 2nd 77° 14'S. Central Meridian – 166° 26'E.

Map 4: ASPA No 116 New College Valley – Facilities, boundaries & vegetation. Data sources as for Map 3 except hut, AWS, Primary Helicopter Landing Site – G. Ballard orthophoto (Nov 2023); Vegetation assessment: B. Bollard pers. comm. (Nov 2023). Map specification as for Map 3 except Central Meridian – 166° 26.5' E.

6. Description of the Area

6(i) Geographical coordinates, boundary markers and natural features

Cape Bird is at the northwest extremity of Mount Bird (1,800 m), an inactive volcanic cone which is probably the oldest on Ross Island. New College Valley is located south of Cape Bird on ice-free slopes above Caughley Beach, and lies between two Adélie penguin colonies known as the Cape Bird Northern and Middle Rookeries (Map 3). The Area, comprising veneered glacial moraines at the foot of the Cape Bird Ice Cap, consists of seaward dipping olivine-augite basalts with scoriaceous tops erupted from the main Mount Bird cone.

The northwest corner of the north boundary of the Area is approximately 100 m south of the Cape Bird hut (New Zealand) and is marked by an ASPA sign post (77° 13.128'S, 166° 26.147'E) (Map 4). The north boundary of the Area extends upslope and eastward toward a prominent terminal moraine ridge, approximately 20 m from the Cape Bird Ice Cap and is marked with a rock cairn (77° 13.158'S, 166° 26.702'E).

The eastern boundary follows the terminal moraine ridge from the rock cairn (77° 13.155'S, 166° 26.683'E) southeast until the ridge disappears where it joins the Cape Bird Ice Cap. The boundary continues southeast following the glacier edge to the southern boundary.

The southern boundary is a straight line crossing the broad southern flank of New College Valley, and is marked with rock cairns at the south-western corner of the Area (77° 13.471'S, 166° 25.832'E) and the south-eastern corner of the area on the hilltop 100 m from the Cape Bird Ice Cap glacier edge (77° 13.571'S, 166° 27.119'E).

The western boundary of the Area follows the top of the coastal cliffs of Caughley Beach from the south-western corner rock cairn (77° 13.471'S, 166° 25.832'E) for a distance of 650 m to the northwest corner of the Area (77° 13.128'S, 166° 26.147'E) where the ASPA signpost is.

New College Valley, Caughley Beach is located within Environment S – McMurdo – South Victoria Land geologic based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and in Region 9 – South Victoria Land based on the Antarctic Conservation Biogeographic Regions (Resolution 6 (2012)). Environment Domain S includes known areas of abundant mosses and lichens at Botany Bay, Cape Geology (ASPA 154), Beaufort Island (ASPA 105) and Canada Glacier in the Taylor Valley (ASPA 131).

Northwest-facing New College Valley drains meltwater from the Cape Bird Ice Cap during the summer. Streams in the Area are fed by melt from perennial summer snow drifts and have eroded their own shallow gullies and channels. The ground is largely covered by stones and boulders of volcanic origin which have been reworked by glacial action. During the peak of the melt (Dec-Jan), running water traverses across much of the ASPA. As the melt increases and the soils absorb the meltwater, the ground in parts of the site, softens significantly, particularly the Restricted Zone. There is evidence of small scale rock and sediment movement at the site from this meltwater action each summer, with small, localised landslides and sediment movement witnessed in parts of site in 2023 (Figure 4). Under the influence of a changing climate (both global and local), increases in volume and shifts in location of water flow through or over the vegetation would inevitably lead to changes in the vegetation distribution, diversity and abundance. The Area would be ideal for assessing the impacts of climate change on Antarctic terrestrial ecosystems dominated by moss vegetation.

The Area includes the full course and catchments of three stream systems that support significant growths of algae and mosses. These include the most extensive ephemeral stream course distributions of the moss Hennediella heimii on Ross Island. Surveys have shown that this moss, together with lower occurrences of two other species – Bryum argenteum and Bryum pseudotriquetrum – are confined almost entirely to the margins of stream courses across the steep till and scoria covered slopes (Map 4). The mosses generally co-occur with cyanobacteria-dominated algal growths, namely rich, red-brown oscillatorialean mats and occasional reddish-black growths of Nostoc commune. Previously this Area was known to lack lichens. However, saprophytic lichen species including Caloplaca athallina have recently been found growing on moribund or dead moss in this Area (Figure 5A). This parallels findings of four lichen species on Beaufort Island in 2011;

an island 20 km to the north of Cape Bird, which was also earlier characterised by its absence of lichens.

The Area supports a terrestrial invertebrate community including populations of springtails Gomphiocephalus hodgsonii (Collembola: Hypogastruridae), mites Nanorchestes antarcticus and Stereotydeus mollis (Acari: Prostigmata), nematodes (Panagrolaimus davidi, Plectus antarcticus, Plectus murrayi, Plectus frigophilus, Scottnema lindsayae and Eudorylaimus antarcticus), tardigrades (Acutuncus antarcticus) and rotifers (Adineta spp) with the presence of ciliate and flagellate protozoa noted. The majority of species of terrestrial invertebrates, and their highest abundance, are associated with macroscopic growths of moss and algae and with soils containing high abundance of microscopic algae.

Skuas (Catharacta maccormicki) frequently rest on Caughley Beach and overfly, land and nest within the Area. Adélie penguins (Pygoscelis adeliae) from the nearby rookeries do not nest in the Area, but have been observed occasionally to traverse New College Valley, and have been observed moulting in the Area in late summer.

6(ii) Access to the Area

Land vehicles are prohibited within the Area and access shall be by foot or by helicopter. Overflight of the Area is prohibited below 50 m (150ft) above sea level. Access restrictions apply within the Area, the specific conditions for which are set out in Section 7(ii) below.

6(iii) Location of structures within and adjacent to the Area

Structures known to exist within the Area include a United States Navy Astrofix marker (77° 13.299'S, 166° 26.690'E), cairns marking the boundaries of the Area and the Restricted Zone, a signpost situated at the northwest corner of the Area (77° 13.128'S, 166° 26.147'E) and an approximately one meter square wooden frame (77° 13.226'S, 166° 26.517'E) marking the site of an experimental oil spill from 1982.

A field hut (New Zealand), stores hut and toilet are located north of the northwest corner of the Area (Maps 3 and 4).

6(iv) Location of other protected areas in the vicinity

The nearest protected areas are:

- Lewis Bay, Mount Erebus, Ross Island (ASPA No 156), approximately 25 km SE.
- Tramway Ridge, Mount Erebus, Ross Island (ASPA No 175) 30 km SSE.
- Cape Crozier, Ross Island (ASPA No 124) 75 km SE.
- Cape Royds, Ross Island (ASPA No 121 and No 157) and Cape Evans, Ross Island (ASPA No 155) 35 km and 45 km south on Ross Island respectively.
- Beaufort Island, Ross Sea (ASPA No 105) 20 km to the north.

The nearest protected areas with similar terrestrial ecosystem attributes are Canada Glacier (ASPA No 131), approximately 100 km SW and Botany Bay (ASPA No 154), approximately 120 km NW.

6(v) Special zones within the Area

- *Restricted Zone*

An area of New College Valley is designated as a Restricted Zone in order to preserve part of the Area as a reference site for future comparative studies, while the remainder of the Area (which is similar in biology, features and character) is more generally available for research programmes and sample collection. The Restricted Zone encompasses ice-free slopes within New College Valley above Caughley Beach some of which are north-facing with snow drifts which provide a ready supply of melt water to foster moss and algal growth.

The northwest corner (77° 13.159'S, 166° 26.073'E) of the Restricted Zone is 60 m to the south and across a small gully from the northwest corner of the Area. The north boundary of the Restricted Zone extends 500 m upslope from the northwest corner to a midway cairn along the northern restricted zone boundary (77° 13.261'S, 166° 26.619'E), then following a faint but increasingly prominent ridge southeast to a point in the upper catchment of New College Valley marked by a cairn approximately 60 m from the ice terminus of the Cape Bird Ice Cap marking the northeast corner of the Restricted Zone (77° 13.368'S, 166° 26.976'E). The Restricted Zone boundary then extends 110 m southwest across the valley to a cairn marking the southeast corner of the Restricted Zone (77° 13.435'S, 166° 26.865'E). The southern boundary of the Restricted Zone extends in a straight line from this cairn (77° 13.435'S, 166° 26.865'E) 440 m northwest down a broad and relatively featureless slope to the southwest corner of the Area (77° 13.328'S, 166° 26.006'E). A cairn is placed on the southwest boundary of the Restricted Zone to mark the lower position of the south boundary (77° 13.330'S, 166° 25.995'E).

Access to the Restricted Zone is allowed only for compelling scientific and management purposes that cannot be served by visits elsewhere in the Area.

7. Terms and conditions for entry Permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority. Conditions for issuing a Permit to enter the Area are that:

- outside of the Restricted Zone, it is issued only for scientific study of the ecosystem, or for compelling scientific reasons that cannot be served elsewhere, or for essential management purposes consistent with the Management Plan objectives such as inspection or review;

- access to the Restricted Zone is allowed only for compelling scientific or management reasons that cannot be served elsewhere in the Area;
- the actions permitted are not likely to jeopardise the ecological or scientific values of the Area or other permitted activities;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or a copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- the Permit shall be issued for a stated period.

7(ii) Access to and movement within or over the Area

Helicopters are prohibited from landing within the Area. Two helicopter landing sites are located outside the Area. The primary helicopter landing site is located adjacent to the Cape Bird field hut (New Zealand), above Caughley Beach 77° 13.095S, 166° 26.157' E (Map 2). The secondary landing site is below the cliffs on Caughley Beach, 100 m west of the western boundary of the Area 77° 13.221'S, 166° 25.812'E (Maps 2, 3 and 4). The helicopter landing sites at Cape Bird are for support of scientific research and management only.

The flight path is an approach from the south above Middle Rookery (Map 2). Flights north of the helicopter pad may be necessary under certain wind conditions but should follow the recommended aircraft approach and departure routes, and to maximum extent possible, follow the 'Guidelines for the Operation of Aircraft Near Concentrations of Birds in Antarctica' (Resolution 2, 2004). See Map 2 for the recommended aircraft approach routes into and out of Cape Bird.

Overflight of the Area lower than 50 m (~150 ft) above ground level is prohibited. Hovering over the Area is not permitted lower than 100 m (~300 ft) above ground level. Use of helicopter smoke grenades within the Area is prohibited.

Vehicles are prohibited within the Area and all movement within the Area should be on foot. Access into the Area should preferably follow the track from the Cape Bird Hut (New Zealand). Visitors should avoid areas of visible vegetation and care should be exercised walking in areas of moist ground, particularly the stream course beds, where foot traffic can easily damage sensitive soils, plant and algal communities, and degrade water quality. Avoid walking on such areas by walking on ice or rocky ground. Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise effects.

Access to regions south of the Area from the Cape Bird Hut should be made by a route below the cliffs along Caughley Beach.

Overflight and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

7(iii) Activities that may be conducted in the Area

- Compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the ecosystem or values of the Area or interfere with existing scientific studies.
- Essential management activities, including monitoring and inspection.

7(iv) Installation, modification or removal of structures

No structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons, as specified in a Permit. All markers, structures or scientific equipment installed in the Area must be authorised by Permit and clearly identified by country, name of the principal investigator or agency, year of installation and date of expected removal. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit.

7(v) Location of field camps

Camping within the Area is prohibited. A field hut (New Zealand), stores hut and toilet are located north of the northwest corner of the Area (Map 3).

7(vi) Restrictions on materials and organisms which may be brought into the Area

To avoid compromising the ecological values, specifically the unique biological assemblages, for which the Area is protected, the following restrictions apply to all activities in the Area:

- Deliberate introduction of plants, animals, microorganisms and non-sterile soil into the Area is prohibited and precautions listed in 7(x) shall be taken against accidental introductions.
- No poultry products shall be brought into the Area.
- No herbicides or pesticides shall be brought into the Area.
- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel or other chemicals shall not be stored in the Area, unless required for essential purposes connected with the activity for which the Permit has been

granted and must be contained within an emergency cache authorized by an appropriate authority.

- All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimised.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016); CEP 2019).

7(vii) Taking or harmful interference with native flora or fauna

Taking of, or harmful interference with native flora or fauna is prohibited, except in accordance with a Permit issued in accordance with Annex II of the Protocol on Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(viii) The collection or removal of materials not imported by the Permit holder

Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs. Similarly, sampling is to be carried out using techniques which minimise disturbance to the Area as well as duplication. Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit holder or otherwise authorised and is not an historical artefact or abandoned relic, may be removed from any part of the Area, including the Restricted Zone, unless the environmental impact of removal is likely to be greater than leaving the material in situ. If this is the case the appropriate national authority must be notified and approval obtained.

7(ix) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims and objectives of the Management Plan

Permits may be granted to enter the Area to:

- carry out biological monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
- to erect or maintain signposts, structures or scientific equipment; or
- for management activities.

Any specific sites of long-term monitoring shall be appropriately marked.

To help maintain the ecological and scientific values of the isolation and relatively low level of human impact at the Area, visitors shall take special precautions against introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other Antarctic sites, including stations, or from regions outside Antarctica. To minimise the risk of introductions, visitors shall thoroughly clean footwear, particularly after any contact with penguin guano from the beach below, and any equipment to be used in the area particularly sampling equipment and markers before entering the Area.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority after the visit has been completed in accordance with national procedures and permit conditions.
- Such reports should include, as appropriate, the information identified in the visit report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organizing the scientific use of the Area.
- The appropriate authority should be notified of any activities / measures that might have exceptionally been undertaken, or anything removed, or of anything released and not removed, that were not included in the authorized permit.

8. Supporting Documentation

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Figure 1: Approach into Cape Bird, Beaufort Island in the background to the north. Photo B. Bollard, University of Wollongong (November 2023).

Figure 2. Moss in the northern valley of ASPA 116. Photo R. Innes, Antarctica New Zealand (December 2023).

Figure 3. Moss in the Restricted Zone, New College Valley. Photo R. Innes, Antarctica New Zealand (December 2023).

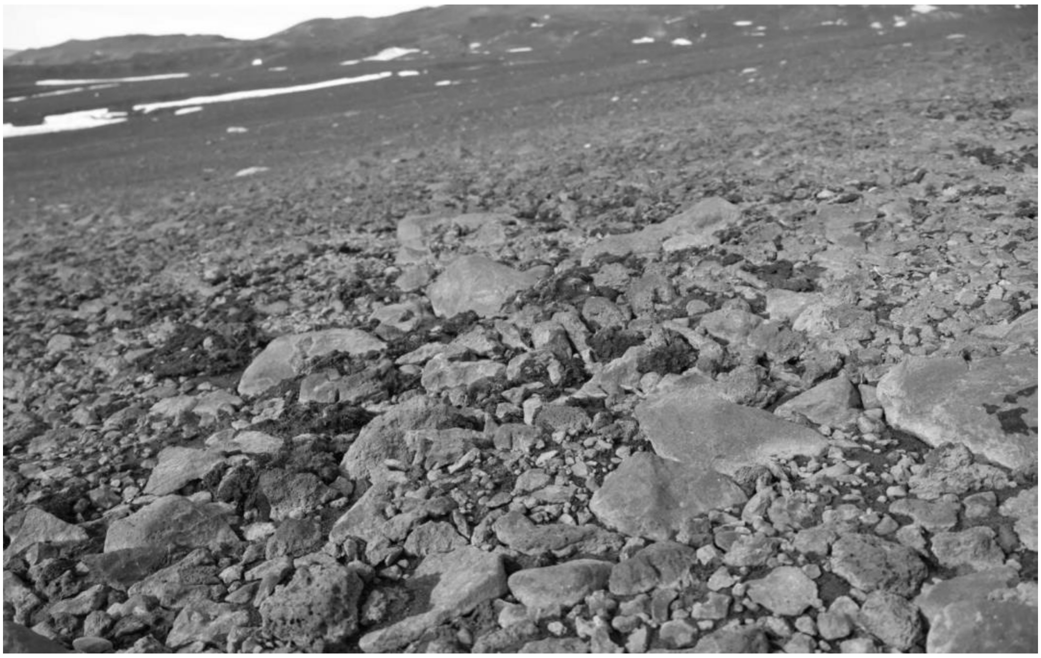


Figure 4. Small scale landslide in the lower section of New College Valley. Photos R. Innes, Antarctica New Zealand (December 2023).

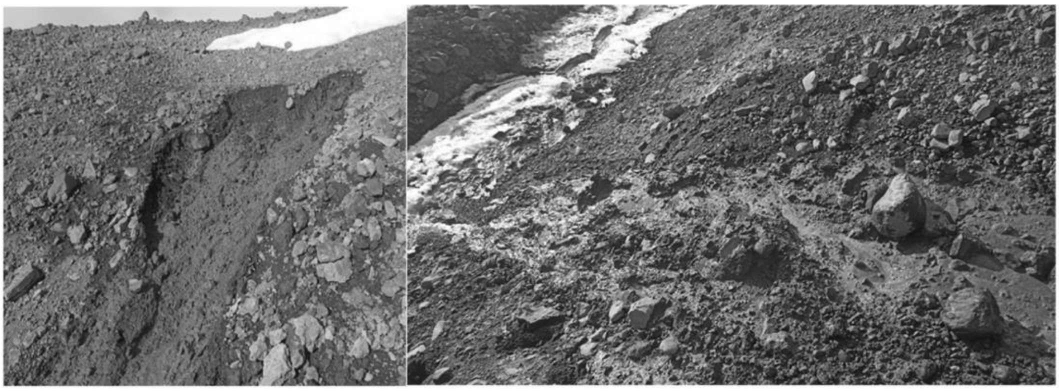


Figure 5. Examples of Cape Bird vegetation: A) Mixture of healthy, stressed and moribund moss, some of which is encrusted with white lichen; B) Dry (left image) and wet (right image) cyanobacterial communities amongst moss. Orange quadrats are 25 cm x 25 cm; C) Moss covered in a thin layer of mud washed down the hill (left), moss covered in sediment (right). Photos M. Waterman, University of Wollongong and R. Innes, Antarctica New Zealand (December 2023).

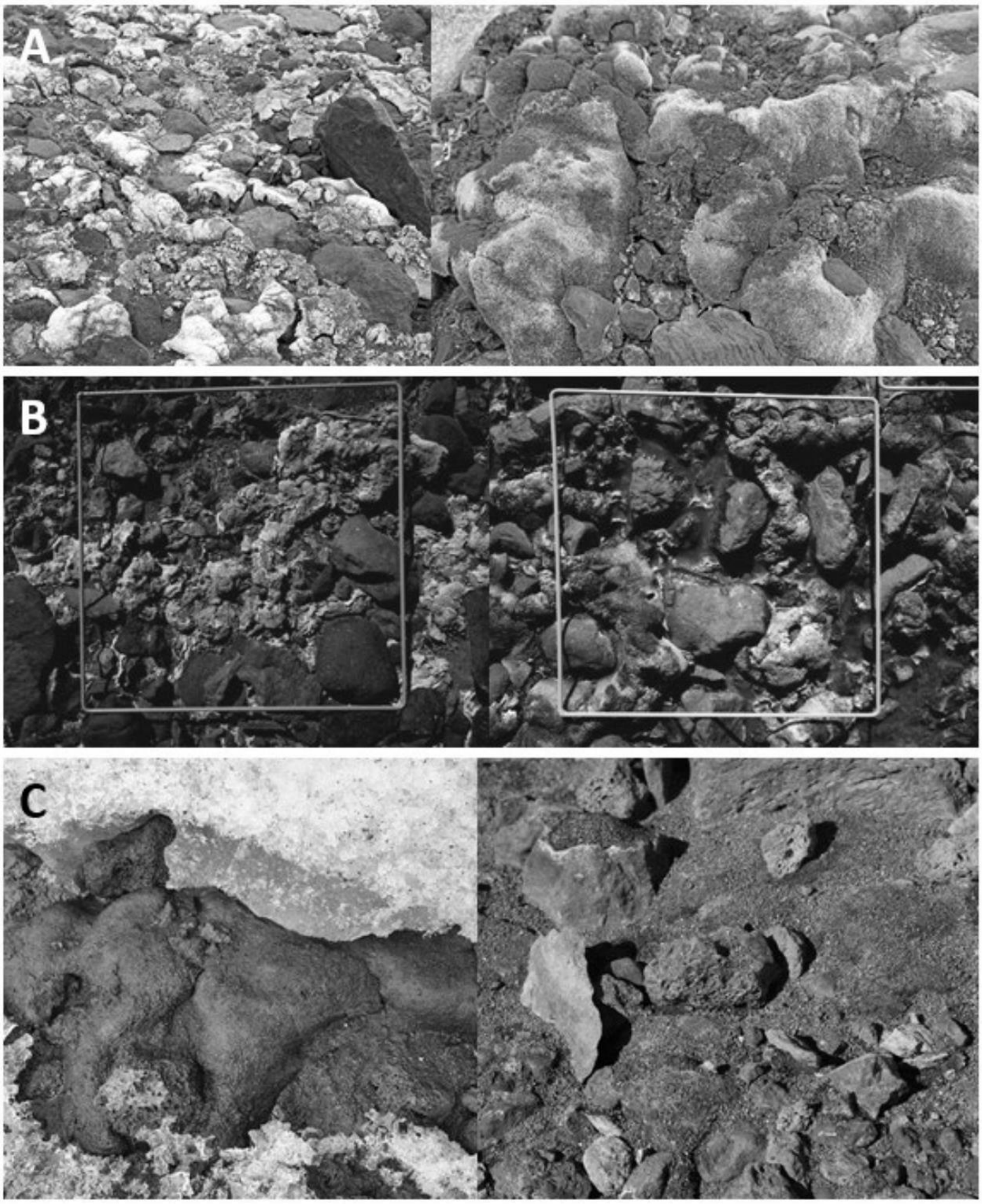
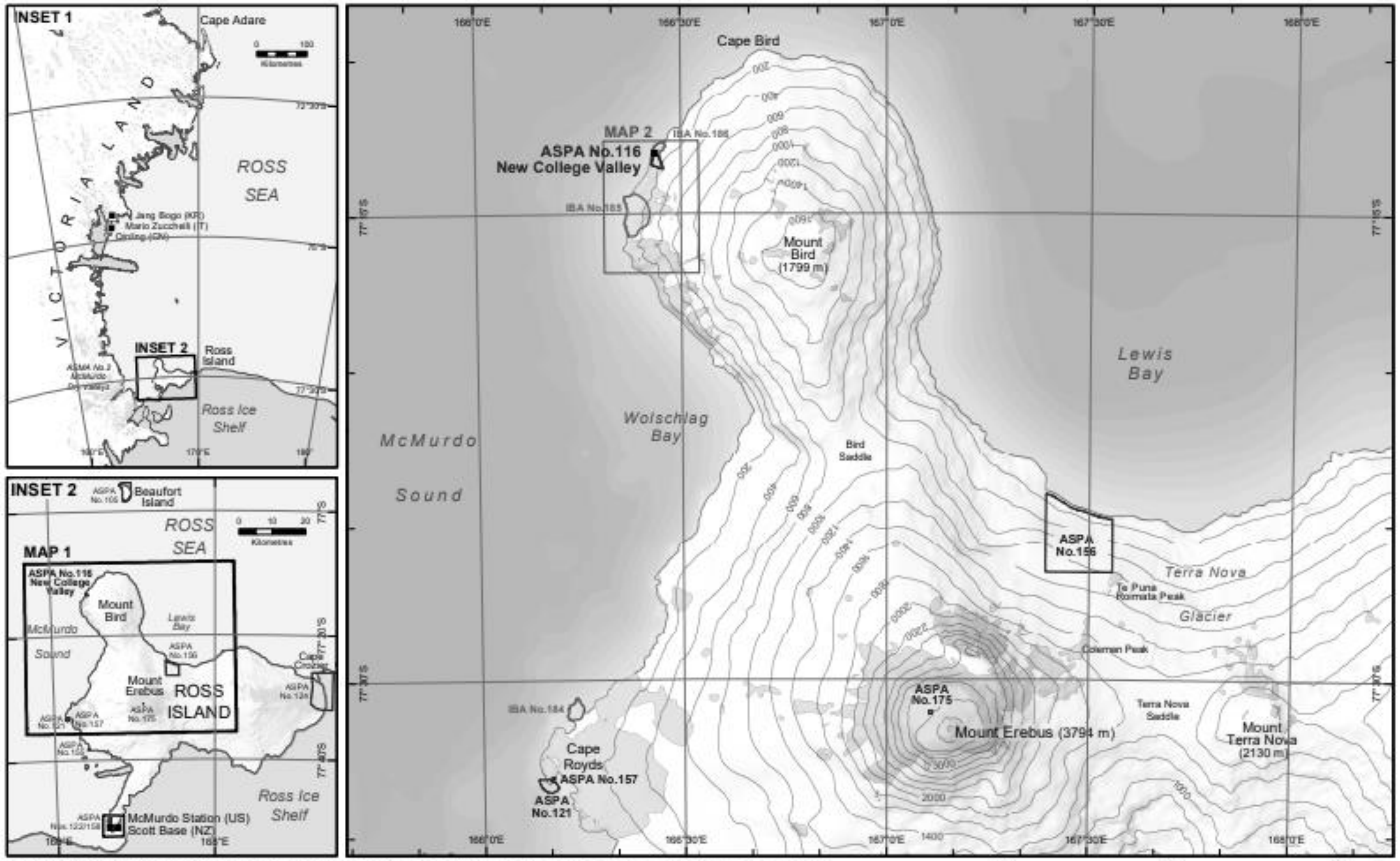


Figure 6. Transition of dry moss cushions to wet algal and cyanobacterial communities to dry moss cushions. Photo R. Innes, Antarctica New Zealand.
Figure 7. Transition of wet algal and cyanobacterial communities (middleground) to dry moss cushions (foreground). The yellow tape measure is 3 m and the black rod is 1 m. Photos M. Waterman, University of Wollongong (December, 2023).

Figure 7. Transition of wet algal and cyanobacterial communities (middleground) to dry moss cushions (foreground). The yellow tape measure is 3 m and the black rod is 1 m. Photos M. Waterman, University of Wollongong (December, 2023).



Map 1: ASPA No.116 New College Valley, Caughley Beach, Cape Bird - regional overview

02 Apr 2024 (v1.0)
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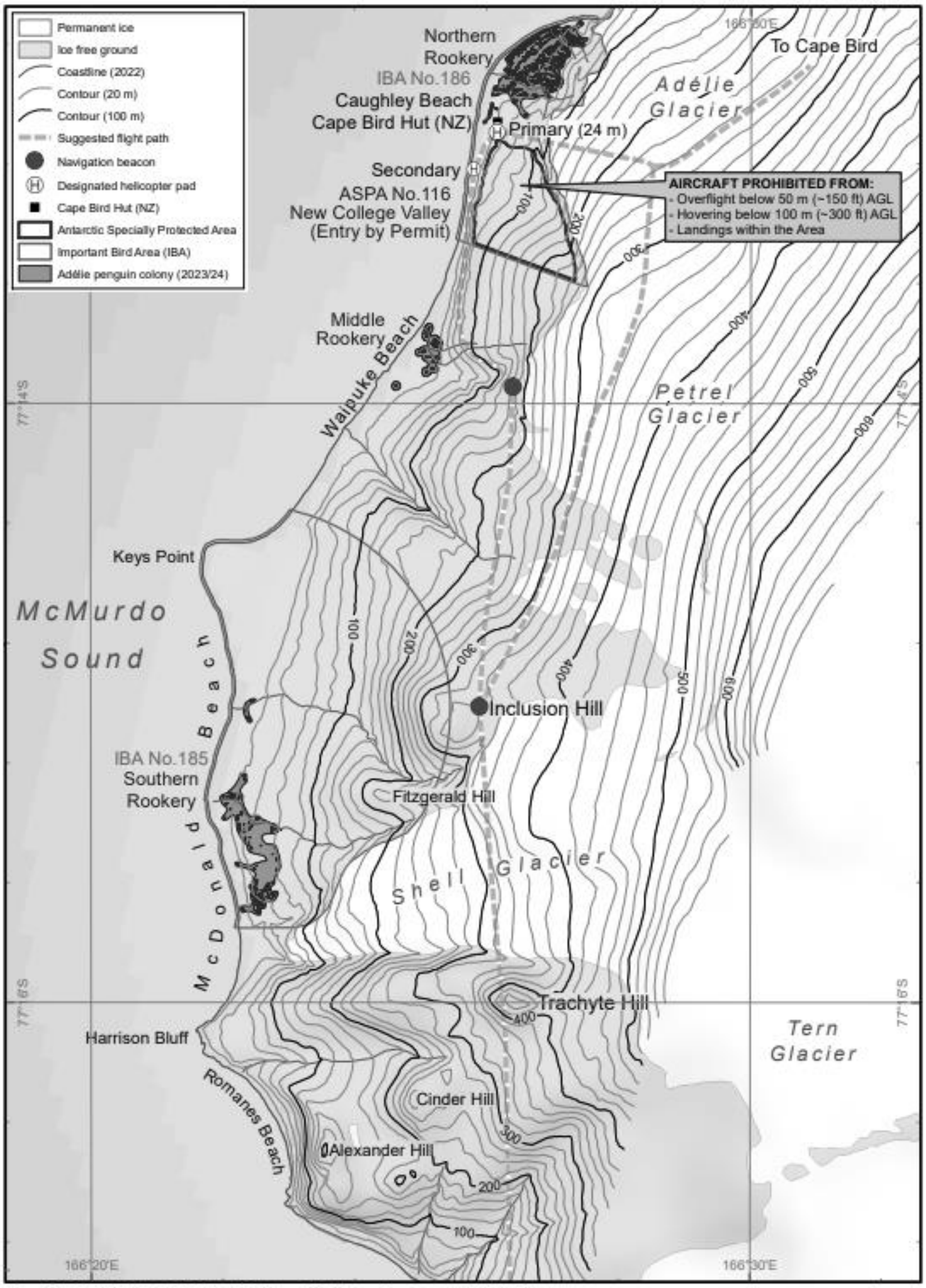
Antarctica New Zealand

Permanent ice | Contour (200 m) | Important Bird Area
Ice-free ground | Protected area boundary | Cape Bird Hut (NZ)



Map 2: ASPA No.116 New College Valley - Topography & air access

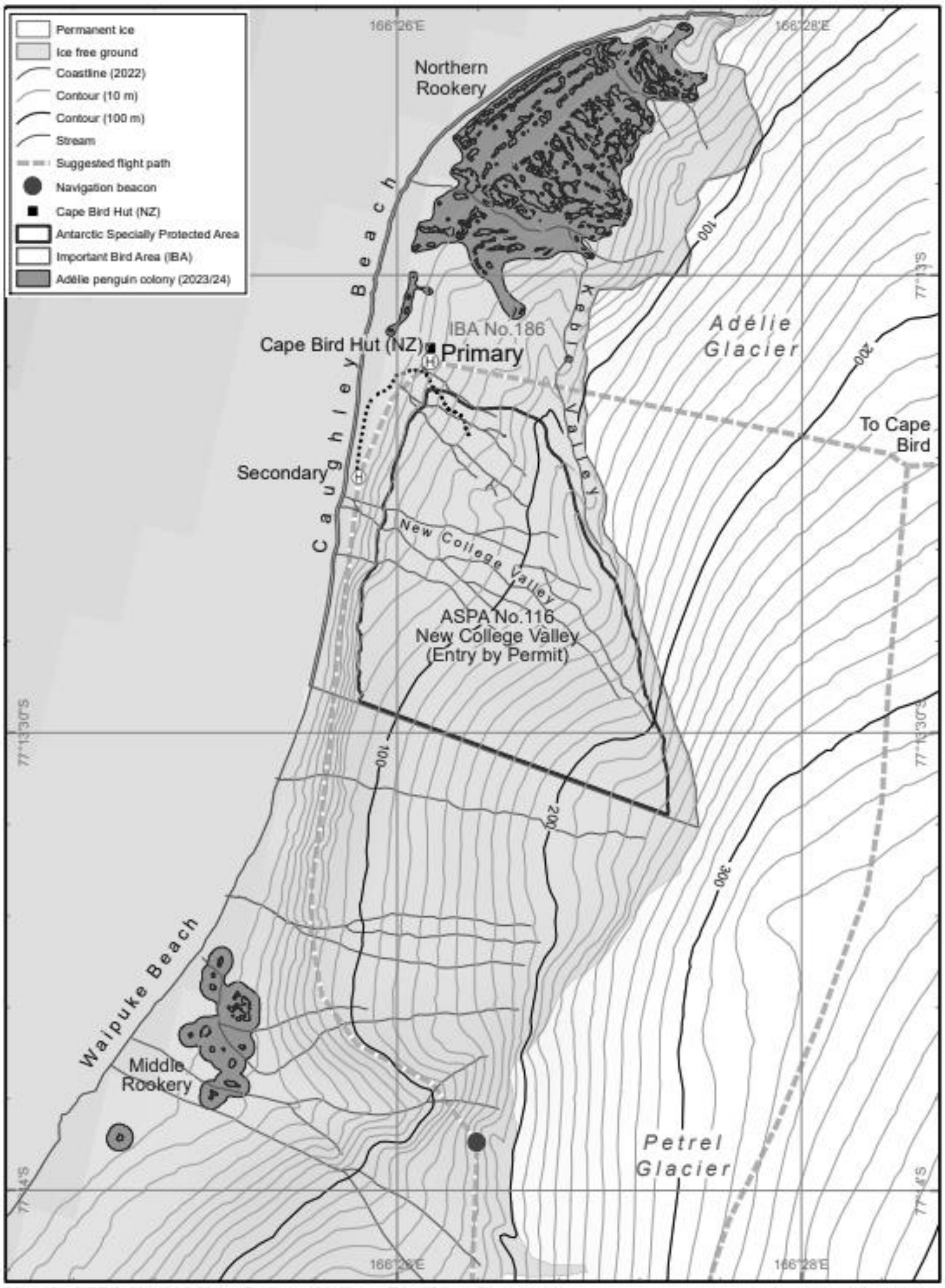
03 Apr 2024
Environmental Research & Assessment

Antarctica New Zealand

0 1 2
Kilometres

N

Projection: Lambert Conformal Conic
Horizontal datum: WGS84; Vertical datum: MSL.
Data sources: ASPA, hut, contours: Gateway Antarctica (2012);
Helicopter landing sites / flight route: Antarctica NZ 2024;
Coastline / streams / ice-free ground / glacial extent: digitised
ERA from WV3 (23 Dec 2022). IBA boundary: ERA 2024;
Penguin sub-colonies: G. Ballard pers.comm. 2024.



Map 3: ASPA No.116 New College Valley - Facilities & access

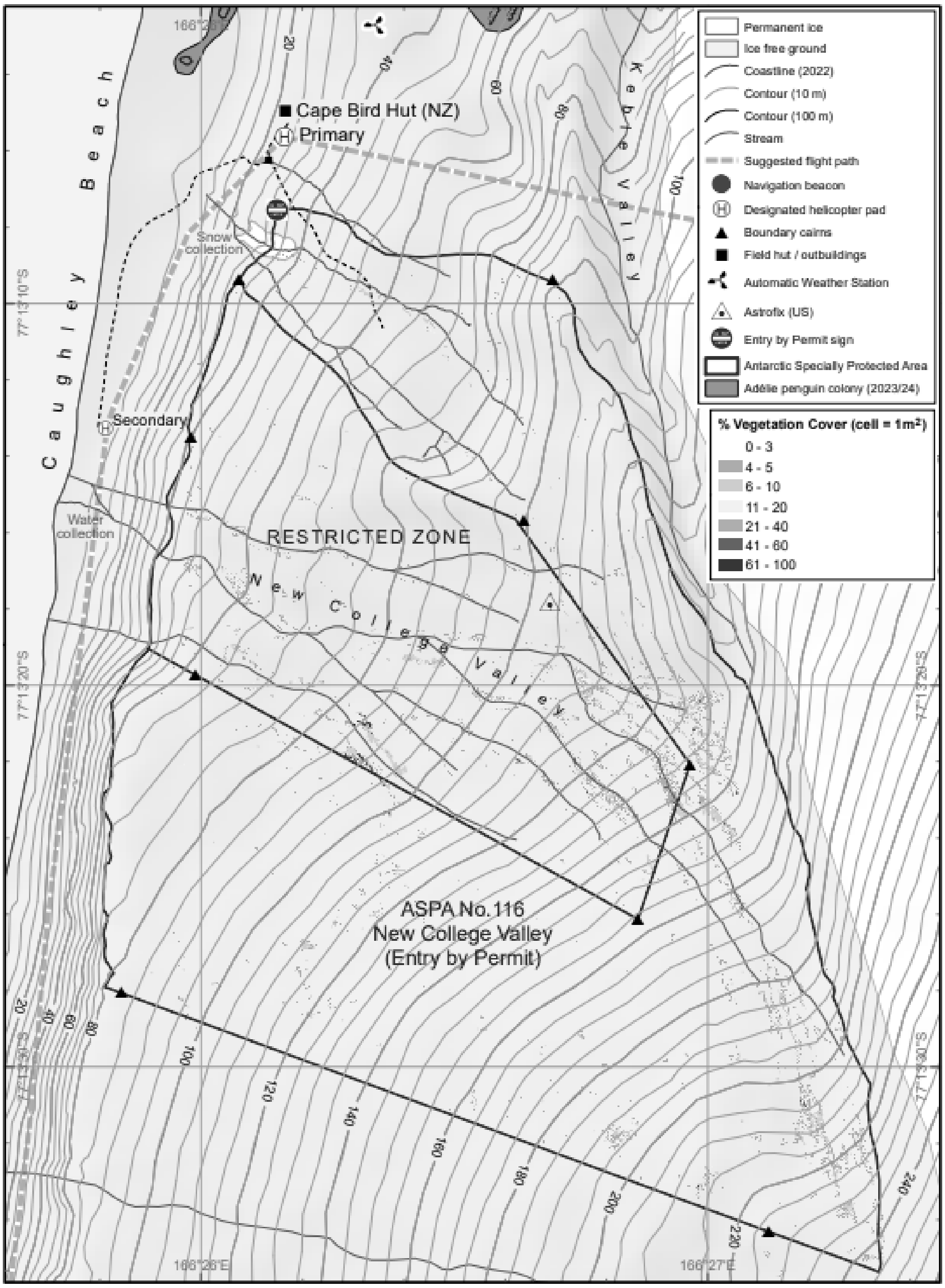
03 Apr 2024
Environmental Research & Assessment

Antarctica
New Zealand

0 100 200 300 400 500
Metres

N

Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84;
Data sources: ASPA, hut, contours: Gateway Antarctica (2012);
Helicopter landing sites / flight route: Antarctica NZ (2024);
Coastline / streams / ice-free ground / glacier extent: ERA
from WV3 (23 Dec 2022) / high resolution orthphoto G.Ballard
pers.comm (Nov 2023); Penguin sub-colonies: G.Ballard
pers.comm. (Nov 2023). IBA boundaries: ERA (2024).



Map 4: ASPA No.116 New College Valley - Facilities, boundaries & vegetation

03 Apr 2024
Environmental Research & Assessment

Antarctica New Zealand

0 100 200
Metres

N

Projection: Lambert Conformal Conic
Horizontal datum: WGS84; Vertical datum: MSL.
Data sources: boundary, contours: Gateway Antarctica (2012);
Helicopter landing sites / flight route: Antarctica NZ 2024;
Coastline / streams: digitised ERA from WV3 (23 Dec 2022) /
high resolution orthophoto Ballard pers.comm. (Nov 2023);
Hut, emergency cache, AWS, HLS - Ballard orthophoto (Nov 2023);
Vegetation assessment: B. Ballard pers.comm. (Nov 2023).

Measure 2 (2024)

Antarctic Specially Protected Area No 128 (Western shore of Admiralty Bay, King George Island, South Shetland Islands): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation X-5 (1979), which designated the Western shore of Admiralty Bay, King George Island as Site of Special Scientific Interest ("SSSI") No 8 and annexed a Management Plan for the Site;
- Recommendations XII-5 (1983), XIII-7 (1985) and Resolution 7 (1995), which extended the expiry date for SSSI 8;
- Measure 1 (2000), which adopted a revised Management Plan for SSSI 8;
- Decision 1 (2002), which renamed and renumbered SSSI 8 as ASPA 128;
- Measure 2 (2006), which designated Admiralty Bay, King George Island as Antarctic Specially Managed Area ("ASMA") No 1, within which ASPA 128 is located;
- Measures 14 (2014) and 1 (2023), which adopted revised Management Plans for ASMA 1;
- Measures 4 (2014) and 2 (2019), which adopted revised Management Plans for ASPA 128;

Recalling that Recommendations X-5 (1979), XII-5 (1983), XIII-7 (1985) and Resolution 7 (1995) were designated as no longer current by Decision 1 (2011);

Recalling that Measure 1 (2000) did not become effective and was withdrawn by Decision 3 (2017);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 128;

Desiring to replace the existing Management Plan for ASPA 128 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 128 (Western shore of Admiralty Bay, King George Island, South Shetland Islands), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 128 annexed to Measure 2 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area No 128

WESTERN SHORE OF ADMIRALTY BAY, KING GEORGE ISLAND, SOUTH SHETLAND ISLANDS

Introduction

The Western Shore of Admiralty Bay is located on King George Island, South Shetland Islands, ~125 kilometers from the northern Antarctic Peninsula. Approximate area and coordinates: 16.8 km² (centered at 62° 11' 50" S, 58° 27' 40" W). The Area is wholly terrestrial, and the primary reasons for designation are its diverse avian and mammalian fauna and locally rich vegetation, providing a representative sample of the maritime Antarctic ecosystem. Long term scientific research has been conducted on the animals within the Area. The Area is relatively accessible to nearby research stations and tourist ships regularly visit Admiralty Bay, so the ecological and scientific values of the area need protection from potential disturbance.

The Area was originally designated as Site of Special Scientific Interest (SSSI) No 8 in Recommendation X-5 (1979, SSSI No 8) after a proposal by Poland. The SSSI designation was extended through Recommendation XII-5 (1983), Recommendation XIII-7 (1985) and Resolution 7 (1995). Revised Management Plans were adopted through Measure 1 (2000), Measure 4 (2014) and Measure 2 (2019). The site was renamed and renumbered as Antarctic Specially Protected Area (ASPA) No 128 by Decision 1 (2002). The Area lies within Antarctic Specially Managed Area (ASMA) No 1 Admiralty Bay, King George Island, South Shetland Islands, originally designated through Measure 2 (2006) and revised through Measure 14 (2014) and Measure 1 (2023).

The biological and scientific values of the Area are vulnerable to human disturbance (e.g. oversampling, disturbance to wildlife, introduction of non-native species). Therefore, it is important that human activities in the Area are managed to minimize the risk of impacts. The Area is considered of sufficient size to protect the values for which special protection is required because it includes within the boundaries numerous examples of the features represented (e.g. plant and animal communities), which should ensure that the Area is able to withstand changes that could arise from local or regional pressures, particularly when considered in combination with other instruments that apply in the region such as Antarctic Specially Managed Area No 1 Admiralty Bay, the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), and the Agreement on the Conservation of Albatrosses and Petrels (ACAP).

Antarctic Important Bird Area No 046 West Admiralty Bay is identified within the Area. The Area comprises environments within three of the domains defined in the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)): Environment A – Antarctic Peninsula northern geologic; Environment E – Antarctic Peninsula, Alexander and other islands; and Environment G – Antarctic Peninsula offshore islands. Areas of ice-free ground classified as Region 3 – Northwest Antarctic

Peninsula under the Antarctic Conservation Biogeographic Regions classification (Resolution 3 (2017)) lie within the Area.

1. Description of values to be protected

The western shore of Admiralty Bay possesses a diverse avian and mammalian fauna and locally rich vegetation which is representative of the maritime Antarctic terrestrial ecosystem. The breeding colonies of Adélie (Pygoscelis adeliae) and Gentoo penguin (Pygoscelis papua) within the Area are among the largest on King George Island, and the site is one of only a few protected areas where all three Pygoscelid penguins (including Chinstrap (Pygoscelis antarcticus)) are found breeding together at the same location. Nine other birds breed within the Area, including southern giant petrel (Macronectes giganteus), cape petrel (Daption capense), Wilson's storm petrel (Oceanites oceanicus), black-bellied storm petrel (Fregetta tropica), snowy sheathbill (Chionis albus), south polar skua (Catharacta maccormicki), brown skua (Catharacta antarctica), kelp gull (Larus dominicanus), and Antarctic tern (Sterna vittata).

Southern elephant seals (Mirounga leonina), Antarctic fur seals (Arctocephalus gazella), Weddell seals (Leptonychotes weddellii) rest and/or breed on a number of beaches within the Area. Leopard seals (Hydrurga leptonyx) and crabeater seals (Lobodon carcinophagus) are frequent in waters of Admiralty Bay and are occasionally present on beaches within the Area.

Rich terrestrial plant communities exist within the Area, including one of the most extensive areas colonized by the Antarctic hairgrass Deschampsia antarctica and the pearlwort Colobanthus quitensis in Antarctica. Extensive stands of moss from the families Andreaeaceae, Bryaceae, Polytrichaceae, Pottiaceae and Grimmiaceae are present, particularly near the coast up to 60 m above sea level. Lichen assemblages are more dominant at higher elevations. Rich microbial communities are also represented, including algae (e.g Prasiola, Phormidium), mites (from the Orders / Suborders Prostigmata, Mesostigmata and Oribatida) and nematodes (e.g. Plectus and Panagrolaimus).

The values to be protected are those associated with the exceptionally diverse assemblage of plants and animals, which is a representative example of the Maritime Antarctic ecosystem, and the long-term scientific studies that have been undertaken within the Area, especially since 1976. In particular, scientific studies undertaken within the Area have been important in relation to documenting and interpreting large-scale regional shifts in pygoscelid penguin populations that have been observed on the Antarctic Peninsula and its offshore islands over recent decades.

Recent exposure of new areas of ice-free ground as a result of glacial recession offers opportunities for studies of colonisation processes, which represents an additional scientific value of the Area. Implementation of a program to eradicate the known population of the non-native species Poa annua on the deglaciated moraines near Ecology Glacier was successful in 2015, and the site continues to be systematically monitored for potential recolonization. The whole area is also monitored for the presence of other unintentionally introduced species.

2. Aims and objectives

Management at the western shore of Admiralty Bay aims to:

- Avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance;
- Allow scientific research on the ecosystem of the Area, in particular on the avifauna, pinnipeds and terrestrial ecology, while ensuring protection from oversampling or other possible scientific impacts;
- Allow other scientific research, scientific support activities and visits for educational and outreach purposes (such as documentary reporting (visual, audio or written) or the production of educational resources or services) provided that such activities are for compelling reasons that cannot be served elsewhere and will not jeopardise the natural ecological system in the Area;
- Minimize the possibility of introduction of additional alien plants, animals and microbes to the Area;
- Minimize the possibility of the introduction of pathogens that may cause disease in faunal populations within the Area;
- Continue the on-going monitoring of the non-native grass Poa annua in the Area, if the presence of a non-native plant is found, continue the eradication program, and to coordinate these strategies with those developed for the management of non-native species within ASMA No 1 Admiralty Bay more generally;
- Implement a monitoring and, if possible, eradication program for the non-native fly Trichocera maculipennis, and to coordinate these strategies with those developed for other National Antarctic Programs active on King George Island; and
- Allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- Notices showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, at all permanent scientific stations located within Admiralty Bay;
- Copies of this Management Plan shall be made available to all vessels and aircraft visiting the Area and/or operating in the vicinity of the adjacent stations, and all pilots and ship captains operating in the region shall be informed of the location, boundaries and restrictions applying to entry and overflight within the Area;

- National programs shall take steps to ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and nautical / aeronautical charts;
- Signs illustrating the location and boundaries with clear statements of entry restrictions should be installed, as appropriate, at or near the northern boundary of the Area to help avoid inadvertent entry from the vicinity of nearby Arctowski Station (Poland). As appropriate, signs may be installed at hut facilities within the Area to help avoid inadvertent entry to the Area;
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer required;
- National Antarctic programs operating in the Area should maintain a record of all new markers, signs and structures erected within the Area;
- The presence of, and / or recolonization by, the non-native species Poa annua within the Area near Ecology Glacier should be monitored and the eradication program (mechanical removal by hand tools) continued as necessary, with reports on the effectiveness of any control and eradication measures, including on measures taken to mitigate against further introductions of non-native species, made by National Antarctic programs operating in the Area at least once every five years in support of Management Plan reviews;
- The presence of a breeding population of Trichocera maculipennis in the Area should be established. If the presence of a breeding population is confirmed, monitoring of the distribution and the impact on the local ecosystem should be undertaken. Eradication measures should be considered, including in a context broader than only within the Area to ensure any measures will be effective. Management measures taken should be reported to the ATCM.
- Instruction on the provisions and contents of the Management Plan is the responsibility of national programs, tour operators, independent visitors or appropriate national authorities that have personnel (national program staff, field expeditions, tourist expedition leaders, independent visitors and pilots) who will be in the vicinity of, accessing (only under the terms of "General permit conditions") or flying over the Area.
- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate;
- National Antarctic Programs operating in the region shall consult together with a view to ensuring that the above provisions are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1. ASPA No 128 Western Shore of Admiralty Bay, King George Island – Regional overview. Inset: Location of King George Island, South Shetland Islands, Antarctic Peninsula. Topography and coastlines provided by Proantar, Brasil. Bathymetry: International Bathymetric Chart of the Southern Ocean (IBCSO) v1 (2013). Other data supplied by Environmental Research & Assessment. Projection: Lambert Conformal Conic; Standard parallels: 1st 62°00' S; 2nd 62°15' S; Central Meridian: 58°15' W; Latitude of Origin 64°00 S; Spheroid and horizontal datum: WGS84.

Map 2. ASPA No 128 Western Shore of Admiralty Bay: access, facilities & wildlife. Map specifications: Projection: UTM Zone 21S; Spheroid and horizontal datum: WGS84. Topography and bathymetry provided by Proantar, Brasil. Coastline updated from WorldView-3 (01 Feb 2024; imagery © 2024 Maxar: provided by Polar Geospatial Center (NSF #2129685). Streams digitized from orthophoto map by Pudelko (2007)). Location of former colonisation site of Poa annua, small boat landing sites, marker and HSM No 51 supplied by Polish Antarctic Program. Other data supplied by Environmental Research & Assessment.

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

- *General description*

The Area is situated on the western shore of Admiralty Bay on the south side of King George Island, which is the largest of the South Shetland Islands archipelago. Arctowski Station (Poland) is situated 0.5 km to the north. The Area comprises ice-free terrain including steep crags of up to 400 m in elevation with more gentle morainic slopes interspersed by several glaciers extending down to the coast. The shoreline consists of broad pebbly beaches interrupted by rocky headlands. The Area is ~17 km².

- *Boundaries and coordinates*

The eastern boundary of the Area follows the coastline on the western shore of Admiralty Bay from the SE extremity of Halfmoon Cove (62°09'44"S, 58°27'49"W) for ~ 6 km SSE to Demay Point (Map 2). The boundary thence follows the coastline SW around Paradise Cove and Uchatka Point approximately 3.5 km to Telefon (Patelnia) Point (62°14'03"S, 58°28'28"W). From Telefon Point the boundary extends northward in a straight line for ~2.3 km to The Tower (367 m; 62°12'55"S, 58°28'48"W), a distinctive peak above Tower Glacier. The boundary continues in this direction a further 5.3 km to Jardine Peak (285 m; 62°10'03"S, 58°29'54"W). The boundary descends eastward in a straight line from Jardine Peak for ~1.7 km to the highest point on Penguin Ridge, ~ 550 m from Arctowski Station. The boundary thence extends NE for ~0.3 km to the SE coast of Halfmoon Cove. A marker is placed in Halfmoon Cove on the northern boundary of the Area at 62°09'43.7" S, 58°27'48.7" W, ~500 m southeast of Arctowski station (Map 2).

- *Climate*

The climate of the Area is typical of maritime Antarctica. Based on complementary data obtained at Arctowski Station (Poland) between 1977-98 (Marsz & Styszyńska 2000) and 2013-17 (Plenzler et al. 2019), and from 2006 and at the Comandante Ferraz Station (Brazil) since 1984, the microclimate of Admiralty Bay is characterized by an average annual temperature of around -l.7°C. An average annual wind speed for 1977-98 was of approximately 6.6 m s^{-1} (Marsz & Styszyńska 2000). In 2013-17, the mean multi-annual wind speed at 2.5 m a.g.l was 5.7 m s^{-1} with SW as predominant wind direction (31.3 %) (Plenzler et al. 2019). The total sum of precipitation in 2017 was 491.2 mm, which was similar to the mean annual precipitation during 1977-98, which was 499.8 mm (Plenzler et al. 2019). Furthermore, for 2013-17 mean annual humidity was 78.1%, while that during 1978-97 was 82.3%. The annual mean air pressure near the Arctowski Station is 990 hPa (Plenzler et al. 2019). The waters of Admiralty Bay have an annual temperature range of -1.8°C to +4°C, being well mixed by tides and strongly influenced by currents and coastal upwelling (from ASMA No 1 Admiralty Bay Management Plan).

The climate has recently been changing under the influence of unstable pressure systems such as the Southern Annular Mode (SAM) and the El Nino Southern Oscillation (ENSO) (Bers et al. 2012). Rapid regional warming of air temperature on the Western Antarctic Peninsula (WAP) observed over the last 50 years is exceptional and unprecedented in comparison with the record from ice core data over the past 500 years (Vaughan & Doake 1996). The most recent reconstructions show a warming trend between 1957 - 2006 of 0.12°C per decade for the whole Antarctic continent, and of 0.17°C per decade for West Antarctica (Steig et al. 2009). Schloss et al. (2012) show the 50-year warming trend has yielded an average increase of air temperature of about 2.0°C in summer and 2.4°C in winter at nearby Carlini Station (Map 1). Kejna et al. (2013), analysing data from all available meteorological sources on King George Island and on Deception Island, showed a 1.2°C increase in annual average air temperature and a 2.3 hPa decrease in atmospheric pressure over a comparable time period. In 2017, and the preceding 2016, the mean annual temperature at Arctowski Station was approximately 1°C higher than the preceding years 2013-15 (Plenzler et al. 2019).

- *Geology, geomorphology and soils*

Geological investigations on King George Island prior to 1980 were performed by British, Argentinian, Russian and Chilean scientists, although the area within ASPA No 128 was not described because it does not have any paternal lithostratigraphic rock sequences (for details see Birkenmajer 2003). The first geological map covering this area was presented by Birkenmajer (1980), republished with minor modifications in Birkenmajer (2003). The area of ASPA No 128 is included by Birkenmajer (2003) in the Warszawa tectonic block (terrane), that consists of Cretaceous, Paleocene, Eocene volcanic and pyroclastic rock with trace participation of sedimentary rocks. Volcanic rocks belong mainly to basalt, basaltic andesite, andesite intercalated with tuffs, scoria and volcanic breccia. Sediments bearing plant remains occur only in the thin horizon (<1 m) of the upper part of Zamek sections.

Moreover, dispersed petrified wood is present in agglomerates of the Tower, and abundant fossil flora was present in reworked clastics of the Błaszczyk moraine. A rich collection of dicotyledonous leaf, represented mainly by the genus Nothofagus and by laurophyllos plant frond impressions as well as conifer shoot imprints, was gathered and described from this site (Birkenmajer & Zastawniak 1989; Zastawniak 1994; Dutra & Batten 2000). Several hypabyssal intrusions (plug, dykes, sills) of diversified petrographic and geochemical composition cut stratiform volcanic complexes of Warszawa Terrane (Barbieri et al. 1987). Isotopic analyses (^{40}Ar-^{39}Ar of rock and U-Pb of zircons) gave Eocene ages for most of the rocks from the Area considered previously as Cretaceous, including the fossil flora bearing formations (Nawrocki et al. 2011).

Poor tundra soils occurring in the maritime Antarctic climate are difficult to describe according to criteria used in traditional soil classification systems. The first ecological and intuitive soil classification covering the maritime Antarctic, including ASPA No 128, was proposed by Everett (1976). Schaefer et al. (2007) identified 20 soil-scape units in the Arctowski Station vicinity and classified them according to their vulnerability in a geo-environmental map, partly comparable to that of more formal soil units proposed by Blume et al. (2002). Particular attention has been focused in this region on coastal soils around penguin colonies, since their fertile ecosystems are highly productive and biologically diverse. Ornithogenic soils were fully described and mapped (or indicated on air photographs) in papers by Tatur & Myrcha (1984); Tatur (1989) and Tatur (2002). Ornithogenic soils of the maritime Antarctic were subdivided into: organic soils of the rookery (with hydroxyapatite); soils of the phosphatized zone (with Al-Fe phosphates bearing K and NH4 ions) and soils accumulated from inactive reworked phosphates. Moreover, relic soils at the locations of abandoned penguin colonies were distinguished and are an important feature in the Area. The phosphatization was described as a soil forming process, investigated also in other papers (e.g. Simas et al. 2007).

- *Glaciology, streams and lakes*

The Area is shaped by valley glaciers draining the Warszawa icefield, which are constrained at the sides by exposed bedrock. Isolated rocky hills are covered by rock rubble, with glaciers and glacial deposits filling depressions among them. Prominent early Holocene cliffs may be observed in the coastal zone. Holocene raised beaches (up to 16 m a.s.l.) and more recent beaches are comprised of sand with pebbles and boulders.

Several glaciers descend into the Area, flowing eastward from the Warszawa Icefield (Map 2). These have been in continuous retreat for at least the last 30 years, with former tidal glacier fronts retreating up to 900 m inland between 1997–2007 (Battke et al. 2001; Pudełko 2007), which is consistent with a global warming trend and a local reduction in the size of floating glaciers in Admiralty Bay (Braun & Gossmann 2002) . The ice-free area of ASPA No 128 has increased from 20% in 1979 to more than 50% in 1999 (Battke et al. 2001) and continues to increase. Retreating glaciers deposited bands of ridges formed by fresh lateral moraines and ground moraines on the flat areas at the front of glaciers, often with brackish water lagoons collecting glacial meltwaters mixed with seawater (Ecology, Baranowski, and Windy glaciers). Newly exposed land and new water bodies are colonized by biota that create a unique opportunity to study succession processes in the Antarctic environment (Olech & Massalski 2001).

A number of small meltwater streams are present within the Area, mainly originating from the outlet glaciers flowing down from the Warszawa Icefield (Map 2).

- *Terrestrial ecology*

Vegetation typical of the maritime Antarctic has partially colonised the ice-free terrain within the Area. Dry areas and rocks are colonised by lichens, with flowering plants such as Deschampsia antarctica and Colobanthus quitensis locally numerous and occupying fairly large areas particularly in the vicinity of Arctowski Station. This constitutes one of the largest areas covered by these species in the Antarctic. Bryophyta and flowering plants dominate the vegetation from 0 to 60 m a.s.l., while lichens are more dominant above this elevation. Mosses can be found from the families Andreaeaceae, Bryaceae, Polytrichaceae, Pottiaceae and Grimmiaceae. Around penguin colonies the species richness and diversity is lower due to the high nitrate and ammonia content of the soil (Olech 2002; Victoria et al. 2009).

A non-native species of grass, Poa annua, was observed in 2008/09 within the Area on the deglaciated moraines of the Ecology Glacier (Olech & Chwedorzewska 2011) (approximate location 62° 10' 7"S, 58° 27' 54"W, Map 2). This species was first recorded outside of the Area, at Arctowski Station, in summer 1985/86 (Olech 1996), first in places where the soil structure had been disturbed by human activities and later within native vegetation communities (Chwedorzewska 2008)). High genetic variability suggests several separate immigration events from different sources, including Europe and South America (Chwedorzewska 2008). As of 2023/24, this species has been eradicated from the Area.

Recently, propagules and pollen of the rush Juncus bufonius were found in one location within the Area (Cuba-Diaz et al. 2012).

Three different types of mite are present in the Area: Prostigmata, Mesostigmata and Oribatida. Prostigmata is the dominant community and Oribatida is only found in ice free areas that have been ice-free for more than 30 years (Gryziak 2009).

Glacial recession has exposed new ice-free areas that are being successively colonized by microbial and invertebrate communities including algae, mites and nematodes, as well as lichens, mosses and vascular plants. The pioneer species that appeared first were the moss Bryum pseudotriquetrum, and then the grass Deschampsia antarctica. In the second stage of succession the dominance of Colobanthus quitensis was marked. The first rock-inhabiting lichens (Caloplaca johnstoni, C. sublobulata, Lecanora spp.) appeared in the third stage of succession. The substantial influence of penguin colonies, which occur in the Telefon (Patelnia) Point region, was revealed in the fourth stage. On rocks the ornithocoprophilous communities of epilithic lichens dominated, while on soil the grass Deschampsia antarctica with the nitrophilous algae (Prasiola crispa, Phormidium spp.) and mosses (e.g. Syntrichia magellanica) were prominent (Olech & Massalski 2001). The abundance of nematodes increases with the age of the ice free area and common species present are Plectus and Panagrolaimus (Ilieva-Makulec & Gryziak 2009).

- *Breeding birds*

Twelve bird species regularly breed within the Area, the most numerous of which are penguins. In 2023/24 there were 4765 breeding pairs of Adélie penguin (Pygoscelis adeliae), 432 breeding pairs of Chinstrap penguin (Pygoscelis antarcticus) and 9410 breeding pairs of Gentoo penguin (Pygoscelis papua) (unpublished data Polish Ecological Monitoring program). Interannual variation in breeding pairs is large for all these species, with changes in some years in excess of 40% (Ciaputa & Sierakowski 1999). Significant decreases in average penguin breeding numbers were observed between the four-year periods of 1978-81 and 2014-18, when an average decrease of ~66% was observed for Adélie penguins and over 87% for Chinstrap penguins, while Gentoo penguins have increased by 216%. These trends are consistent with those observed for these species at other nearby colonies on King George Island, in particular those at Lions Rump (Korczak-Abshire et al. 2013), Turret Point (Korczak-Abshire et al. 2018) and Stranger Point (Carlini et al. 2009). Hinke et al. (2017) modelled future trends in the Copacabana Adélie penguin colony based on almost 30 years of historical data (1982-2011), finding a one in three probability of >90% declines in the local population over the next 30 years, and a near 100% probability for a decline of 50%, given status-quo conditions. New methods to monitor seabird breeding performance within the Area are being applied using autonomous time-lapse photography, which is an important component of the CCAMLR Ecosystem Monitoring Program to inform fisheries management (Hinke et al. 2018).

The regional trends and breeding data suggest differential over-winter survival between the species (Hinke et al. 2007, Carlini et al. 2009), which relates to influences remote from nesting sites within the Area. Therefore, the changes being observed in populations at breeding sites within the Area are not considered related to human pressures or impacts occurring within the Area.

Table 1: Four-year averages of numbers of penguin breeding pairs within ASPA 128 (based on data from Ciaputa & Sierakowski 1999, US AMLR program unpublished data, Polish Ecological Monitoring program unpublished data).

Species	Location	Census Period				
		1978-81	**1992-96**	**2009-12**	**2014-17**	**2019-22**
Pygoscelis adeliae	Llano Point	10859	6073	2454	2853	2231
	Point Thomas	11899	9886	4578	4740	3196
	Total	*22758*	*15959*	*7032*	*7593*	*5427*

Species	Location	Census Period				
		1978-81	1992-96	2009-12	2014-17	2019-22
Pygoscelis antarcticus	Telefon Point	2029	1511	604	461	336
	Uchatka Point	1944	909	292	236	146
	Demay Point	819	263	52	15	6
	Llano Point	347	8	2	10	16
	Point Thomas	541	1	0	1	2
	Total	*5681*	*2692*	*950*	*723*	*506*
Pygoscelis papua	Llano Point	2174	1765	4646	6162	8083
	Point Thomas	715	267	90	76	0
	Total	*2889*	*2032*	*4736*	*6238*	*8083*

Nine other bird species breed within the Area: cape petrel (Daption capense); Wilson's storm petrel (Oceanites oceanicus); black-bellied storm petrel (Fregetta tropica); snowy sheathbill (Chionis albus); kelp gull (Larus dominicanus); Antarctic tern (Sterna vittata); southern giant petrel (Macronectes giganteus), whose number of active nests in the area in the 2020/21 season was 208 (143 for the Rescuers Hills nesting group, 63 for Llano Point and 2 for Petrel Hill (census date December 4, 2020)), the number of chicks 106 (66, 39 and 1 for the subgroups, respectively (census date February 8, 2020)) (Fudala & Bialik 2022a); south polar skua (Catharacta maccormicki) and brown skua (C. antarctica). Data for the latter two species show successful breeding was rare in the 2012/13 season (Table 2), when no south polar skua or mixed pairs bred. Despite the poor skua breeding performance in that season, numerous birds were present on territories (Hinke pers. comm. 2013, U.S. AMLR program). More recent data (Hinke pers. comm. 2018) show the number of breeding pairs has recovered since the low in 2012/13, and while still considerably fewer than in 2004/05 the total population was at a level similar to that in 1978/79. In 2022/23 season the number of breeding pairs of the south polar skua has exceeded the number from the 2004/05 season (Polish Ecological Monitoring program unpublished data).

Table 2: Skua breeding pair census (Carneiro et al. 2009, US AMLR program unpublished data Hinke pers. comm. 2018, Polish Ecological Monitoring program unpublished data)

Location	Brown Skua				South Polar Skua				Mixed Skua			
	2004 - 2005	2012 - 2013	2016 - 2017	2022 - 2023	2004 - 2005	2012 - 2013	2016 - 2017	2022 - 2023	2004 - 2005	2012 - 2013	2016 - 2017	2022 - 2023
Llano Point to Telefon Point	21	11	16	27	27	0	21	44	6	0	1	5

Location	Brown Skua				South Polar Skua				Mixed Skua			
	2004 - 2005	2012 - 2013	2016 - 2017	2022 - 2023	2004 - 2005	2012 - 2013	2016 - 2017	2022 - 2023	2004 - 2005	2012 - 2013	2016 - 2017	2022 - 2023
Llano Point to Telefon Point	21	11	16	27	27	0	21	44	6	0	1	5
Point Thomas	21	7	12	10	45	0	14	35	10	0	2	6

Four other penguin species (King (Aptenodytes patagonicus), Emperor (Aptenodytes forsteri), Rockhopper (Eudyptes chrysocome) and Magellanic (Spheniscus magellanicus)) are occasionally observed within the Area. Other Antarctic bird species (e.g. snow petrel (Pagodroma nivea)) are also occasionally observed within the Area (Gryz et al. 2018, Sierakowski et al. 2017).

Seven South American bird species have been observed within the Area as stray visitors that remained only temporarily: cattle egret (Bubulcus ibis), black-necked swan (Cygnus melanocoryphus), Chiloe wigeon (Anas sibilatrix), Yellow-billed pintail (Anas georgica), white-rumped sandpiper (Calidris fuscicollis), Wilson's phalarope (Pharalopus tricolor) and barn swallow (Hirundo rustica) (Poland 2002; Korczak-Abshire et al. 2011a; Korczak-Abshire et al. 2011b).

Antarctic Important Bird Area (IBA) No 046 West Admiralty Bay lies within the Area, which was identified for its large colony of Gentoo penguins and the concentration of seabirds present (Harris et al. 2015). Dias et al. (2018) identified the adjacent marine area, including all of Admiralty Bay and extending ~20 km into Bransfield Strait, as an important foraging ground for penguins breeding on the western shore of Admiralty Bay.

- *Breeding mammals*

Southern elephant seals (Mirounga leonina), Antarctic fur seals (Arctocephalus gazella) and Weddell seals (Leptonychotes weddellii) are present on beaches at numerous sites, although only southern elephant seals and occasionally Weddell seals breed within the Area. In 2009-10 six southern elephant seal harems with 238 pups were observed within the Area (Map 2), while in the same year the maximum number of Antarctic fur seals exceeded 1290 individuals (Korczak-Abshire, pers. comm.). In the 2019/20 season, southern elephant seal harems have been reported in two locations: at the Patelnia (Telefon) Point and Blue Dyke. The largest reproductive aggregation of seals forms annually on Patelnia, with 428 females recorded in this subarea at the peak of the season 2019 (October 25) (Fudala & Bialik 2022b) and the maximum number of pups reaching 418 on 4 November 2019 (Fudala & Bialik 2020). Four Weddell seal pups were observed in the Point Thomas area in 2011 (Korczak-Abshire, pers. comm. 2019). Annual seal censuses have been conducted by Poland year-round once every ten days since 1988 (Ciaputa 1996; Salwicka & Sierakowski 1998; Salwicka & Rakusa-Suszczewski 2002). A strong annual cycle in numbers is evident, with the number of southern elephant seals reaching a maximum during the moulting period from December to February and Antarctic fur seals showing a high peak around February and another lower peak around June. Leopard seals (Hydrurga leptonyx) and crabeater seals (Lobodon carcinophagus) are frequently seen on ice floes during the winter, although rarely come ashore (Salwicka & Rakusa-Suszczewski 2002).

- *Human activities / impacts*

The permanent year-round Arctowski Polish Antarctic Station (62°09'34"S, 58°28'15"W) situated 0.5 km north of the Area (Map 1) has been occupied continuously since 1977 and can host up to 70 people during the summer, and 20 during winter. Several other permanent national program stations are located nearby within Admiralty Bay, including Ferraz (Brazil) (~9.5 km from the Area), Machu Picchu (Peru) (~7.6 km from the Area) and Vincente (Ecuador) (~5.2 km from the Area). Activities of national programs operating with the region are coordinated under the Management Plan for ASMA No 1 Admiralty Bay.

A semi-permanent summer-only field camp (US) (62°10'46"S, 58°26'49"W) is situated within the Area south of Llano Point (Map 2). Known as 'Copacabana', the field camp has capacity for up to six people and has been occupied by ornithologists every summer season since it was established in 1985.

A small (16 m², 4 berth) wooden refuge (Poland) (62°13'03"S, 58°26'32"W) is situated ~300 m NW of Uchatka Point near the shore of Paradise Cove. The hut is used mostly by researchers who study the pinniped and penguin colonies located in the southern part of the Area. The refuge also serves as a base camp for glaciologists, geologists and botanists working on Baranowski and Windy Glaciers.

Admiralty Bay has been a perennial destination for tourism due to its location, historic and ecological values, and the interest provided by permanent scientific stations. Arctowski Station has been particularly popular (Chwedorzewska & Korczak 2010), with a peak of over 5000 visitors in 2007/08, although in recent years the number of tourists visiting per season ranged between 871 and 2703 (Table 3). The principal activities conducted are station visits, with extended walks, kayaking and small boat cruises also being undertaken near to, but outside of, the Area.

Table 3: Number of tourist visits to Arctowski Station 2016-2024 (Source: Seasons 2016-18: IAATO, seasons 2018-2024: Polish Ecological Monitoring program).

Season	*Number of Tourists (landed and non-landed)*	*Number of Tourists Landed only*	*Number of Vessels*
2016-17	*871*	*871*	*5*
2017-18	*2106*	*2106*	*6*
2018-19	*1300*	*1300*	*7*
2019-20	*2703*	*2703*	*13*
2020-24	*0*	*0*	*0*

The level of visitation at Arctowski Station makes the Area relatively vulnerable to the introduction of non-native species. One such species, the grass Poa annua, has established a stable population at Arctowski Station (Olech 1996), and was present on a deglaciated moraine inside the Area (approximate location 62° 10' 7"S, 58° 27' 54"W, Map 2). At the latter site approximately 70 individuals were reported spread over an area of 100 m² in 2011 (Olech & Chwedorzewska 2011), although all individuals have since been removed. Since 2014/15 Poland has embarked on a systematic eradication/monitoring program (Galera et al. 2017).

A survey of moraines within the Area in the Ecology Glacier forefield was repeated in 2015/16. Three seedlings of P. annua were found, which were documented and removed by hand tools, with the sites marked for on-going monitoring (Poland 2016). This area was re-surveyed in March 2017 and no new P. annua seedlings were found (Poland 2017). In the 2018 summer season several plants were discovered and removed from within the Area (again in the glacial forefield of Ecology Glacier). As of April 2018, no Poa annua has been found in the Area, and inspections are carried out every summer season. According to the latest unpublished data of the Polish Ecological Monitoring program, inspections carried out during the 2023/24 season excluded the presence of Poa annua in the area. The eradication of Poa annua is carried out continuously in the Arctowski Station's infrastructure area and the progress of these treatments is reported at the annual ATCM.

Historical, morphometric and genetic analyses revealed that the population in the vicinity of Arctowski Station had most likely originated from multiple introductions from Poland and perhaps also South America (Chwedorzewska et al. 2015; Galera et al. 2017), while the Ecology Glacier population within the Area had most likely been transferred directly from the station area by human activity rather than aerial dispersal (Wódkiewicz et al. 2017). Thus, eradication of the invasive species from the vicinity of Arctowski Station is important to preventing further and repeated introductions to the Area.

The first report documenting the presence of T. maculipennis on King George Island was from the Uruguayan Base Científica Antártica Artigas in 2006 (Volonterio et al. 2013). Subsequently, there have been reports of the fly within or in the surroundings of the following stations on the island: Artigas, Arctowski, Escudero, Frei, Fildes, and King Sejong. This species has established itself in natural areas, as well as within buildings such as sewage treatment plants, scientific research stations, military bases, and hydroponic installations (Hughes et al. 2005; Volonterio et al. 2013).

The non-native T. maculipennis fly was first reported at the Polish Antarctic Arctowski Station with live larvae and adult individuals in the sewage system in October 2017 (Potocka & Krzemieńska 2018). Only a few adult individuals were observed outside the facility at a distance of less than 50 cm from the septic tank (Potocka et al. 2020). Since their discovery, their presence has been recorded on a regular basis. Imago individuals of T. maculipennis have been recorded at Arctowski Station throughout the year.

Systematic monitoring and control measures have been carried out at the Arctowski Station to eradicate T.maculipennis. After the initiation of several control measures, the number of recorded individuals dropped significantly, with fewer than 10 individuals being observed during the summer of 2019/20. In the 2020/21 season, 1 individual was found in the adhesive trap in a 4°C storage container, and no flies were found in the septic tank or in the buildings. The number of individuals recorded on adhesive traps on station infrastructure increased to 33 individuals reported in two summer seasons combined: between November 2021 and the beginning of April 2023. T. maculipennis was not found in the septic tank during these seasons.

In the 2022/23 season, a new sewage treatment plant and storage system were implemented at Arctowski Station. Monitoring and eradication of the fly are carried out continuously on the station's infrastructure and will be continued.

In December 2022, imago individuals of the genus Trichocera were reported at two locations within the Area (Poland, 2023). Approximately 23 individuals were observed at a stream located near Llano Point (58° 27' 3.114" S, 62° 9' 45.6156" W), and more than 30 individuals were observed in the Rakusa Point area (58° 27' 37.8756" S, 62° 9' 45.6156" W) on the shore opposite the Glacier Ecology lagoon. Trichocera monitoring within the Area was implemented in the 2023/24 season by the Polish Ecological Monitoring Program and confirmed the presence of the fly at another location, at Blue Dyke (58° 26' 53.772" S, 62° 13' 24.672" W). All subsequent results will be reported to the ATCM.

It should be taken into account that T.maculipennis may occur at numerous locations on King George Island beyond the Area, so eradication efforts should be coordinated among all Antarctic programs active on King George Island.

Arctowski Station has been closed to tourist visits since the 2020/21 season due to the COVID-19 pandemic and for station renovations (Poland 2021). The station is planned to remain closed to tourist visits until at least the 2025/26 season, due to minimise the risk of the further uncontrolled spread of the non-native species Poa annua and Trichocera maculipennis.

6(ii) Access to the Area

The Area may be accessed by traversing over land or sea ice, by sea or by air. Particular routes have not been designated for access to the Area. Small boat access, overflight and aircraft landing restrictions apply within the Area, the specific conditions for which are set out in Section 7(ii) below.

6(iii) Location of structures within and adjacent to the Area

Two structures are located within the Area (Map 2): Copacabana Field Camp (US) (62° 10' 45.89" S, 58° 26' 49.27" W), located ~500 m south of Llano Point and consisting of three wooden huts to accommodate up to six people. A four-berth wooden refuge (Poland) (62° 13' 2.9" S, 58° 26' 32.27" W) is located in Paradise Cove ~1.2 km SW of Demay Point.

6(iv) Location of other protected areas in the vicinity

ASPA No 125, Fildes Peninsula, King George Island, and ASPA No 150, Ardley Island, Maxwell Bay, King George Island, lie ~27 km west of the Area (Map 1). ASPA No 132, Potter Peninsula, and ASPA No 171 Narebski Point, Barton Peninsula, lie ~15 km and ~19 km to the west respectively on King George Island. ASPA No 151, Lion's Rump, King George Island, lies ~20 km to the east of the Area (Map 1). Historic Monument No 51, consisting of the grave of Wlodzimierz Puchalski surmounted by an iron cross, is situated ~80 m outside of the northern boundary of the Area (Map 2).

The Area lies within Antarctic Specially Managed Area (ASMA) No 1 Admiralty Bay, King George Island, South Shetland Islands (Map 1).

6(v) Special zones within the Area

There are no zones designated within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority. Conditions for issuing a permit for the Area are that:

- It is issued for scientific research, and in particular for research on the avifauna in the Area, or for compelling scientific, educational or outreach reasons that cannot be served elsewhere, or for reasons essential to the management of the Area;
- The actions permitted are in accordance with this Management Plan;
- The activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the environmental, ecological and scientific values of the Area;
- Approach distances to fauna must be respected, except when the scientific projects may require otherwise and this is specified in the relevant permits;
- The Permit shall be issued for a finite period;
- The Permit, or a copy, shall be carried when in the Area.

7(ii) Access to, and movement within or over, the Area

Access into the Area is permitted on foot, by small boat or by aircraft. Vehicles are prohibited within the Area. Access to bird breeding areas during the breeding season (01 October to 31 March) is restricted to visitors conducting or supporting scientific research, carrying out educational or outreach activities consistent with the aims and objectives of the Management Plan, or undertaking essential management activities.

- *Foot access and movement within the Area*

Persons on foot should at all times avoid disturbance to birds and seals, and damage to vegetation. Pedestrians entering the Area from the vicinity of nearby Arctowski Station should be particularly mindful of the potential to transfer plant material or seeds of the invasive non-native grass Poa annua and observe the precautions set out below in Section 7(v) to minimize the risk of further spread.

Pedestrians should maintain the following minimum approach distances from wildlife, unless it is necessary to exceed these for purposes allowed for by the permit:

- Southern giant petrels (Macronectes giganteus) – 50 m
- breeding/moulting other birds and seals, and Antarctic fur seals (for personal safety) – 15 m
- non-breeding birds and seals – 5 m.

Pilots, air, or boat crew, or other people in boats or aircraft are prohibited from moving on foot beyond the immediate vicinity of their landing site or the hut facilities unless specifically authorised by Permit. Visitors should move carefully so as to minimize disturbance to flora, fauna, and soils, and should walk on snow or rocky terrain where practical and avoid vegetated areas. Where possible avoid moist ground where foot traffic can easily damage sensitive soils, plant and algal communities, and degrade water quality. Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects.

- *Small boat access*

Access from the sea is permitted only by small boat. Access to the beach area between Llano Point and Sphinx Hill (Map 2) from the sea is prohibited in order to avoid interference with animal communities that are the subject of long-term and ongoing research, except for the purpose of visiting 'Copacabana' Field Camp for purposes allowed for by Permit, or in an emergency. The recommended landing sites for small boats are at the following locations (Map 2):

- on the beaches at Halfmoon Cove or Arctowski Cove, both of which are outside of the Area where no permit for entry is required;
- on the beach immediately in front of 'Copacabana' Field Camp (US); or
- on the beach immediately in front of the refuge (PL) in Paradise Cove.

Access from the sea to any sites suitable for landing south of Sphinx Hill is allowed, provided this is consistent with the purposes for which a Permit has been granted. Visitors to the Area by small boat should inform Arctowski Station.

- *Access and overflight by piloted aircraft and Remotely Piloted Aircraft Systems (RPAS)*

Due to the widespread presence of seabirds and pinnipeds within the Area during the breeding season (01 October – 31 March), access to the Area by piloted aircraft in this period is strongly discouraged. All restrictions on aircraft access and overflight apply between 01 October – 31 March inclusive, when aircraft shall operate and land within the Area according to strict observance of the following conditions:

- Piloted aircraft should maintain a horizontal and vertical separation distance 2000 ft (~610 m) from the coast generally, and from the breeding wildlife colonies in particular, as identified on Map 2, unless otherwise authorized by permit;
- Weather with a low cloud ceiling often prevails over King George Island, particularly in the vicinity of the permanent ice caps such as the Warszawa Icefield. Piloted aircraft should avoid the Area unless it is possible to maintain safely the minimum horizontal and vertical separation distance of 2000 ft (~610 m) given above;
- Landing of helicopters within the Area is generally prohibited, except on permanent glaciers or in an emergency;
- Helicopters operating in the region may land at the designated landing site located at Arctowski Station (62° 9.536' S, 58° 28.20' W) which should be approached from the NE over Admiralty Bay. Helicopter overflight of the northern boundary of Area where many birds and seals are present should be avoided;
- Use of smoke grenades to indicate wind direction is prohibited within the Area unless absolutely necessary for safety, and any grenades used should be retrieved;
- In circumstances not covered above piloted aircraft should, as a minimum standard, comply with the Guidelines for the Operation of Aircraft near Concentrations of Birds contained in Resolution 2 (2004);
- Overflight below 2000 ft (610 m) and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

7(iii) Activities that may be conducted within the Area

- Scientific research that will not jeopardize the ecosystem or values of the Area;
- Activities with educational and / or outreach purposes that cannot be served elsewhere;
- Activities with the aim of preserving or protecting historic resources within the Area;
- Essential management activities, including management of non-native species within the Area, monitoring and inspection;

- Activities at the site within the Area known to have been colonised by the invasive grass Poa annua (Map 2) are specifically restricted to research or management related to the non-native species, and other access to this site is prohibited unless access is necessary for other compelling scientific or management reason(s) that cannot be served elsewhere. Those accessing the site shall take precautions not to spread the grass further by thoroughly inspecting and cleaning footwear, equipment and clothing before moving to another location both within or outside of the Area.

7(iv) Installation, modification or removal of structures / equipment

- No structures are to be erected within the Area except as specified in a permit and, with the exception of permanent survey markers and signs, additional permanent structures or installations are prohibited;
- All structures, scientific equipment or markers installed in the Area must be authorized by permit and clearly identified by country, name of the principal investigator, year of installation and date of expected removal. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination or damage to the values of the Area;
- Installation (including site selection), maintenance, modification or removal of structures or equipment shall be undertaken in a manner that minimizes disturbance to values of the Area, preferably avoiding the main breeding season (01 Oct – 31 Mar);
- Removal of specific structures / equipment for which the permit has expired shall be the responsibility of the authority which granted the original permit, and shall be a condition of the permit.

7(v) Location of field camps

The facilities ‘Copacabana’ Field Camp (United States) and refuge (Poland) at Paradise Cove (Map 2) provide limited accommodation for scientific use subject to the permission of the appropriate authority. Camping is prohibited elsewhere within the Area.

7(vi) Restrictions on materials and organisms that may be brought into the Area

In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, restrictions on materials and organisms that may be brought into the area are:

- Deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. Precautions shall be taken to prevent the accidental introduction of animals, plant material, micro-organisms and non-sterile soil from other biologically distinct regions (within or beyond the Antarctic Treaty area).

- Visitors shall ensure that sampling equipment and markers brought into the Area are clean. To the maximum extent practicable, footwear and other equipment used or brought into the area (including backpacks, carry-bags and other equipment) shall be thoroughly cleaned before entering the Area. This is particularly important when travelling to the Area from nearby Arctowski Station where the invasive grass Poa annua has become established, and footwear and equipment that has potential to be contaminated should be cleaned before departing the station and not worn or used around the station before entering the Area. Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016), CEP 2019), and in the Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica (Resolution 5 (2018)).
- All poultry brought into and not consumed or used within the Area, including all parts, products and / or wastes of poultry, shall be removed from the Area or disposed of by incineration or equivalent means that eliminates risks to native flora and fauna;
- Herbicides and pesticides are prohibited from the Area;
- Fuel, food, chemicals, and other materials shall not be stored in the Area, unless specifically authorized by permit and shall be stored and handled in a way that minimises the risk of their accidental introduction into the environment;
- All materials introduced shall be for a stated period only and shall be removed by the end of that stated period; and
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.

7(vii) Taking of, or harmful interference with, native flora or fauna

Taking or harmful interference with native flora and fauna is prohibited, except in accordance with a permit issued under Article 3 of Annex II of the Protocol on Environmental Protection to the Antarctic Treaty. Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(viii) Collection or removal of materials not brought into the Area by the permit holder

- Material may be collected or removed from the Area only in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. This includes biological samples, rock specimens, whale bones, artefacts of the whaling industry, and any other historical item.
- Material of human origin likely to compromise the values of the Area, and which was not brought into the Area by the permit holder or otherwise authorized, may be removed from the Area, unless the impact of removal is

likely to be greater than leaving the material in situ: if this is the case the appropriate authority must be notified and approval obtained.

7(ix) Disposal of waste

All wastes shall be removed from the Area, except human wastes and domestic liquid wastes, which may be removed from the Area or disposed of into the sea.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- Carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
- Install or maintain signposts, markers, structures or scientific or essential logistic equipment;
- Carry out protective measures, which may include mechanical removal of non-native species by hand tools;
- Carry out research or management in a manner that avoids interference with long-term research and monitoring activities or possible duplication of effort. Persons planning new projects within the Area should consult with established programs working within the Area, such as those of Poland and the US, before initiating the work.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority after the visit has been completed in accordance with national procedures and permit conditions.
- Such reports should include, as appropriate, the information identified in the visit report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Parties that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Parties should, wherever possible, deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organising the scientific use of the Area.
- The appropriate authority should be notified of any activities / measures that might have been exceptionally undertaken, or anything released and not removed, that were not included in the authorized permit.

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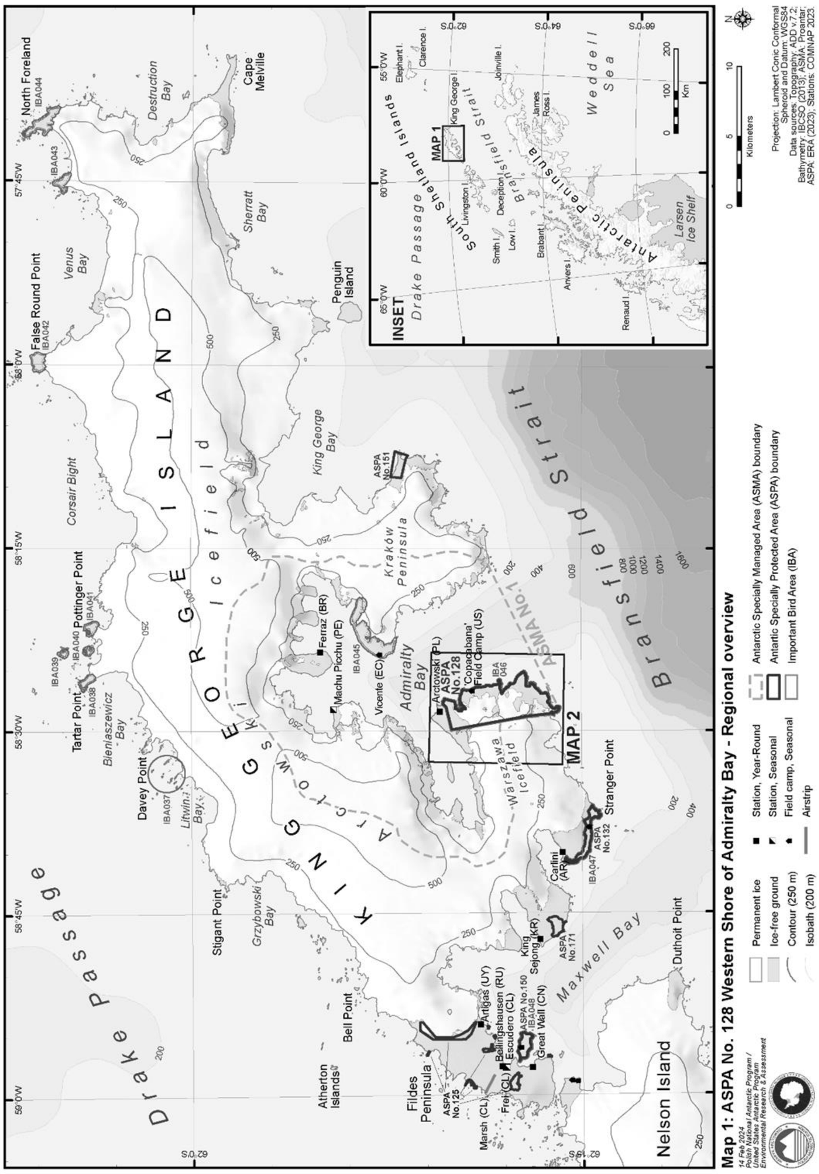
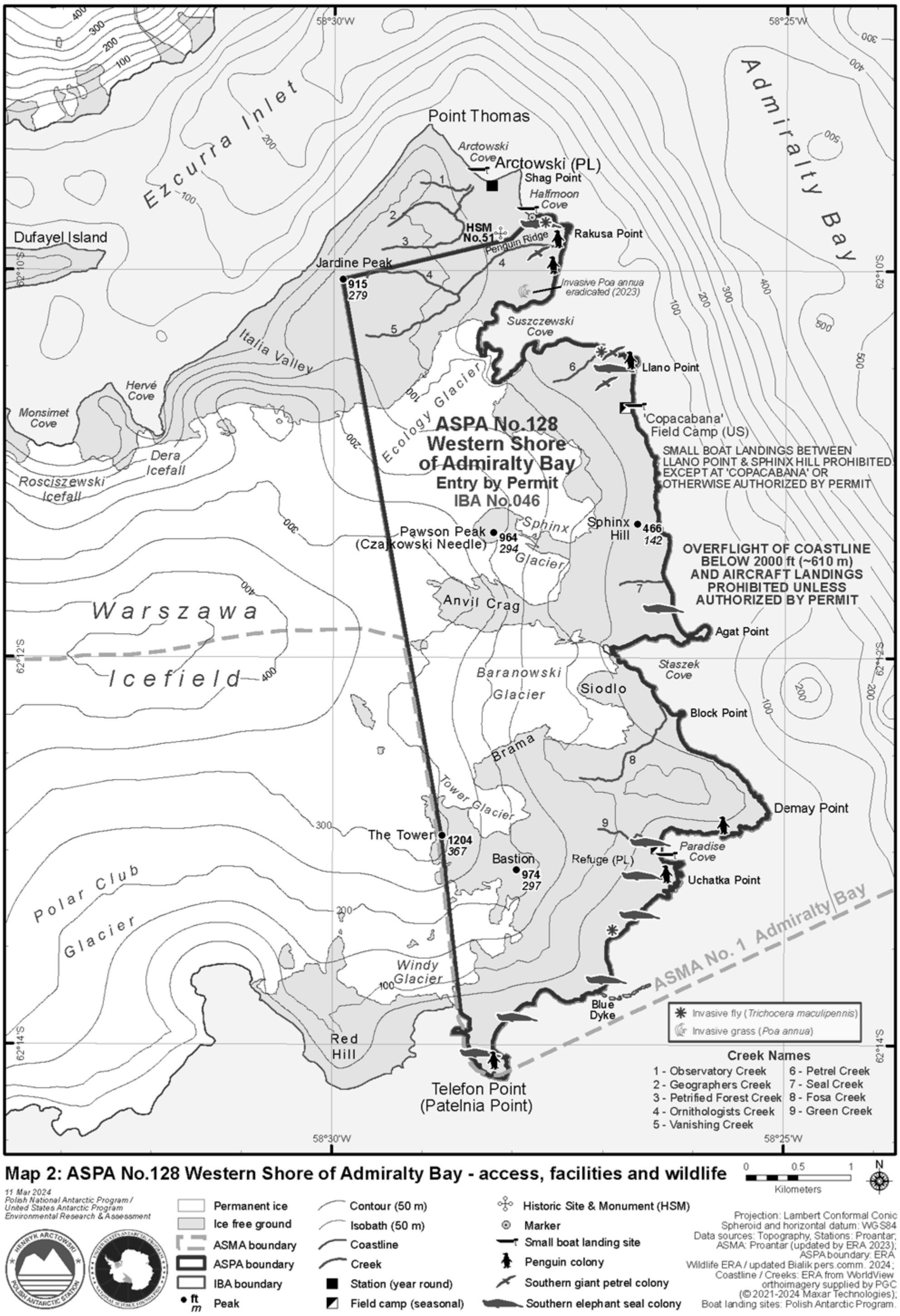




Map 2: ASPA No.128 Western Shore of Admiralty Bay - access, facilities and wildlife

Measure 3 (2024)

Antarctic Specially Protected Area No 135 (North-east Bailey Peninsula, Budd Coast, Wilkes Land): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XIII-8 (1985), which designated North-east Bailey Peninsula, Budd Coast, Wilkes Land as Site of Special Scientific Interest ("SSSI") No 16 and annexed a Management Plan for the Site;
- Resolution 7 (1995) and Measure 2 (2000), which extended the expiry date of SSSI 16;
- Decision 1 (2002), which renamed and renumbered SSSI 16 as ASPA 135;
- Measures 2 (2003), 8 (2008) and 6 (2013), which adopted revised Management Plans for ASPA 135;

Recalling that Recommendation XIII-8 (1995) was designated as no longer current by Measure 13 (2014);

Recalling that Resolution 7 (1995) was designated as no longer current by Decision 1 (2011);

Recalling that Measure 2 (2000) did not become effective and was withdrawn by Measure 5 (2009);

Recalling that the Committee for Environmental Protection ("CEP") XXII (2019) reviewed and continued without changes the Management Plan for ASPA 135, which is annexed to Measure 6 (2013);

Noting that the CEP has endorsed a revised Management Plan for ASPA 135;

Desiring to replace the existing Management Plan for ASPA 135 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 135 (North-east Bailey Peninsula, Budd Coast, Wilkes Land), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 135 annexed to Measure 6 (2013) be revoked.

Management Plan for Antarctic Specially Protected Area No 135

NORTH-EAST BAILEY PENINSULA, BUDD COAST, WILKES LAND

Introduction

North-east Bailey Peninsula (66°16’59.9"S, 110°31’59.9"E) is located adjacent to the eastern border of Australia’s Casey station in the Windmill Islands region of the Budd Coast, Wilkes Land, East Antarctica. It was designated as Site of Special Scientific Interest (SSSI) No 16 under Recommendation XIII-8 (1985), following a proposal by Australia. In accordance with Decision 1 (2002), the site was re-designated and renumbered as Antarctic Specially Protected Area (ASPA) No 135. Revised Management Plans for the Area have been adopted under Measure 2 (2003), Measure 8 (2008) and Measure 6 (2013). The Area was designated primarily as a scientific reference site which, since the early 1980s, has supported a range of studies on the diverse assemblage of vegetation found in the area. Three moss species, 1 liverwort species, 30 lichen species, and over 140 cyanobacterial and algal species have been found in the Area. The immediate proximity of the Area to Casey station allows for ease of access for field research, but subsequently increases the potential for disturbance of sensitive areas so must be managed carefully. The Area is also frequently accessed by Casey station personnel for essential maintenance of communications infrastructure.

1. Description of values to be protected

The North-east Bailey Peninsula, ASPA No 135, is representative of a diverse assemblage of the Windmill Islands region flora. As such, the Area has intrinsic ecological value and scientific importance, particularly to botanists, microbiologists, soil scientists and glacial geomorphologists, and is designated to protect the communities and ecosystem from further human impact.

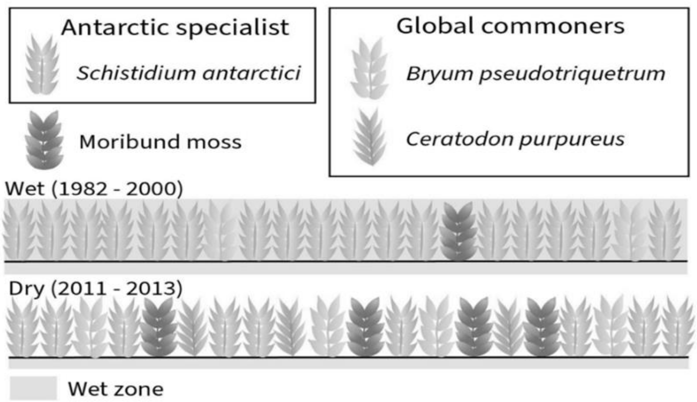
The Area contains several extensive and contrasting moss fields that have been the subject of taxonomic, ecological and physiological studies since the summer of 1982/83 (see Map C). Additional studies have included population ecology of invertebrates associated with the vegetation and soil/water chemistry. Long-term monitoring sites have been established to observe lichen and moss as well as long term vegetation changes (see Map E). Other floral studies have concentrated on the determination of biodiversity, physiological and biochemical attributes, component interactions, impact of anthropogenic pollutants, and effects of global climate change.

Moss and lichen communities are used as indicators of environmental impacts of Casey station. The Area provides baseline data for comparison with changes in similar plant communities in the immediate surroundings of Casey station. The Area also serves as a valuable comparative site for similar plant communities in ASPA 136 Clark Peninsula, which are subject to less environmental stress and disturbance, due to lower human proximity.

Global change studies have included a multi-year investigation into the impact of water and nutrients on various components of the vegetation, associated studies into the tolerance of mosses to both submergence and desiccation, and examination of the tolerance of three moss species to increased UV-B radiation as a result of ozone depletion. Fine-scale analysis of genetic diversity of the cosmopolitan moss species Ceratodon purpureus has been compared for this location and others in the region and globally (Biermsa et al., 2022). Complex UV-active compounds have also been isolated for Antarctic C. purpureus with similarities to populations in Australia. Dating of long cores of mosses using ^{14}C shows that these individual moss plants are up to 100 years old and stable carbon isotopes of moss shoots, which provide a signature for changes in site water availability, indicate that moss beds have become drier since the 1960s (Robinson et al., 2018). This study also indicates that mosses in the Area have a higher rate of drying (60% of cores) than the Windmill Islands regional mean (40% of cores), perhaps due to modification of the site prior to ASPA designation.

The Area is included within the geographic coverage of an Australian Antarctic program State of the Environment Indicator 72 “Windmill Islands terrestrial vegetation dynamics”, which involves quantitative analysis of a series of long-term transects across selected vegetation since 2003, with the aim of monitoring the effects of climate change on Antarctic cryptogamic communities. This indicator was last updated in 2022. Monitoring indicates that since the 1980s the two cosmopolitan moss species, Ceratodon purpureus and Bryum pseudotriquetrum, have expanded into locations that were previously dominated by the endemic species Schistidium antarctici (see Figure 1).

Figure 1: Moss community change in ASPA 135 since the 1980s (redrawn from Robinson et al., 2018). Replacement of the endemic species Schistidium antarctici, which prefers wetter conditions, with two more generalist native species, Bryum pseudotriquetrum and Ceratodon purpureus, that prefer drier conditions. Samples collected since 2011 also contain more individual plants that appear dead.



However, there is also evidence that vegetation health may have improved since ASPA designation, with moss regrowth on the old station access road and most indicators showing that moss is less stressed (2003-2014) than the other State of the Environment site at Robinson Ridge.

2. Aims and objectives

Management of the Area aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance in the Area;
- allow scientific research on the ecosystem and elements of the ecosystem in particular on lichen and moss species, algae, invertebrates while ensuring protection from over-sampling;
- preserve a part of the natural ecosystem as a reference for recovery from human impacts, including the direct and indirect effects of Casey station;
- prevent or minimise the introduction of non-native plants, animals and microbes to the Area;
- minimise the possibility of the introduction of pathogens which may cause disease in fauna populations within the Area; and
- allow for the continued maintenance and operation of essential communications infrastructure, including a transmitter mast, antennas, feed lines and associated facilities, without degradation of the Area’s values.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- a copy of this Management Plan made available at Casey station;
- signage installed at the Area boundary illustrating the location, boundaries and restrictions that apply to the Area to prevent inadvertent entry;
- markers, signs and structures erected within the Area for scientific or management purposes, and secured, maintained in good condition and removed when no longer required;
- abandoned equipment or materials removed to the maximum extent possible provided it does not adversely impact on the values of the Area;
- detailed mapping of dense vegetation and ongoing scientific experimental sites to manage human movement and disturbance;
- visitation of the Area as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it is designated and to ensure that management activities are adequate; and
- review of the Management Plan at least every five years with updating as required.

4. Period of designation

This Area is designated for an indefinite period.

5. Maps

Map A: Antarctic Specially Protected Areas, Windmill Islands, East Antarctica

Map B: Antarctic Specially Protected Areas No 135, North-east Bailey Peninsula: Topography and Bird Distribution

Map C: Antarctic Specially Protected Areas No 135, North-east Bailey Peninsula: Vegetation

Map D: Antarctic Specially Protected Areas No 135, North-east Bailey Peninsula: Geology

Map E: Antarctic Specially Protected Areas No 135, North-east Bailey Peninsula: Long term scientific monitoring sites

Map specifications:

- Projection: UTM Zone 49

- Horizontal Datum: WGS84

Figure 1: Diagram of moss community change in ASPA 135 since the 1980s

Figure 2: Map of moss health within ASPA 135 site

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

- *General description*

The Area is located on Bailey Peninsula in the Windmill Islands region of Budd Coast, Wilkes Land, East Antarctica (Map A). Bailey Peninsula is an area of rock exposures and permanent snow and ice fields lying between Newcomb Bay and O'Brien Bay, 2 km south of Clark Peninsula.

The Area is located in the north-east of Bailey Peninsula, adjacent to Casey station (66°16'59.9"S, 110°31'59.9"E), and covers an area of approximately 0.28 km². The boundary is irregular, extending in the north to within approximately 70 m south of Brown Bay. Boundary coordinates for the Area are shown in Appendix 1.

Topographically, Bailey Peninsula comprises low-lying, rounded ice-free rocky outcrops (maximum altitude approximately 40 m), which rise from the coast to the Løken Moraines (altitude approximately 130 m). Intervening valleys are filled with permanent snow or ice, or glacial moraine and exfoliated debris, and contain water catchment areas. The topography of Bailey Peninsula is shown at Map B.

- *Environmental Domains Analysis*

North-east Bailey Peninsula is located within Environment D East Antarctic coastal geologic (Resolution 3 (2008)).

- *Antarctic Conservation Biogeographic Regions*

North-east Bailey Peninsula is located within Biogeographic Region 7 East Antarctica (Resolution 6 (2012)).

- *Important Bird Areas in Antarctica*

North-east Bailey Peninsula does not represent an Important Bird Area (Resolution 5 (2015)).

- *Vegetation and microbial communities*

The vegetation of Bailey Peninsula is exceptionally well developed and diverse and the Area represents one of the most important botanical sites on continental Antarctica. Within the relatively complex plant communities and contrasting habitats found on Bailey Peninsula, at least 30 lichens, three mosses, and a liverwort have been found. There are expansive dense stands of macrolichens and in the more moist and sheltered areas bryophytes form closed stands of 25-50 m^2 with turf up to 11 cm in depth (Waterman et al., 2015). Together with the lichens Umbilicaria decussata, Pseudephebe minuscula and Usnea sphacelata mixed bryophytes dominate the vegetation cover of most of the ice-free areas. This is particularly so on the north-east and centre of the Peninsula where there are dense communities similar to those found on Clark Peninsula. The most complex bryophyte communities are restricted to small locally moist hollows adjacent to melt pools and streams in the central north-east and central parts of the Peninsula. Vegetation is absent or poorly developed on the ice-free areas of the Peninsula's southern coast. In many areas mosses appear to be becoming increasingly moribund and are being out-competed or overgrown by lichens (Wasley et al., 2012, King et al., 2020, Bergstrom et al., 2021). Stressed bryophytes have also been noted in the Area, especially for exposed ridges of moss beds, as indicated by shifts in pigmentation from green to red or brown. However, the progression of moss from green to red/brown appears slower at ASPA 135 than at the nearby Robinson Ridge site (King et al., 2020). Stable isotopes analysis of moss shoots has shown that growth rates have slowed since the 1980s associated with drying of the moss beds (Robinson et al., 2018). Map C provides contemporary spatial data for bryophytes present in the Area and shows all areas for which bryophytes have been detected – subsequently bryophyte distributions may appear overrepresented and may be more accurately depicted when further refinement of the spatial data is possible. Appendix 2 provides a list of bryophytes and lichens identified in the Area.

Two principal cryptogamic subformations are recognised; a lichen-dominated association occupying a variety of windswept substrata ranging from bedrock to gravel, and, a short cushion and turf moss subformation comprising four moss dominated groupings. The vegetation of Bailey Peninsula is shown at Maps C and E.

At least 150 taxa of non-marine algae and cyanobacteria have been isolated; these include 50 cyanobacteria, 70 chlorophytes and 23 chromophytes. The taxa have been found in snow and ice, soil, rocks, ephemeral ponds, tarns and lakes; 24 cyanobacterial and algal species occur in the snow. Snow algae are abundant and widespread in the icy corridors between the rocky outcrops and in semi-permanent snow drifts. A list of cyanobacterial and algal species from the Area, Bailey Peninsula, and the Windmill Islands region is shown in Appendix 3. At least 48 species of diatoms have been identified from within Windmill Islands moss turfs (Bishop et al., 2020).

The vegetated soils of Bailey Peninsula contain fungal hyphae, yeasts, fungal propagules, an assortment of algae, cyanobacteria, protozoa, and provide a significant habitat for soil microfauna such as nematodes, mites, rotifers and tardigrades. There is relatively low fungal diversity in the Windmill Islands region, with 35 taxa representing 22 genera of fungi being isolated from soils, mosses, algae and lichens. Thirty fungal taxa have been detected in soils in the vicinity of Casey station with 12 of these taxa restricted to anthropogenically influenced soils around the station suggesting that there may be a non-native element in this flora, Penicillium species dominate in these sites. Within the Windmill Islands region, 21 fungal taxa have been isolated the mosses, with 12 taxa isolated from algae and 6 from lichens. A number of fungi have also been found associated with animals of the region. Appendix 4 provides detail of the taxa and their source.

Genomic analysis of soil microbial flora is currently under investigation. There have been some genomic analyses of mosses, especially C. purpureus, results indicating that the species in the Windmill Islands is distinct from the conspecific found in the Maritime Antarctic (Biersma et al., 2020).

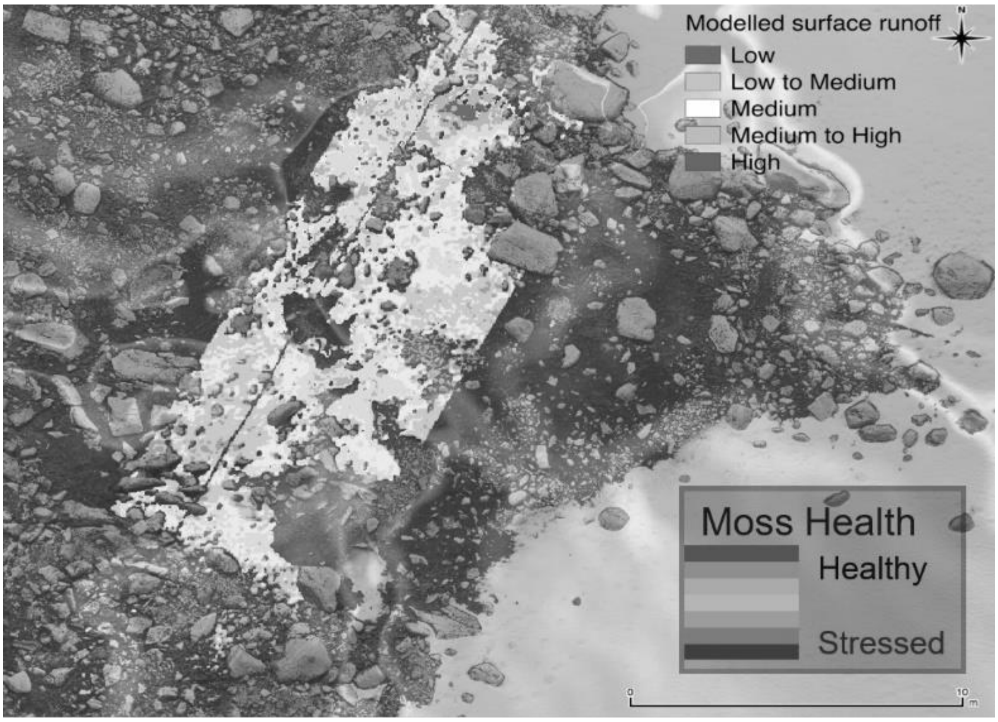
Protozoa have been studied at a number of sites on Bailey Peninsula and in the Area ciliates and testate amoebae are active. 27 ciliate species and six testacean species have been found (see Appendix 5). Remotely piloted aerial systems (RPAS) have been deployed in ASPA 135 and a range of vegetation health metrics developed (see Figure 2).

Figure 2: Map of relative moss vigour at the Antarctic Specially Protected Area (ASPA) 135 (redrawn from Malenovsky et al., 2017). Australian Antarctic Program State of the Environment study site. Map derived from RPAS hyperspectral image overlaid onto snowmelt runoff map to illustrate main water drainage pathways observed at ASPA 135 in February 2013.

As full aerial coverage with appropriate sensors is achieved, these will allow for more comprehensive vegetation health assessments to be applied across ASPA 135, whilst maintaining minimal disturbance.

- *Terrestrial invertebrates*

The Antarctic flea Glaciopsyllus antarcticus has been found in the nests of southern fulmars in the vicinity of Bailey Peninsula. A number of species of mallophagan lice have also been found on birds, and the anopluran louse Antarctophthirus ogmorhini is found on the Weddell seal Leptonychotes weddellii.



The free-living mite Nanorchestes antarcticus has been found on Bailey Peninsula at sites characterised as having sandy or gravelly soils, free of extensive moss or lichen cover, and moist but not water-logged.

Five species of tardigrades have been collected on Bailey Peninsula: Pseudechiniscus suillus, Macrobiotus sp., Hypsibius antarcticus, Ramajendas frigidus and Diphascon chilenense. Significant positive associations between bryophytes and the most common species of tardigrades P. suillus, H. antarcticus and D. chilenense, have been found, and strong negative associations between those species and algae and lichens have been established. No systematic or ecological accounts of nematodes have yet been published for the Windmill Islands region.

- *Birds*

Snow petrels Pagodroma nivea and Wilson’s storm petrels Oceanites oceanicus breed throughout the Windmill Islands including close to the Area and may nest within the Area. Snow petrels are seen all year round. Adélie penguin Pygoscelis adeliae, are the most abundant bird species breeding at ice free sites throughout the Windmill Islands (Southwell et al., 2021). The nearest breeding colony is on Shirley Island about 1.5 km west of Casey station. The Antarctic skua Catharacta maccormicki breeds throughout the Windmill Islands region at widely dispersed nests, mostly near Adélie penguin colonies. Skuas use the lake in the Area for bathing.

- *Climate*

The climate of the Windmill Islands region is frigid-Antarctic. Climate records from nearby Casey station (altitude 32 m) show mean temperatures for the warmest and coldest months of 2.2 and -11.4°C respectively, extreme temperatures ranging from 9.2 to -34°C, and mean annual maximum and minimum temperatures of –5.9°C and –12.5°C respectively. The climate is dry with a mean annual snowfall of 219 mm year (rainfall equivalent), precipitation as rain has been recorded in the summer and recently in July 2008 and July 2009.

There is an annual average wind speed of 25 km per hour. Gale winds are predominantly from the east, off the polar ice cap. Blizzards may occur very suddenly and are a frequent occurrence especially during winter. Snowfall is common during the winter, but the extremely strong winds scour the snow off exposed areas of the Peninsula. On most hill crests on Bailey Peninsula snow gathers in the lee of rock outcrops and in depressions in the substratum. Further down the slopes snow forms deeper drifts.

- *Geology and soils*

Bailey Peninsula is part of the northern gradation of a metamorphic grade transition which separates the northern part of the Windmill Islands region from the southern part. The metamorphic grade ranges from amphibolite facies, sillimanite-biotite-orthoclase in the north at Clark Peninsula, through biotite-cordierite-almandine granulite, to hornblende-orthopyroxene granulite at Browning Peninsula in the south. The Ardery Charnockite of the south is prone to deep weathering and crumbles readily because of its mineral assemblage, whereas the metamorphic sequences of the northerly parts of the region have a much more stable mineral assemblage and crystalline structure. This difference has a significant influence on the distribution of vegetation in the Windmill Islands region with the northern rock types providing a more suitable substrate for slow growing lichens.

The leucocratic granite gneiss, which constitutes the main outcrop on Bailey Peninsula, may be subdivided into leucogneiss and two different types of garnet-bearing gneiss. The outcrop on Bailey Peninsula is characterised as a garnet-bearing gneiss type 1 which is white, medium grained and foliated. The foliation is defined by the alignment of an early biotite generation that is tight to openly folded, with a garnet and a later biotite generation that overgrows the fabric. Unmetamorphosed and undeformed dolerite dykes occur over Bailey Peninsula such as at "Penguin Pass" (66°17’18"S, 110°33’16"E), to the south of the Area. Small outcrops of metapelite, metapsammite and leuco- gneisses occur on the Peninsula. Recent geochronology of the rocks of the Windmill Islands region suggest two major phases of metamorphism, the first at c. 1400-1310 Ma, an upper amphibolite facies event, followed by a granulite facies overprint c. 1210-1180 Ma. The geology of Bailey Peninsula is shown at Map D.

The Windmill Islands region was glaciated during the Late Pleistocene. The southern region of the Windmill Islands was deglaciated by 8000 corr. yr B.P., and the northern region, including Bailey Peninsula deglaciated by 5500 corr. yr B.P. Isostatic uplift has occurred at a rate of between 0.5 and 0.6 m/100 yr, with the upper mean marine limit, featured as ice-pushed ridges, being observed on Bailey Peninsula at approximately 30 m where they extend in continuous rows from the present sea- level.

Soils on Bailey Peninsula are derived from weathered gneiss, moraine deposits and outwash gravels stemming from glacial episodes. Seabirds have a large impact on soil formation in the entire landscape. Soils are frozen much of the year during summer, the upper 30-60 cm thaws with the few top centimetres, refreezing at night. Soils are mainly formed by cryoturbation and cryoclastic weathering. In the vicinity of Casey station most soils are classified by Blume, Kuhn and Bölter (2002) as cryosols with lithic, leptic, skeletal, turbic and stagnic subunits. Other soils in the Area are gelic subunits of histosols, podzols, and regosols, boulder and rock outcrops with ecto- and endolithic flora are classified as Lithosols. ASPA 135 was the site of an abandoned penguin colony, isolated due to isostatic uplift between 3-8000 years ago, that provides a rich ancient guano nutrient source for the current vegetation.

- *Lakes*

Cold monomictic lakes and ponds occur throughout the Windmill Islands region in bedrock depressions and are usually ice-free during January and February. Nutrient rich lakes are found near the coast, in close proximity to penguin colonies or abandoned colonies, sterile lakes are located further inland and are fed by meltwater and local precipitation. A number of these lakes and ponds occur across Bailey Peninsula with two large lakes located 500 m to the west of the Area. The distribution of lakes and ponds on Bailey Peninsula is shown at Map B.

6(ii) Access to the Area

The north-west boundary of the Area is located adjacent to the eastern boundary of Casey station limits, and the Area is easily accessible by foot. Vehicle access to and within the Area is covered under section 7(ii) of this plan.

6(iii) Location of structures within and adjacent to the Area

Casey station (Australia) is located immediately west of the Area (the station limits boundary abuts the ASPA boundary). An array of radio transmitters had been progressively established at the site since 1964, until the designation of the Area in 1986, and have since been removed once redundant. A number of structures remain within the Area (see Maps B-E), including the Transmitter hut (which can also be used as an emergency refuge), Transmitter mast – a 45 m high tandem delta antenna mast and a non-directional beacon antenna located in the south-east, – and long-term monitoring markers. A 35 m high mast is located approximately 100 m south of the Area, which together with the Transmitter mast, forms the basis of the Casey High Frequency (HF) Transmit installation.

6(iv) Location of other Protected Areas in the vicinity

Other protected areas in the vicinity include (see Map A):

- ASPA No 136, Clark Peninsula, (66°15'S, 110°36'E): located 2.5 km to the north-east, across Newcomb Bay;
- ASPA No 103, Ardery and Odbert Islands (66°22'20"S, 110°29'10"E): located approximately 11 km to the south, west of Robinson Ridge; and
- ASPA No 160, Frazier Islands (66°14'S, 110°10'E): located in the eastern part of Vincennes Bay approximately 16 km to the west-north-west.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry to the Area is prohibited except in accordance with a permit issued by an appropriate national authority. Conditions for issuing a permit to enter the Area are that:

- the activities permitted give due consideration, via the environmental impact assessment process, to the continued protection of the values of the Area;
- the actions permitted are in accordance with this Management Plan and its objectives and provisions;
- permits shall be issued for a finite period;
- permits shall be carried when in the Area;
- permit holders shall notify the permitting authority of any activities or measures undertaken that were not authorised by the permit;
- a visit report must be supplied to the authority that approved the permit, as soon as practicable after the visit to the Area has been completed (but no later than six months after the visit has been completed); and
- all census and GPS data should be made available to the permitting authority and to the Party responsible for the development of the Management Plan.

Additional conditions, consistent with this Management Plan's objectives and provisions, may be included by the permitting authority.

7(ii) Access to, and movement within or over, the Area

- *Helicopters are prohibited from landing within the Area.*

The operation of Remotely Piloted Aircraft Systems (RPAS) over the Area should be carried out, as a minimum requirement, in compliance with the 'Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (v 1.1) contained in Resolution 4 (2018).

Vehicles are prohibited from entering the Area, except for the purpose of conducting ongoing maintenance of the transmitter building, associated buildings and antennas, or for the removal of structures/materials. Access to the Transmitter hut near the south-east end of the Area should be via the over-snow access route to Law Dome, several kilometres to the south. Within the Area, vehicles should follow the most direct practicable route between the Area boundary and the communications facilities, avoiding vegetation and cables. Vehicle use in the Area shall be kept to a minimum and only use the route specified in the permit.

The north-west boundary of the Area is located approximately 200 m east of Casey station buildings, and the Area is easily accessible by foot. Due to their fragile and brittle structure, macrolichens (fructose and foliose) are especially sensitive to damage from trampling. Growth rates for continental Antarctic lichens are exceedingly slow, with most growing only a fraction of a mm per year. As a consequence, if damaged, lichens will take hundreds or even thousands of years to recover. Foot traffic should therefore be minimised and remain on solid snow/ice (where there is no risk of punching through) or on bare rock to minimise impact when accessing or transiting through ice-free areas. Rock with crustose lichen cover will likely be more tolerant of occasional foot traffic, where it is practicable and safe, although extreme care should always be exercised.

7(iii) Activities which may be conducted in the Area

Activities which may be conducted within the Area include:

- compelling scientific research which cannot be undertaken elsewhere;
- sampling, but this should be the minimum required for the approved research programs;
- essential management activities, including monitoring, erection of signs, removal of structures/materials, and visits to assess the effectiveness of the Management Plan and management activities; and
- essential operational activities in support of scientific research or management within or beyond the Area, including maintenance and other activities associated with the communications installation including the Transmitter hut, Transmitter mast, antennas, feed lines, storage rack and associated facilities.

7(iv) Installation, modification or removal of structures

Permanent structures and installations are prohibited within the Area. Temporary structures and installations may only be established in the Area for compelling scientific or essential management reasons and for a pre-established period, as specified in a permit.

Any temporary structure or installation established in the Area must be:

- first cleaned of organisms, propagules (e.g. seeds, eggs) and non-sterile soil;

- made of materials that do not impact on the surrounding environment, and can withstand Antarctic conditions;
- installed, maintained, modified and removed in a manner that minimises disturbance (and does not cause more damage than benefit) to the values of the Area;
- clearly identified by country, name of the principal agency/investigator, date of installation and date of expected removal;
- reported to the permitting authority if left in situ; and
- removed when they are no longer required, or before the expiry of the permit, whichever is earlier.

7(v) Location of field camps

Camping is prohibited within the Area.

7(vi) Restrictions on materials and organisms which may be brought into the Area

- No living animals, plant material, microorganisms or non-sterile soils shall be deliberately introduced into the Area. Appropriate precautions, such as the thorough cleaning of footwear and equipment, must be taken to prevent accidental introduction.
    - To help maintain the ecological and scientific values of the plant communities found in the Area, persons entering the Area shall take special precautions against unintentional introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other Antarctic sites, including stations, or from regions outside Antarctica. To minimise the risk of introductions footwear and any equipment – such as carry cases, sampling equipment and markers – to be used in the Area shall be thoroughly cleaned before entering the Area.
- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- Chemicals may be introduced for scientific or management purposes specified in a permit, and shall be removed from the Area at or before the conclusion of the permitted activity.
- Permanent or semi-permanent fuel depots are not allowed. Fuel must not to be stored in the Area unless it is required for essential purposes connected with the activity for which the Permit has been granted. All such fuel must be stored in sealed and bunded containers removed from the Area at or before the conclusion of the permitted activity.
- Any materials or supplies introduced for a stated period shall be removed at or before the conclusion of the stated period, and shall be stored and handled so that the risk of dispersal into the environment is minimised.

7(vii) Taking of, or harmful interference with native flora and fauna

The taking of, or harmful interference with, native flora and fauna is prohibited except in accordance with a permit. Where the taking of, or harmful interference with, animals is involved, this action should be conducted in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica as a minimum standard.

7(viii) The collection or removal of material not brought into the Area by the permit holder

Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material in situ. If such material is found, the appropriate national authority must be notified. Where possible, photographic documentation should be obtained and included in the site visit report.

7(ix) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to carry out the following measures, provided they do not adversely impact on the values of the Area:

- the collection of samples for analysis or review;
- the establishment or maintenance of scientific and/or logistical equipment, infrastructure and signposts; and
- other protective measures.

7(xi) Requirements for reports

The principal permit holder for each permit issued shall submit to the permitting authority a report describing the activities undertaken no later than six months after the visit has been completed. Such reports should include, as appropriate, the information identified in the Visit Report form contained in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage; to be used both in any review of the Management Plan and in organising the scientific use of the Area.

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Appendix 1: North-east Bailey Peninsula, Antarctic Specially Protected Area No 135, boundary coordinates.

Boundary	Longitude	Latitude	**Boundary**	Longitude	Latitude
1	110°32'56"	66°17'11"	**15**	110°32'16"	66°16'52"
2	110°32'50"	66°17'11"	**16**	110°32'19"	66°16'53"
3	110°32'41"	66°17'10"	**17**	110°32'19"	66°16'55"
4	110°32'22"	66°17'7"	**18**	110°32'24"	66°16'55"
5	110°32'20"	66°17'6"	**19**	110°32'25"	66°16'53"
6	110°32'18"	66°17'2"	**20**	110°32'29"	66°16'53"
7	110°32'18"	66°17'0"	**21**	110°32'44"	66°16'54"
8	110°32'14"	66°17'0"	**22**	110°33'9"	66°17'5"
9	110°32'9"	66°16'56"	**23**	110°33'11"	66°17'6"
10	110°32'8"	66°16'54"	**24**	110°33'10"	66°17'9"
11	110°32'5"	66°16'54"	**25**	110°33'2"	66°17'11"
12	110°32'7"	66°16'52"			
13	110°32'7"	66°16'52"			
14	110°32'12"	66°16'51"			

Appendix 2: Mosses, liverworts and lichens identified from North-east Bailey Peninsula Antarctic Specially Protected Area No 135, (from Melick 1994, Seppelt pers. comm.).

Mosses
Bryum pseudotriquetrum (Hedw.) Gaertn., Meyer et Scherb.
Ceratodon purpureus (Hedw.) Brid.
Schistidium antarctici Card.
Liverworts
Cephaloziella varians Steph.
Lichens
Acarospora gwynii Dodge & Rudolph
Amandinea petermannii (Hue) Matzer, H. Mayrhofer & Scheid.
Buellia cf. cladocarpiza Lamb?
Buellia frigida Darb.
Buellia grimmiae Filson
Buellia cf. lignoides Filson
Buellia papillata Tuck.
Buellia pycnogonoides Darb.
Buellia soredians Filson
Caloplaca athallina Darb.
Caloplaca citrina (Hoffm.) Th. Fr.
Candelariella flava (C.W. Dodge & Baker) Castello & Nimis
Lecanora expectans Darb.
Lecidea spp.
Lecidea cancriformis Dodge & Baker (=*Lecidea phillipsiana* Filson)
Lecidea andersonii Filson
Lepraria sp.
Pleopsidium chlorophanum (Wahlenb.) Zopf
Rhizocarpon geographicum
Rhizoplaca melanophthalma (Ram.) Leuck. & Poelt
Rinodina olivaceobrunnea Dodge & Baker
Physcia caesia (Hoffm.) Hampe
Umbilicaria aprina Nyl.
Umbilicaria decussata (Vill.) Zahlbr.
Umbilicaria cf. propagulifera (Vainio) Llano
Xanthoria elegans (Link) Th. Fr.
Xanthoria mawsonii Dodge.
Pseudephebe minuscula (Nyl ex Arnold) Brodo & Hawksw.
Usnea antarctica Du Rietz
Usnea sphacelata R. Br.

Appendix 3: Fungi isolated from soils, mosses, lichens and algae from ASPA No 135 and from species of wider distribution in the Windmill Islands region (from Azmi 1998 and Seppelt pers. comm. 2008).

Note: This is only a partial list of the taxa isolated from the Windmill Islands.

	ASPA No 135	Bailey Peninsula	Bryum pseudotri-quetrum	Ceratodon purpureu	Grimmia antarctici	Algae	Lichens*
Acremonium sp.					9		
Acremonium crotocinigenum (Schol-Schwarz) W. Gams		9					9
Alternaria alternata (Fr.) Keissl.		9					
Arthrobotrys			9	9			
Aspergillus nidulans (Eidam) G. Winter		9					
Aspergillus sp.						9	
Botrytis cinerea Pers.		9					
Chrysosporium sp	9		9	9	9		
Chrysosporium pannorum (Link.) S. Hughes	9	9	9	9	9	9	9
Cladosporium sp.		9					
Diplodia sp.		9					
Fusarium oxysporum E.F. Sm., & Swingle		9					
Geomyces sp.		9	9	9		9	9
Geotrichum sp.							
Mortierella sp.		9	9		9	9	9
Mortierella gamsii Milko		9	9				
Mucor pyriformis Scop.		9	9		9		
Mycelia sterilia 1**	9		9	9	9	9	9
Mycelia sterilia 2**	9		9	9	9	9	
Mycelia sterilia 3**	9		9	9	9		
Mycelia sterilia 4**		9					
Nectria peziza Berk.		9	9		9		
Penicillium chrysogenum Thom	9		9		9	9	
P. commune Thom		9					
P. corylophilum Dierckx		9					
P. expansum Link		9	9	9		9	
P. hirsutum Dierckx		9					
P. palitans Westling		9	9	9	9		
P. roqueforti Thom		9					
Penicillium sp.			9	9	9	9	
Penicillium sp. 1							
Penicillium sp. 2							
Phialophora malorum (Kidd & Beaumont) McColloch		9	9	9	9	9	

	ASPA No 135	Bailey Peninsula	Bryum pseudotri-quetrum	Ceratodon purpureu	Grimmia antarctici	Algae	Lichens*
Phoma herbarum Westend		9	9	9	9		
Phoma sp.	9						
Phoma sp. 1			9	9	9		
Phoma sp. 2				9	9		
Rhizopus stolonifer (Ehrenb.) Vuill.		9				9	
Sclerotinia sclerotiorum (Lib.) de Bary		9					
Thelebolus microsporus (Berk. & Broome) Kimbr.	9	9	9	9	9	9	9
Trichoderma harzianum Rifai		9					
T. pseudokoningi Rifai		9					

*Lichens are Xanthoria mawsonni, Umbilicaria decussata and Usnea sphacelata.
** Mycelia sterilia is a general term for sterile mycelia. Approximately 45% of all the isolates obtained from the Windmill Islands have not been identified because they remained sterile in culture.

Appendix 4: Cyanobacterial and algal species identified from the Windmill Islands region.

The taxa are listed in alphabetical order under each phylum together with their habitats and whether they are maintained in culture. A = Aquatic, T = Terrestrial (from soil),
S = Snow or ice and C = Culture. (from Ling 1998 and Seppelt pers. comm. 2008).

Cyanobacteria	
Aphanothece castagnei (Breb.) Rabenh.	A
Aphanocapsa elachista var. irregularis Boye-Pet.	A
Aphanocapsa muscicola (Menegh.) Wille	A
Aphanothece saxicola Nageli	A
Aphanothece sp.	A
Calothrix parietina Thur.	A
Chamaesiphon subglobosus ((Ros-Taf) Lemmerm.	A
Chroococcus dispersus (Keissl.) Lemmerm.	A
Chroococcus minutus (Kutz.) Nageli	A
Chroococcus turgidus (Kutz.) Nageli	A
Dactylococcopsis antarctica F E. Fritsch	A
Dactylococcopsis smithii R. et E.Chodat (= *Rhabdogloea smithii* (R. et E.Chodat)	A
Eucapsis sp.	T
Gloeocapsa dermochroa Nageli	A
G. kuetzingiana Nageli	A
Hammatoidea sp.	A
Homoeothrix sp.	A
Isocystis pallida Woron.	AT
Katagnymene accurata Geitler	AT
Lyngbya attenuata Fritsch	A
Lyngbya martensiana Menegh.	A
Merismopedia tenuissima Lemmerm.	AT
Myxosarcina concinna Printz	A
Nodularia harveyana var. *sphaerocarpa* (Born. et Flah.) Elenkin	A
Nostoc commune Vaucher	ATC
Nostoc sp.	T
Oscillatoria annae Van Gook	A
Oscillatoria fracta Carlson	A
Oscillatoria irrigua Kutz	A
Oscillatoria lemmermannii Wolosz.	A
Oscillatoria proteus Skuja	A
Oscillatoria sp. (Broady 1979a, *Oscillatoria* cf. *limosa* Agardh)	A
Oscillatoria sp. (BROADY 1979a, *Oscillatoria* sp. C)	T
Phormidium autumnale(Agardh) Gomont	T
Phormidium foveolarum Gomont	A
Phormidium frigidum F.E. Fritsch	A
Phormidium subproboscideum (W et G. S. West) Anagnost et Komarek	A
Phormidium sp.	A
Plectonema battersii Gomont	A
Plectonema nostocorum Bornet	A
Pseudanabaena mucicola (Hub.-Pest. et Naum.) Bour.	A
Schizothrix antarctica F E. Fritsch	A
Stigonema mesentericum Geitler f.	T
Stigonema minutum (AGARDH) Hassall	T
Stigonema sp.	T
Synechococcus aeruginosus Nageli	T
Synechococcus maior Schroeter	AT
Tolypothrix byssoidea (Berk.) Kirchner f	A
Tolypothrix distorta var. *penicillata* (Agardh)Lemmerm.(= Tolypothrix penicillata Thuret)	A
Chlorophyta	
Actinotaenium cucurbita (Breb.) Teiling	AC
Apodochloris irregularis Ling et Seppelt	AC
Asterococcus superbus (Cienk.) Scherff.	AC
Binuclearia tatrana Wittr.	AC
Binuclearia tectorum (KÜTZ.) Beger	AC
Chlamydomonas pseudopulsatilla Gerloff	S
Chlamydomonas sphagnicola (F.E. Fritsch) F.E. Fritsch et Takeda	TC
Chlamydomonas subcaudata Wille	A
Chlamydomonas sp. 1	A
Chlamydomonas sp. 2	A
Chlorella vulgaris Beij.	AT

Chloromonas brevispina Hoham, Roemer et Mullet	S
Chloromonas polyptera (F.E. Fritsch) Hoham, Mullet et Roemer	SC
Chloromonas rubroleosa Ling et Seppelt	SC
Chloromonas sp. 1	SC
Chloromonas sp. 2	A
Coenochloris sp.	T
Desmococcus olivaceus (Pers. ex Ach.) Laundon	ATC
Desmotetra sp. 1	SC
Desmotetra sp. 2	SC
Dictyosphaerium dichotomum Ling et Seppelt	T
Fernandinella alpina Chodat	AC
Geminella terricola Boye-Pet.	T
Gloeocystis polydermatica (Kutz.) Hindak	T
Gloeocystis vesiculosa Nageli	T
Gongrosira terricola Bristol	AC
Gonium sociale (Dujard.) Warm.	AC
Hormotila sp.	SC
Kentrosphaera bristolae G.M.Smith	A
Klebsormidium dissectum var. 1(Broady 1979a, *Chlorhormidium dissectum* var. A)	T
Klebsormidium subtilissimum (Rabenh.) Silva, Mattox et Blackwell	A
Klebsormidium sp. (BROADY 1981, *Klebsormidium* sp. A)	SC
Lobococcus sp.?	T
Lobosphaera tirolensis Reisigl	TC
Macrochloris multinucleate (Reisigl) Ettl et Gartner	ATC
Mesotaenium berggrenii (Wittr.) Lagerh. f.	S
Monoraphidium contortum (Thur.) Komark.-Legn.	A
Monoraphidium sp.	S
Myrmecia bisecta Reisigl	T
Palmella sp. 1	TC
Palmella sp. 2	A
Palmellopsis sp.	SC
Prasiococcus calcarius (Boye-Pet.) Vischer	ATSC
Prasiola calophylla (Carmich.) Menegh.	TC
Prasiola crispa (Lightf.) Menegh.	ATSC
Prasiola sp.?	A
Pseudochlorella subsphaerica Reisigl	T
Pseudococcomyxa simplex (Mainx) Fott	T
Pyramimonas gelidicola McFadden, Moestrup et Wetherbee	A
Pyramimonas sp.	A
Raphidonema helvetica Kol	S
Raphidonema nivale Lagerh.	S
Raphidonema sempervirens Chodat	TC
Raphidonema tatrae Kol	S
Schizogonium murale Kutz.	ATC
Schizogonium sp.	AT
Staurastrum sp.	A
Stichococcus bacillaris Nageli	TSC
Stichococcus fragilis (A. Braun) Gay	A
Stichococcus minutus Grintzesco et Peterfi	S
Tetracystis sp. 1	TC
Tetracystis sp. 2	TC
Trebouxia sp.	TC
Trichosarcina mucosa (B Broady) Chappell et O'Kelly	TC
Trochiscia sp. (Broady 1979x,	A
Trochiscia sp. A)	
Ulothrix implexa (Kutz.) Kutz. A	
Ulothrix sonata (Weber et Mohr) Kutz	
Ulothrix sp. 1	A
Ulothrix sp. 2	S
Uronema sp.	S
Xanthophyta	
Botrydiopsis sp.	TC
Bumilleriopsis sp.	TC
Ellipsoidion sp.?	S
Fremya sp.	ATC
Gloeobotrys sp.	A
Heterococcus filiformis Pitschm.	TC
Heterococcus sp.	TC
Heterothrix debilis Vischer	TC
Tribonema microchloron Ettl	A

Chrysophyta	
Chrysococcus sp.	S
Chroomonas lacustris Pascher et Ruttner	A
Dinophyta	
Gymnodinium sp.	A
Bacillariophyta	
**Achnanthes coarctata* var. *elliptica* Krasske	S
Amphora veneta Kutz.	A
**Cocconeis imperatrix* A. Schmidt	S
**Diploneis subcincta* (A. Schmidt) Cleve	S
**Eucampia balaustium* Castray	S
Fragilaria sp.	A
Fragilariopsis antarctica (Castray) Hust.	A
Hantzschia amphioxys (Ehrenb.) Grun.	A
Navicula atomus (Nag.) Grun.	A
Navicula murrayi W. et G. S. West	A
Navicula muticopsis Van Heurck	AT
Navicula sp.	A
Nitzschia palea (Kutz.) W. S M.	AT
Pinnularia borealis Ehrenb.	AT
Torpedoes laevissima W et G. S. West	A

*Believed to be marine diatoms from wind-borne sea spray.

Appendix 5: Ciliates and testate amoebae active in the vicinity of Casey Station on Bailey Peninsula.

(Modified from Petz and Foissner 1997).

Ciliates
Bryometopus sp
Bryophyllum cf. loxophylliforme
Colpoda cucullus (Mueller, 1773)
Colpoda inflata (Stokes, 1884)
Colpoda maupasi Enriques, 1908
Cyclidium muscicola Kahl, 1931
Cyrtolophosis elongata (Schewiakoff, 1892)
Euplotes sp.
Fuscheria terricola Berger and others, 1983
Gastronauta derouxi Blatterer and Foissner, 1992
Halteria grandinella (Mueller, 1773)
Holosticha sigmoidea Foissner, 1982
Leptopharynx costatus Mermod, 1914
Odontochlamys wisconsinensis (Kahl, 1931)
Oxytricha opisthomuscorum Foissner and others, 1991
Parafurgasonia sp.
Paraholosticha muscicola (Kahl, 1932)
Platyophrya vorax Kahl, 1926
Pseudocohnilembus sp.
Pseudoplatyophrya nana (Kahl, 1926)
Pseudoplatyophrya cf. saltans
Sathrophilus muscorum (Kahl, 1931)
Sterkiella histriomuscorum (Foissner and others, 1991)
Sterkiella thompsoni Foissner, 1996
Trithigmostoma sp.
Vorticella astyliformis Foissner, 1981
Vorticella infusionum Dujardin, 1 841
Testate amoebae
Assulina muscorum Greeff, 1888
Corythion dubium Taranek, 1881
Euglypha rotunda Wailes and Penard, 1911
Pseudodifflugia gracilis var. *terricola* Bonnet and Thomas, 1960
Schoenbornia viscicula Schoenborn, 1964
Trachelocorythion pulchellum (Penard, 1890)

Australian Government
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Map A: Antarctic Specially Protected Areas, Windmill Islands, East Antarctica

■ Station
Refuge
Coastline
Contour (50 metre interval)
ASPA boundary
NE Bailey Peninsula ASPA No. 135

0 2 4 6 Kilometres

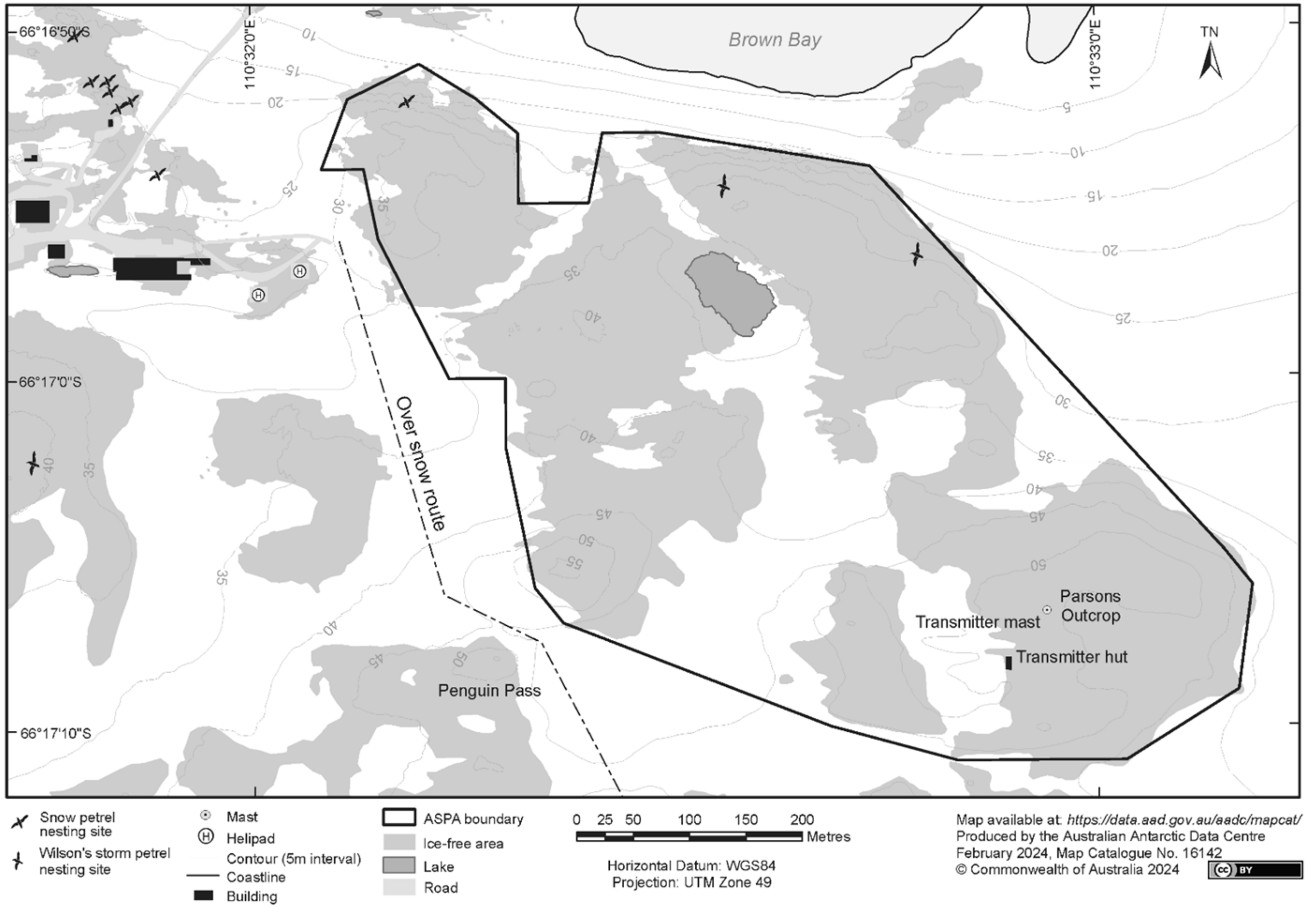
Horizontal Datum: WGS84
Projection: UTM Zone 49

Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16141

Australian Government
Department of Climate Change, Energy, the Environment and Water
Australian Antarctic Division

Map B: Antarctic Specially Protected Area No. 135, North-east Bailey Peninsula

Topography and Bird Distribution



Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
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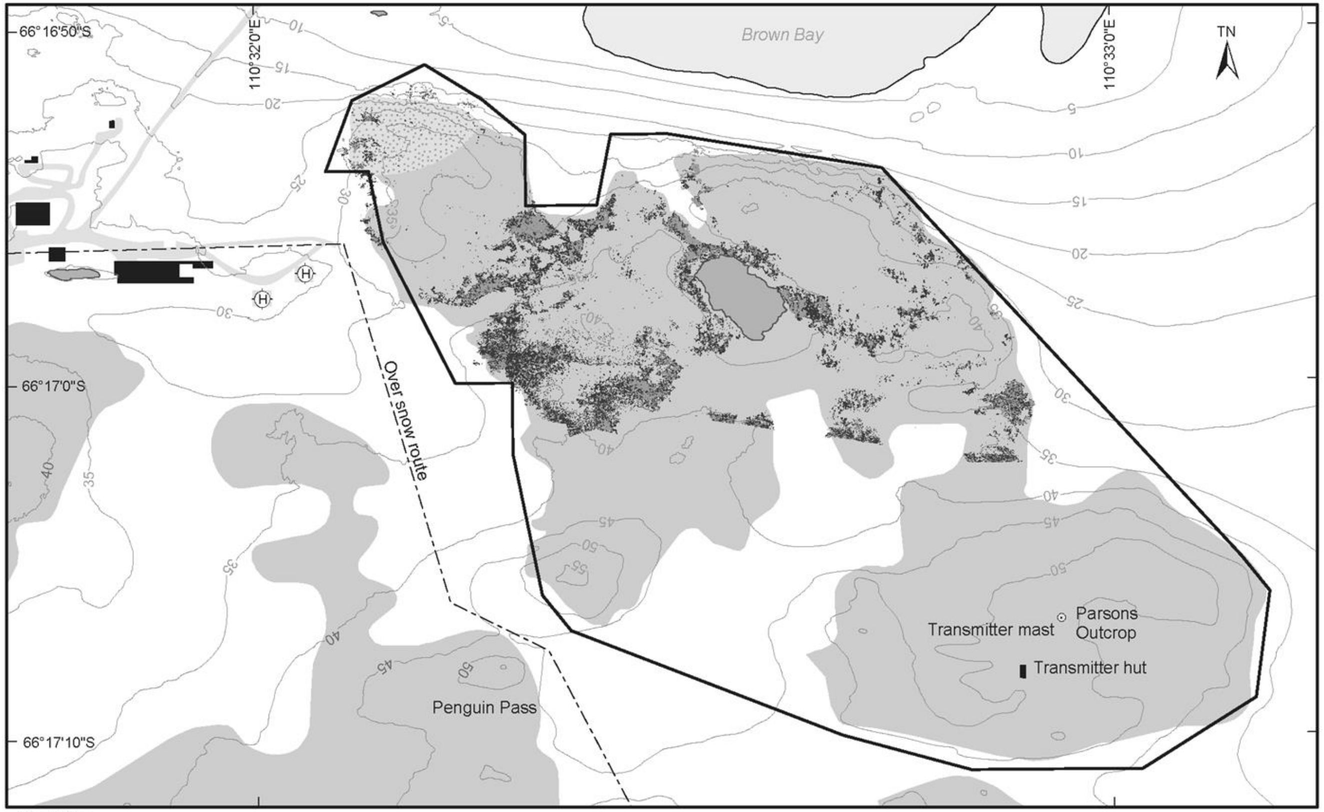
Australian Antarctic Division

Map C: Antarctic Specially Protected Area No. 135, North-east Bailey Peninsula

Vegetation



Vegetation
*Bryophytes (less dense)**
*Bryophytes (more dense)**
Macrolichens
Crustose lichens

Mast
Helipad
Building
Coastline

Contour (5m interval)
ASPA boundary
Lake
Road

0 25 50 100 150 200 Metres

Horizontal Datum: WGS84
Projection: UTM Zone 49

Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16143

**Note: Bryophytes can occur outside indicated areas. At the date of map publication, south of 66°17'2"S had not been surveyed.*

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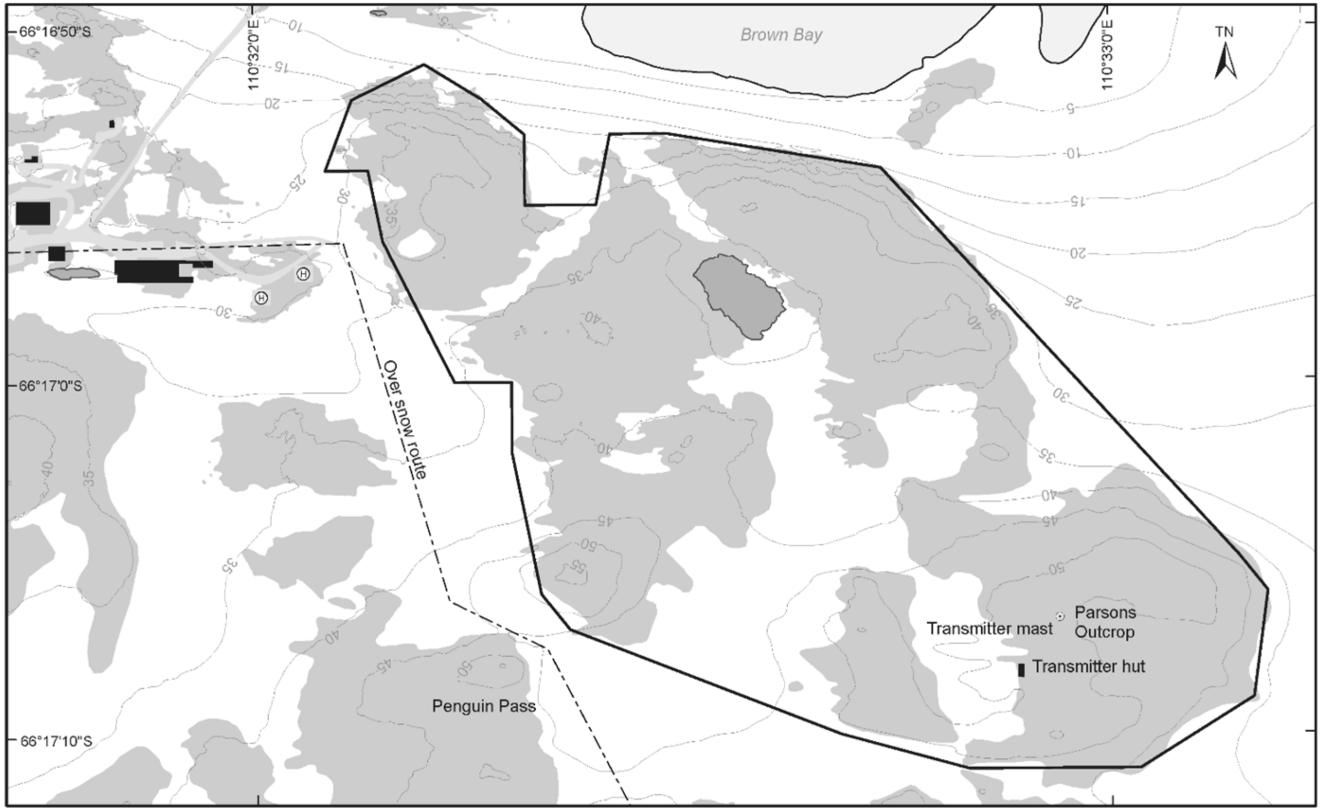
Australian Antarctic Division

Map D: Antarctic Specially Protected Area No. 135, North-east Bailey Peninsula

Geology



Lithology
Late granite gneiss

Mast
Helipad
Building
Coastline

Contour (5m interval)
ASPA boundary
Lake
Road

0 25 50 100 150 200 Metres

Horizontal Datum: WGS84
Projection: UTM Zone 49

Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16144

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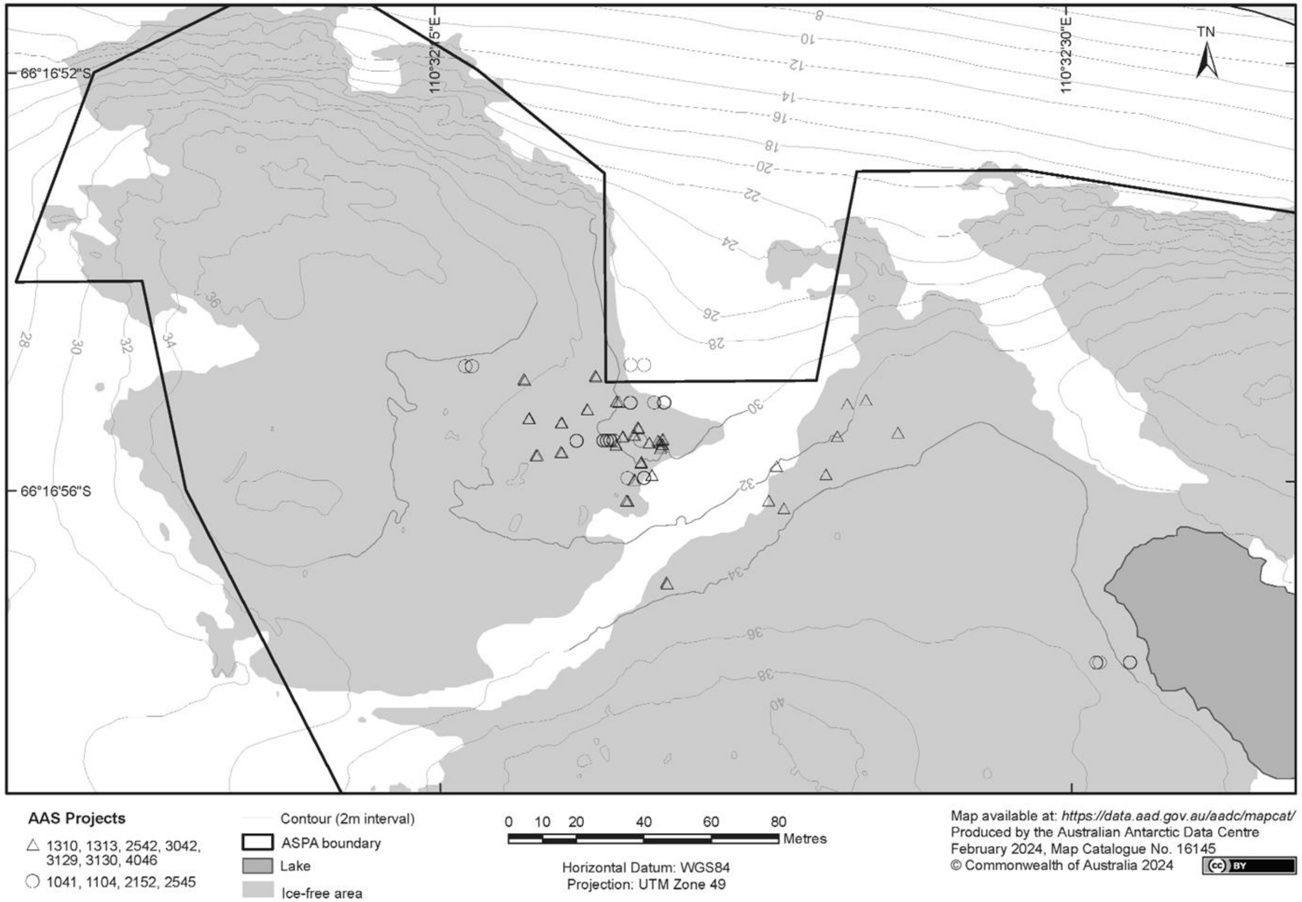
Australian Antarctic Division

Map E: Antarctic Specially Protected Area No. 135, North-east Bailey Peninsula

Long term scientific monitoring sites



Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16145

Measure 4 (2024)

Antarctic Specially Protected Area No 136 (Clark Peninsula, Budd Coast, Wilkes Land, East Antarctica): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XIII-8 (1985), which designated Clark Peninsula, Budd Coast, Wilkes Land as Site of Special Scientific Interest ("SSSI") No 17 and annexed a Management Plan for the Site;
- Resolution 7 (1995), which extended the expiry date of SSSI 17;
- Measure 1 (2000), which adopted a revised Management Plan for SSSI 17;
- Decision 1 (2002), which renamed and renumbered SSSI 17 as ASPA 136;
- Measures 1 (2006), 7 (2009) and 5 (2014), which adopted revised Management Plans for ASPA 136;

Recalling that Recommendation XIII-8 was designated as no longer current by Measure 13 (2014).

Recalling that Resolution 7 (1995) was designated as no longer current by Decision 1 (2011);

Recalling that Measure 1 (2000) did not become effective and was withdrawn by Decision 3 (2017);

Recalling that the Committee for Environmental Protection ("CEP") XXII (2019) reviewed and continued without changes the Management Plan for ASPA 136, which is annexed to Measure 5 (2014);

Noting that the CEP has endorsed a revised Management Plan for ASPA 136;

Desiring to replace the existing Management Plan for ASPA 136 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 136 (Clark Peninsula, Budd Coast, Wilkes Land, East Antarctica), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 136 annexed to Measure 5 (2014) be revoked.Measure 5 (2024)

Management Plan for Antarctic Specially Protected Area No 136

CLARK PENINSULA, BUDD COAST, WILKES LAND, EAST ANTARCTICA

Introduction

Antarctic Specially Protected Area (ASPA) No 136 is located on Clark Peninsula, Wilkes Land at 66°15'S, 110°36'E (see Map A).

The Clark Peninsula was originally designated as Site of Special Scientific Interest (SSSI) No 17 under Recommendation XIII-8 (1985). A revised Management Plan for SSSI 17 was adopted under Measure 1 (2000). The area was redesignated and renumbered as ASPA 136 under Decision 1 (2002). Revised ASPA Management Plans were adopted under Measure 1 (2006), Measure 7 (2009) and Measure 5 (2014).

ASPA 136 is primarily designated to protect the Clark Peninsula's largely undisturbed terrestrial ecosystem. This ecosystem possesses one of the most extensive Antarctic flora communities outside of the Antarctic Peninsula and significant breeding populations of Adélie penguins (Pygoscelis adeliae) and south polar skuas (Catharacta maccormicki).

ASPA 136 is approximately 9.4 km² and is located approximately 5 km north-west of Casey station. Scientific research within the Area has focused on plant communities and long-term population studies of Adélie penguin colonies. The protection of this flora and fauna within the Area allows for valuable comparison with similar plant communities and penguin colonies closer to Casey station which are subject to greater levels of human disturbance.

1. Description of values to be protected

ASPA 136 is primarily designated to protect Clark Peninsula's largely undisturbed terrestrial ecosystem.

Clark Peninsula's ecosystem possesses one of the most extensive Antarctic flora communities outside of the Antarctic Peninsula. Its flora communities form a continuum of ecological variation along environmental gradients of soil moisture, soil chemistry and microclimate.

Clark Peninsula's ecosystem possesses intrinsic ecological value and scientific importance, particularly in the fields of botany, microbiology, soil science and glacial geomorphology. Ecosystem monitoring provides critical baseline data with which to analyse changes in Antarctic bryophyte, macrolichen and cryptogam communities. The cryptogam communities also support studies into short-term microclimate fluctuations and long-term climate change in the region since deglaciation some 5000-8000 years ago.

Stevenson's Cove within ASPA 136 contains the oldest individual moss plants that have been found in the Windmill Islands region indicating the importance of this site for protection of vegetation (Waterman, 2015). Dating of long cores of mosses using ^{14}C shows that these individual moss plants can be hundreds of years old and stable, carbon isotopes of moss shoots, which provide a signature for changes in site water availability show that moss beds have become drier since the 1960s. ASPA 136 mosses show less evidence of drying (29% of cores) than the regional mean (40% of cores) (Waterman, 2015, Robinson et al., 2018).

Clark Peninsula supports relatively undisturbed breeding populations of Adélie penguins (Pygoscelis adeliae) and south polar skuas (Catharacta maccormicki). The significant populations of Adélie penguins at Whitney Point and Blakeney Point have been studied since 1959. These studies provide valuable comparative data for measuring human impacts upon the Adélie penguin colonies located near Casey station, and as the time series has extended, have become increasingly important for understanding the response of seabirds to climate and ecosystem change. Breeding populations of Wilson's storm petrels (Oceanites oceanicus) and snow petrels (Pagodroma nivea) are present in most ice-free areas of ASPA 136.

Clark Peninsula possesses intrinsic geological value. It provides a visible time sequence of the emergence of the Windmill Islands from the sea since the Holocene deglaciation.

The Area requires protection because of its ecological importance, its significant scientific value and the limited geographical extent of the plant communities. The Area is vulnerable to disturbance from trampling, scientific sampling, pollution and alien introductions, while being sufficiently distant from Casey station to avoid immediate impacts and disturbances from activities undertaken there. It is because of the scientific and ecological values, and the usage of the Area for long term monitoring, that it should continue to be protected.

2. Aims and objectives

Management of the Area aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in the Area;
- preserve a part of the natural ecosystem as a reference for recovery from human impacts, including the indirect effects of Casey station;
- prevent or minimise the introduction to the Area of alien plants, animals and microbes; and
- minimise the possibility of the introduction of pathogens which may cause disease in fauna populations within the Area.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- a copy of this Management Plan made available at: Casey station, Wilkes Hilton refuge hut; and Jack's Donga refuge hut;
- signage installed at the Area boundary illustrating the location, boundaries and restrictions that apply to the Area to prevent inadvertent entry;
- markers, signs and structures erected within the Area for scientific or management purposes, and secured, maintained in good condition and removed when no longer required;
- abandoned equipment or materials removed to the maximum extent possible provided it does not adversely impact on the values of the Area;
- visitation of the Area as necessary (where practicable, no less than once every five years) to assess whether the Area continues to serve the purposes for which it is designated and to ensure that management activities are adequate; and
- review of the Management Plan at least every five years with updating as required.

4. Period of designation

This Area is designated for an indefinite period.

5. Maps

Map A: Antarctic Specially Protected Areas, Windmill Islands, East Antarctica

Map B: Antarctic Specially Protected Area No 136, Clark Peninsula, Windmill Islands, East Antarctica – Topography and distribution of birds

Map C: Antarctic Specially Protected Area No 136, Clark Peninsula, Windmill Islands, East Antarctica – Distribution of major vegetation types

Map D: Antarctic Specially Protected Area No 136, Clark Peninsula, Windmill Islands, East Antarctica – Geology

Map specifications:

- Projection: UTM Zone 49

- Horizontal Datum: WGS84

Figure 1: Population size and breeding success of Adélie penguins

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

- *General description*

Clark Peninsula (66°15’S 110°36’E) is located on the northern coastline of Newcomb Bay at the eastern end of Vincennes Bay on Budd Coast, Wilkes Land (see Map A). It is an area of permanent ice, snow fields and rocky exposures. It is approximately 3.5 km wide and 4.5 km long.

The Area itself covers an area of 9.4 km² and comprises all of the land on Clark Peninsula north of the southern boundary line connecting the east side of Powell Cove at 66°15’15” S 110°31’59” E, through 66°15’29”S 110°33’26”E, 66°15’21”S 110°34’00”E, 66°15’24”S 110°35’09”E, 66°15’37”S 110°34’40”E, 66°15’43”S 110°34’45”E to a point to the east-south-east on the Løken Moraines at 66°16’06”S 110°37’11”E. The eastern boundary is the westernmost limit of the Løken Moraines as far north as a point east of Blakeney Point at 66°14’15”S 110°38’46”E and thence to the coastline at 66°14’15”S 110°38’06”E, returning along the coast to the point of origin. The boundary of the Area is indicated on Maps A, B, C and D.

- *Environmental Domains Analysis*

Clark Peninsula is located within Environment D East Antarctic coastal geologic (Resolution 3 (2008)).

- *Antarctic Conservation Biogeographic Regions*

Clark Peninsula is located within Biogeographic Region 7 East Antarctica (Resolution 6 (2012)).

- *Important Bird Areas in Antarctica*

Clark Peninsula represents Important Bird Area No 147 (Resolution 5 (2015)).

- *Flora*

Clark Peninsula’s comparatively mild temperatures facilitated the development of a complex, diverse and stable vegetation cover. The ice-free rocky exposures support an extensive cover of lichen. Mosses predominate in lower lying areas. Factors responsible for the distribution of vegetation include wind exposure, the availability of water and the location of abandoned penguin colonies.

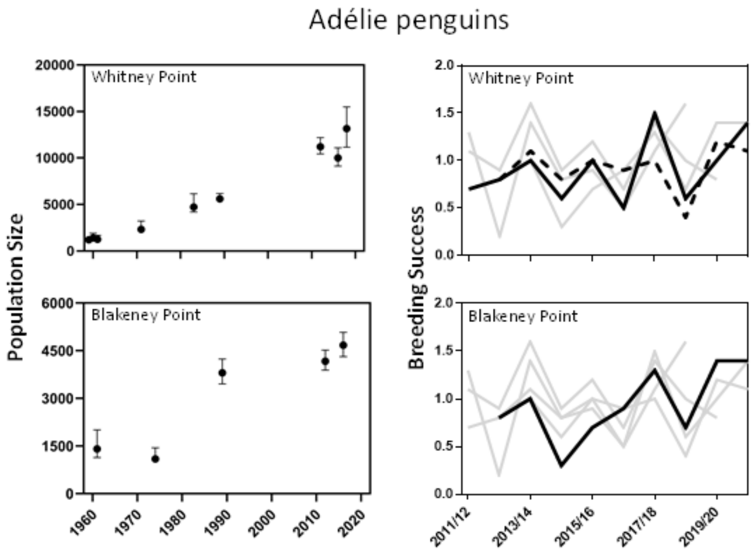
The broader Windmill Islands region possesses 4 species of bryophytes, 30 species of lichens, 44 species of cyanobacteria and 75 species of algae. Many of these taxa are known to inhabit Clark Peninsula. Well-developed macrolichen communities of Umbilicaria decussata, Pseudephebe minuscula, Usnea sphacelata communities predominate in the northeast. Further inland U. sphacelata predominates and forms extensive carpets over the metamorphic rocks and gravel beds.

Bryophyte communities of mosses Bryum pseudotriquetrum, Schistidium antarctici and Ceratodon purpureus, and liverwort Cephaloziella varians predominate in moist, sheltered sites where they form closed stands up to 15 cm in depth. The lichens Xanthoria mawsonii, Candelariella flava and Buellia frigidida predominate around the Adélie penguin colonies of the north-western and western coasts. Usnea. decussata and U. sphacelata predominate around the abandoned penguin colonies of the southern coastal areas, and U. decussata, P. minuscula, B. soredians and B. frigid predominate in the centre of Clark Peninsula alongside smaller assemblages of Pleopsidium chlorophanum. Clark Peninsula's microflora includes algae (with Botrydiopsis constricta and Chlorella conglomerata predominating), bacteria, yeasts and filamentous fungi. Flora distributions on the Clark Peninsula are depicted at Map C.

- *Fauna*

Adélie penguin (Pygoscelis adeliae) colonies are located on Whitney Point and Blakeney Point. In 2012-13 Whitney Point supported approximately 11,000 occupied nests and Blakeney Point supported approximately 4000 occupied nests (Southwell et al., 2015). The breeding populations of these two sites have increased since research commenced in 1959-60, consistent with a six-fold increase over the last 6 decades of the entire Windmill Islands population (see Figure 1).

Figure 1: Population size and breeding success of Adélie penguins (data from Southwell et al., 2015 and 2021). Population size in terms of breeding pairs across time for Whitney and Blakeney Points, and for breeding success from automated cameras showing times series for each site in black noting there are two cameras established at Whitney Point, with grey lines indicating breeding success across other Windmill Islands sites (data from McLatchie et al., 2024). Note that breeding success occurs over split calendar years associated with the austral summer.



Recent surveys indicate that some sites within the broader Windmill Islands area may have slowed their rapid growth rate as a result of density-dependent limitations (Southwell et al., 2021). Breeding success from the nest camera monitoring system established at Whitney Point showed similar fluctuations across years as other sites in the Windmill Islands, although breeding success in 2014/15 and 2015/16 was depressed at Blakeney Point compared with other sites (Figure 1).

Adélie penguins forage farther from the Whitney Point colony than breeding colonies in the Davis and Mawson regions. They travel well beyond the shelf break during the incubation period and reach the shelf break during the chick rearing period (Emmerson et al., 2013). Their diet comprises largely of krill (>50%) followed by fish, calanoid copepods, jellyfish and amphipods (McInnes et al., 2015). Wilson's storm petrels (Oceanites oceanicus), south polar skuas (Catharacta maccormicki) and snow petrels (Pagodroma nivea) continue to breed within the Area. Species distributions on the Clark Peninsula are depicted on Map B.

Terrestrial invertebrate microfauna includes protozoa, nematodes, mites, rotifers and tardigrades. The invertebrates are mainly confined to moss beds, lichen stands and moist soils.

- *Climate*

The climate at the Clark Peninsula and the Windmill Islands is dry and frigid. Meteorological data collected at nearby Casey station indicates that the Clark Peninsula’s mean temperature range is 0.3°C to -14.9°C. Temperature extremes of 9.2°C (24 January 2020) and -41°C have been recorded. Precipitation occurs as snow at approximately 195 mm rainfall equivalent annually. Approximately 96 days of gale-force winds are experienced annually. These are predominantly easterly in direction and emanate from the polar icecap. Snow gathers in the lee of rocky exposures and in substratum depressions.

- *Geology*

Clark Peninsula possesses intrinsic geological value. It provides a visible time sequence of the emergence of the Windmill Islands from the coastal sea since the Holocene deglaciation. It is comprised of low lying, rounded, ice-free rocky outcrops. Its intervening valleys are filled with permanent snow, ice or glacial moraine and exfoliated debris. It rises eastward to the Løken Moraines where it reaches an approximate altitude of 130 m above sea level.

Outcrops of metapelitic rock and leucocratic granite gneiss predominate. The metapelitic rock is generally foliated, migmatized and fine to medium grained. Mineralogy of the metapelitic rock includes biotite-sillimanite and biotite-sillimanite±cordierite. The sillimanite is strongly lineated in the foliation and the cordierite is generally pinnitized.

The early granite gneiss is white, medium grained and foliated. It comprises two felsic intermediate intrusions which predate and/or are synchronous with the deformation in the Windmill Islands. The larger intrusion, which occupies most of central Clark Peninsula, is a quartz, K-feldspar, biotite, white mica and opaque-bearing granitic augen gneiss. Small outcrops of mafics and metapsammite occur. The rock beds lie in a south-west to north-east orientation. The surface geology of Clark Peninsula is depicted at Map D.

Islands of the Windmill Islands group are located offshore from the Area. The Windmill Islands represent one of the easternmost outcrops of a Mesoproterozoic low-pressure ganulite facies terrain that extends westward to the Bunger Hills and the Archaean complexes in Princess Elizabeth Land and eastward to Dumont D'Urville and Commonwealth Bay. The rocks of the Windmill Islands group comprise a series of migmatitic metapelites and metapsammites interlayered with mafic to ultramafic and felsic sequences with rare calc-silicates, large partial melt bodies (Windmill Island supacrustals), undeformed granite, charnockite, gabbro, pegmatite, aplites and late dolerite dykes.

Gravels and soils appear to be derived from marine sediments deposited in the Pleistocene. Subfossil penguin colonies are common at Whitney Point and Blakeney Point and along the central ridge. Around the abandoned penguin colonies, the soils are pebbly and rich in organic matter derived from penguin guano. Small lakes, pools and melt streams are prevalent in summer. The distribution of lakes on Clark Peninsula is depicted at Map B.

6(ii) Access to the Area

The Area may be accessed from Casey station by over-snow vehicle or small boat in accordance with section 7(ii) of this Management Plan.

6(iii) Location of structures within and adjacent to the Area

A dilapidated wood and canvas hide known as "the Wannigan" is located on the Lower Snow Slope (unofficial place name) on the western facing slope of Whitney Point. It was constructed in 1959 by R. L. Penney to facilitate behavioural studies of Adélie penguins.

The Area possesses several survey markers, and several boundary markers delineate the Area's southern boundary.

Four automated camera facilities are located within the Area. Their purpose is to monitor long term variations in the breeding parameters of Adélie penguins. They form part of an ongoing automated camera network across east Antarctica. They are located at Whitney Point (66°15'5.70"S 110°31'50.10"E and 66° 15' 3.20"S 110°32'2.60"E) and Blakeney Point (66° 14'32.20"S 110°34'53.20"E and 66° 14'24.23"S 110°34'32.06"E).

Several structures are also located adjacent to the Area. At its closest point, the Area's boundary is located approximately:

- 3.5 km northeast of Casey station (66°17' S 110°31' E);
- km north of the former Wilkes station and 0.2 km north of Wilkes Hilton refuge hut (66°15'25.6"S 110°31'32.2"E);
- 1.5 km southwest of Jack's Donga refuge hut (66°13.7'S 110°39.2'E).

6(iv) Location of other Protected Areas in the vicinity

Other protected areas in the vicinity include (see Map A):

- ASPA No 135, Northeast Bailey Peninsula (66°16'59.9"S, 110°31'59.9"E): located 2.5 km south-west of Clark Peninsula, across Newcomb Bay, adjacent to Australia's Casey station;
- ASPA No 103, Ardery Island and Odbert Island (66°22'20"S, 110°29'10"E): located in Vincennes Bay, 13 km south of the former Wilkes station; and
- ASPA No 160, Frazier Islands (66°13'S 110°11'E): located approximately 16 km to the north-west in Vincennes Bay.

6(v) Special zones within the Area

A Transit Zone is located north-east of a line that runs north-west from the ASPA boundary at 110°38'34"E, 66°14'47"S to 110°36'54"E, 66°14'31"S (see Map B). Over-snow vehicles may pass through the Transit Zone to undertake scientific or management activities at the edge of the sea ice. To prevent disturbance to vegetation and relic penguin colonies, over-snow vehicles must only travel on ice or snow-covered ground. Use of the Transit Zone may be subject to specific permit conditions.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry to the Area is prohibited except in accordance with a permit issued by an appropriate national authority. Conditions for issuing a permit to enter the Area are that:

- the activities permitted give due consideration, via the environmental impact assessment process, to the continued protection of the values of the Area;
- the actions permitted are in accordance with this Management Plan and its objectives and provisions;
- permits shall be issued for a finite period;
- permits shall be carried when in the Area;
- permit holders shall notify the permitting authority of any activities or measures undertaken that were not authorised by the permit;

- a visit report must be supplied to the authority that approved the permit, as soon as practicable after the visit to the Area has been completed (but no later than six months after the visit has been completed); and
- all census and GPS data should be made available to the permitting authority and to the Party responsible for the development of the Management Plan.

Additional conditions, consistent with this Management Plan's objectives and provisions, may be included by the permitting authority, including (but not limited to) the following:

- maintenance of the communications installation and associated facilities, and removal of obsolete structures/materials.

7(ii) Access to, and movement within or over, the Area

The Area should only be accessed via:

- Wilkes Hilton refuge hut in the south-west;
- Jack's Donga refuge hut in the north-east; or
- a descent of the western slope of Løken Moraines in the vicinity east of Stevenson Cove following a traverse from Casey station to Jack's Donga refuge hut.

The abandoned Wilkes station may be accessed from Casey station via a cane marked route to the south of the Area's southern boundary. On approaching the Area from Casey station, in the areas east and north-east of Noonan Cove, a section of the route is split providing two alternative routes (see Map B). The more southerly route should be used when ice conditions near Noonan Cove allow for safe access. When access via the more southerly route is not possible, the more northerly route should be used. As the Casey–Wilkes route is very close to the Area boundary, pedestrian and vehicular traffic should take care not to stray northward into the Area.

Wilkes station may also be accessed via small boat from Casey station. A designated small boat landing site is located in Powell Cove at 110°31'29"E 66°15'22"S.

Access to the sea ice by over-snow vehicles is allowed within the Transit Zone that is located north-east of a line that runs north-west from the ASPA boundary at the Løken Moraines at 110°38'34"E 66°14"47"S to the coastline at 110°36'54"E 66°14'31"S. All vehicles must only travel on ice or snow-covered ground to avoid disturbance to vegetation and relic penguin colonies.

Vehicles must not access the remainder of the Area except in emergencies. Access to the Area in all other circumstances should be made on foot. Pedestrian traffic in the Area should be kept to the minimum necessary to achieve the objectives of permitted activities. To prevent damage to sensitive soils, plant and algae communities and water quality, visitors must avoid walking on visible vegetation and moist ground.

Helicopters are not allowed to land within the Area, except in emergencies or for essential management activities. The operation of aircraft over the Area should be carried out in accordance with the Resolution 2 (2004) Guidelines for the Operation of Aircraft Near Concentrations of Birds in Antarctica.

Pedestrians should also exercise extreme care when in the Area to avoid damaging sensitive vegetation. Due to their fragile and brittle structure, macrolichens (fructose and foliose) are especially sensitive to damage from trampling. Growth rates for continental Antarctic lichens are exceedingly slow, with most growing only a fraction of a mm per year. As a consequence, if damaged, lichens will take hundreds or even thousands of years to recover. Foot traffic should therefore be minimised and remain on solid snow/ice (where there is no risk of punching through) or on bare rock to minimise impact when accessing or transiting through ice-free areas. Rock with crustose lichen cover will likely be more tolerant of occasional foot traffic, where it is practicable and safe, although extreme care should always be exercised.

The operation of Remotely Piloted Aircraft Systems (RPAS) over the Area should be carried out, as a minimum requirement, in compliance with the 'Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (v 1.1) contained in Resolution 4 (2018).

7(iii) Activities which may be conducted in the Area

Activities which may be conducted within the Area include:

- compelling scientific research which cannot be undertaken elsewhere;
- sampling, but this should be the minimum required for the approved research programs;
- essential management activities, including monitoring, erection of signs, removal of structures/materials, and visits to assess the effectiveness of the Management Plan and management activities; and
- essential operational activities in support of scientific research or management within or beyond the Area.

7(iv) Installation, modification, or removal of structures

Permanent structures and installations are prohibited within the Area. Temporary structures and installations may only be established in the Area for compelling scientific or essential management reasons and for a pre-established period, as specified in a permit.

Any temporary structure or installation established in the Area must be:

- first cleaned of organisms, propagules (e.g. seeds, eggs) and non-sterile soil;
- made of materials that do not impact on the surrounding environment, and can withstand Antarctic conditions;

- installed, maintained, modified and removed in a manner that minimises disturbance (and does not cause more damage than benefit) to the values of the Area;
- clearly identified by country, name of the principal agency/investigator, date of installation and date of expected removal;
- reported to the permitting authority if left in situ (GPS coordinates of long-term monitoring makers should be lodged with the Antarctic Data Directory System through the appropriate national authority); and
- removed when they are no longer required, or before the expiry of the permit, whichever is earlier.

7(v) Location of field camps

Camping is prohibited within the Area. Field parties should camp at either the Wilkes Hilton refuge hut or at Jack's Donga refuge hut (see Map A).

7(vi) Restrictions on materials and organisms which may be brought into the Area

The following restrictions apply:

- No living animals, plant material, microorganisms or non-sterile soils shall be deliberately introduced into the Area. Appropriate precautions, such as the thorough cleaning of footwear and equipment, must be taken to prevent accidental introduction.
- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- Chemicals may be introduced for scientific or management purposes specified in a permit, and shall be removed from the Area at or before the conclusion of the permitted activity.
- Permanent or semi-permanent fuel depots are not allowed. Fuel must not to be stored in the Area unless it is required for essential purposes connected with the activity for which the permit has been granted. All such fuel must be stored in sealed and bunded containers removed from the Area at or before the conclusion of the permitted activity.
- Any materials or supplies introduced for a stated period shall be removed at or before the conclusion of the stated period, and shall be stored and handled so that the risk of dispersal into the environment is minimised.

7(vii) Taking of, or harmful interference with, native flora and fauna

The taking of, or harmful interference with, native flora and fauna is prohibited except in accordance with a permit. Where the taking of, or harmful interference with, animals is involved, this action should be conducted in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica as a minimum standard.

Ornithological research should be limited to activities that, where practicable, are non-invasive and non-disruptive to the breeding birds present within the Area.

Invasive and/or disruptive research activities shall only be authorised if they will have no effect or only a temporary and transient effect on the population.

7(viii) Collection or removal of materials not brought into the Area by the permit holder

Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material in situ. If such material is found, the appropriate national authority must be notified. Where possible, photographic documentation should be obtained and included in the site visit report.

7(ix) Disposal of waste

All wastes, including human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to ensure that the aims and objectives of the Management Plan can continue to be met

Permits may be granted to enter the Area to carry out the following measures, provided they do not adversely impact on the values of the Area:

- the collection of samples for analysis or review;
- the establishment or maintenance of scientific and/or logistical equipment, infrastructure and signposts; and
- other protective measures.

7(xi) Requirements for reports

The principal permit holder for each permit issued shall submit to the permitting authority a report describing the activities undertaken no later than six months after the visit has been completed. Such reports should include, as appropriate, the information identified in the Visit Report form contained in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage; to be used both in any review of the Management Plan and in organising the scientific use of the Area.

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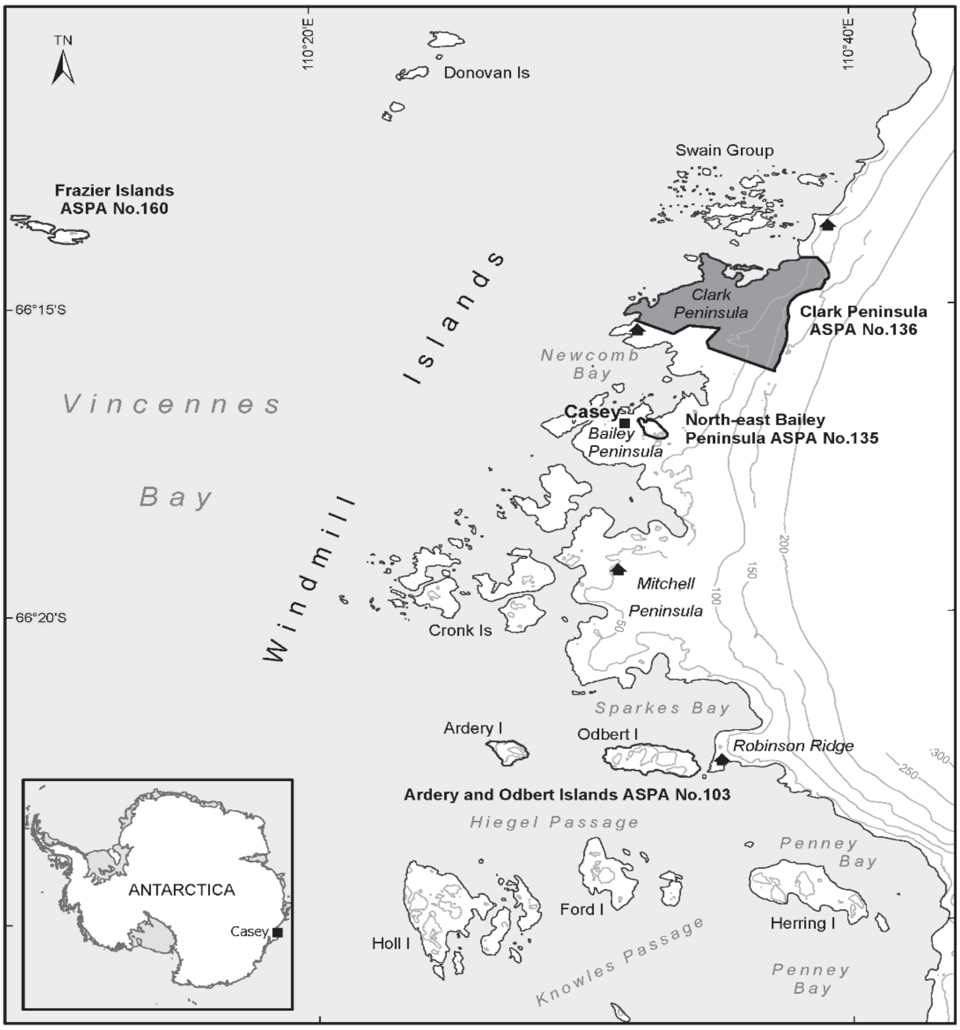
Map A: Antarctic Specially Protected Areas, Windmill Islands, East Antarctica



■ Station ⬆ Refuge
Coastline
Contour (50 metre interval)
ASPA boundary
Clark Peninsula ASPA No. 136

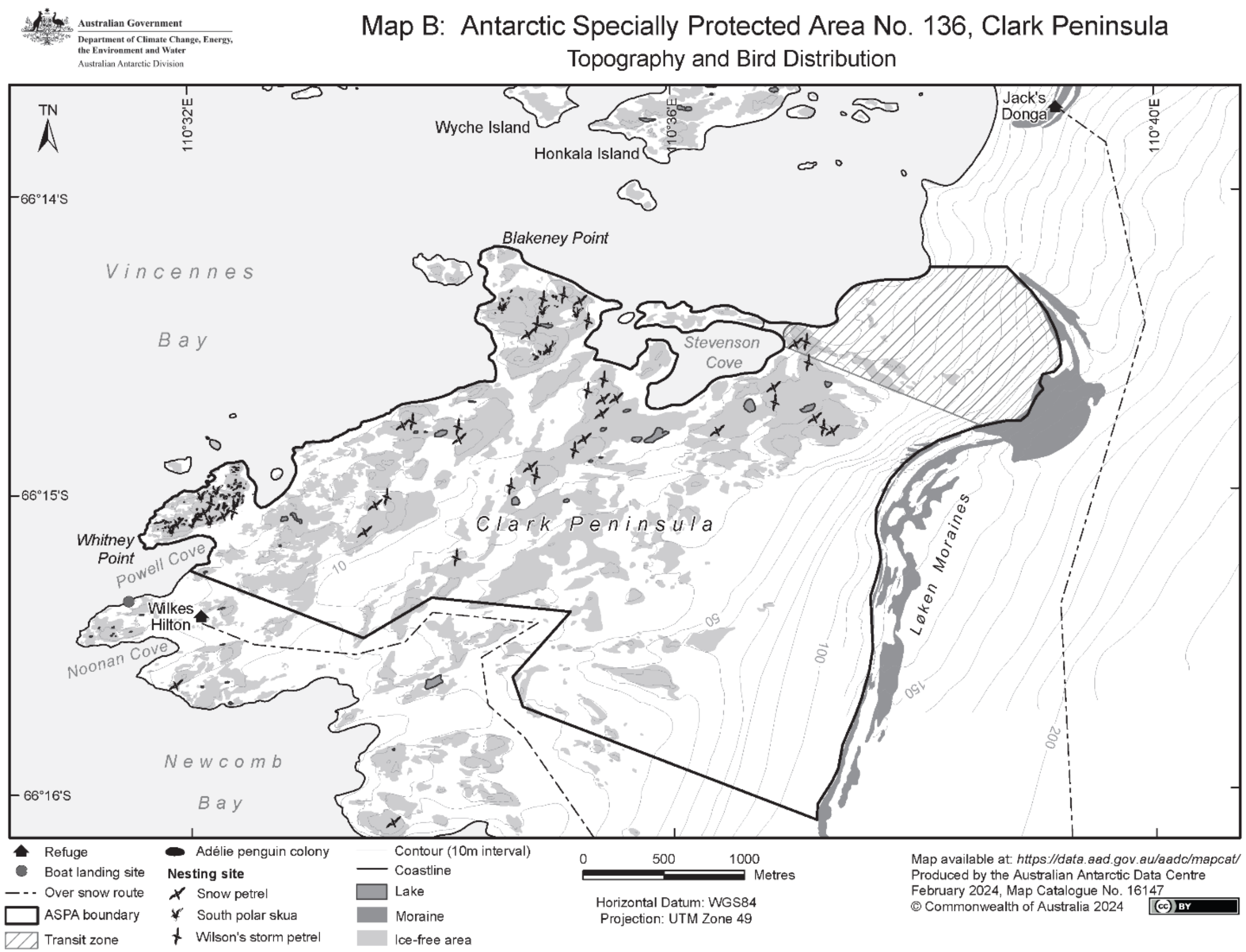
0 2 4 6 Kilometres

Horizontal Datum: WGS84
Projection: UTM Zone 49

Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16146

Map B: Antarctic Specially Protected Area No. 136, Clark Peninsula

Topography and Bird Distribution



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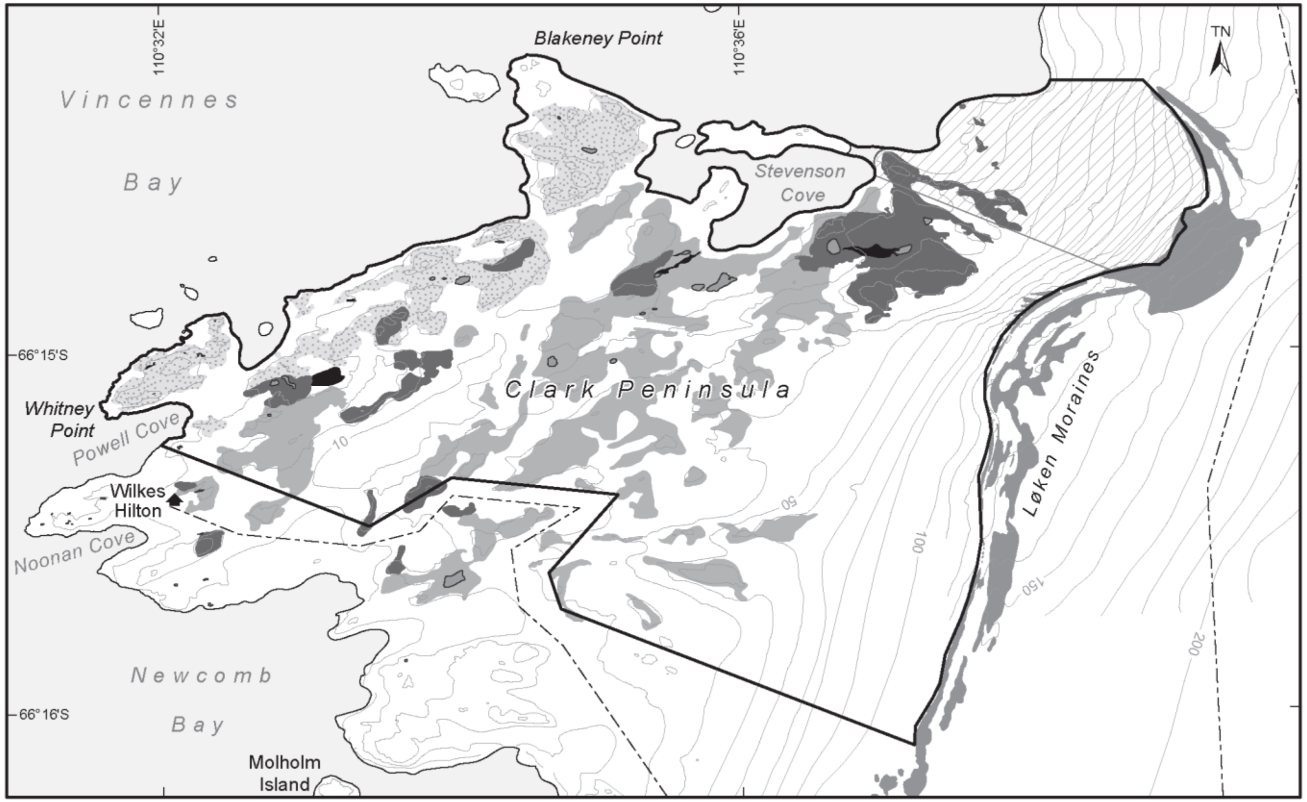
Map C: Antarctic Specially Protected Area No. 136, Clark Peninsula

Vegetation



Vegetation
- Bryophytes
- *Buellia frigida*
- *Umbilcaria decussata*
- *Usnea sphacelata*

- Refuge
- Over snow route
- ASPA boundary
- Transit zone
- Contour (10m interval)
- Coastline
- Lake
- Moraine

0 500 1000 Metres

Horizontal Datum: WGS84
Projection: UTM Zone 49

Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16148

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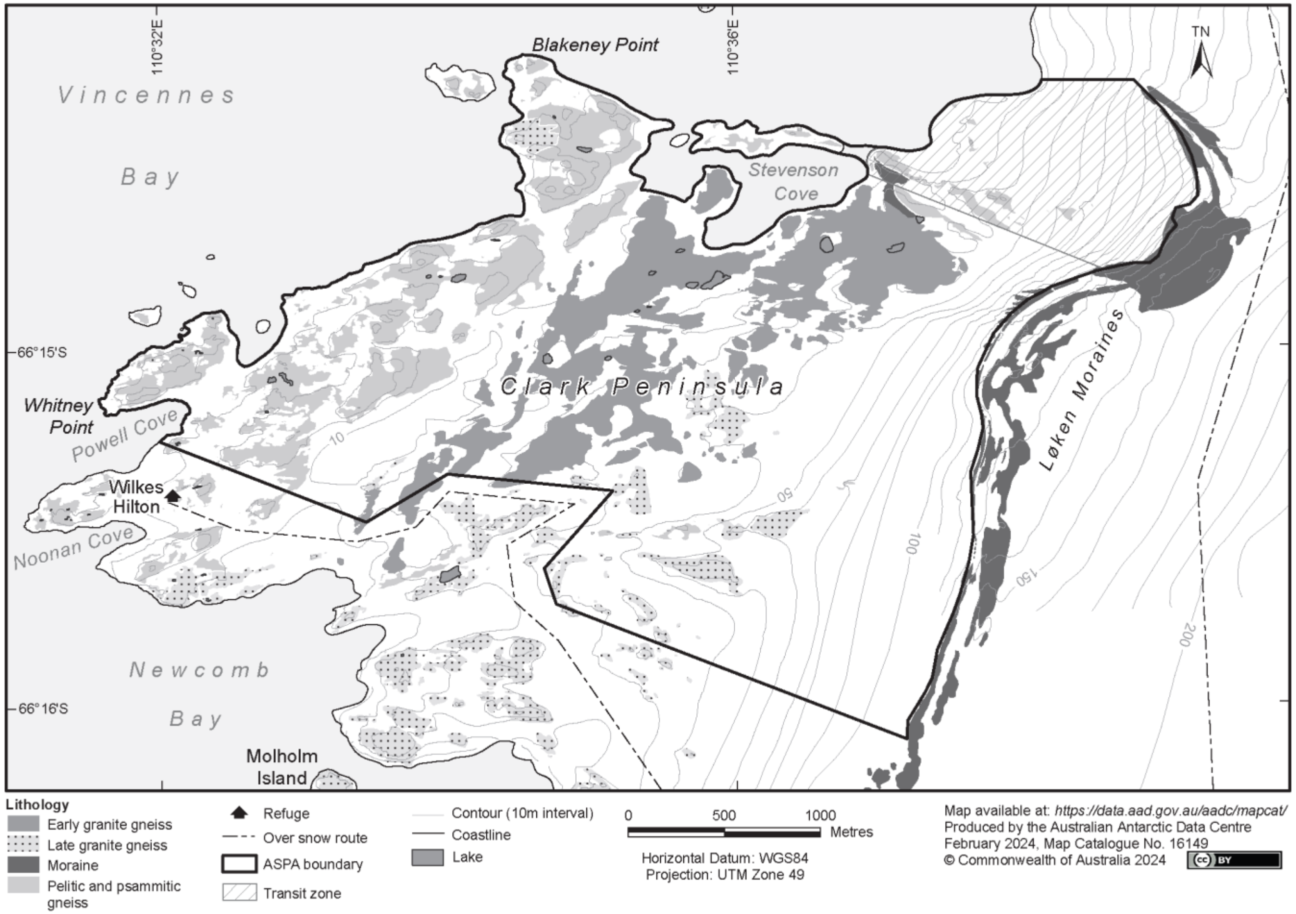
Australian Antarctic Division

Map D: Antarctic Specially Protected Area No. 136, Clark Peninsula

Geology



Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16149

Measure 5 (2024)

Antarctic Specially Protected Area No 137 (Northwest White Island, McMurdo Sound): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XIII-8 (1985), which designated Northwest White Island, McMurdo Sound as Site of Special Scientific Interest ("SSSI") No 18 and annexed a Management Plan for the Site;
- Recommendation XVI-7 (1991) and Measure 3 (2001), which extended the expiry date of SSSI 18;
- Decision 1 (2002), which renamed and renumbered SSSI 18 as ASPA 137;
- Measures 1 (2002), 9 (2008), 7 (2013) and 7 (2023), which adopted revised Management Plans for ASPA 137;

Recalling that Recommendation XIII-8 was designated as no longer current by Measure 13 (2014);

Recalling that Recommendation XVI-7 (1991) did not become effective and was designated as no longer current by Decision 1 (2011);

Recalling that Measure 3 (2001) did not become effective and was withdrawn by Measure 4 (2011);

Recalling that the Committee for Environmental Protection ("CEP") XXI (2018) reviewed and continued without changes the Management Plan for ASPA 137, which is annexed to Measure 7 (2013);

Noting that the CEP has endorsed a revised Management Plan for ASPA 137;

Desiring to replace the existing Management Plan for ASPA 137 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 137 (Northwest White Island, McMurdo Sound), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 137 annexed to Measure 7 (2023) be revoked.

Management Plan for Antarctic Specially Protected Area (ASPA) No 137

NORTHWEST WHITE ISLAND, MCMURDO SOUND

Introduction

White Island is located approximately 25 km SE of McMurdo Station (United States) and Scott Base (New Zealand), Hut Point, Ross Island. The Area comprises a strip of ~5.5 kilometers wide extending around the north-western and northern coastline of White Island, centered at 78° 02.5' S, 167° 18.3' E and is approximately 152.2 km² in area. The primary reason for designation of the Area is to protect the most southerly known pinniped population; a small, completely enclosed, naturally-occurring colony of Weddell seals (Leptonychotes weddellii) that is of high scientific importance. The seal colony was established around the mid-1940s to mid-1950s by a few individuals from Erebus Bay before an advancing McMurdo Ice Shelf cut off the newly-founded colony from access to open water in McMurdo Sound. Cracks exist in the ice shelf where it abuts the coastline of White Island, which allow the seals access to forage in the water underneath. The seal population has remained small, around 30 individuals. Seals at White Island are sensitive to disturbance arising from multiple visits over short time intervals. Scientific work is usually conducted during the breeding season. On-going research aims to understand the impact of isolation on the genetics of the White Island seal colony. The colony offers unique opportunities for scientific insights into the effects of in-breeding on small isolated populations, as well as valuable control information for larger scale studies of population dynamics and environmental variability of Weddell seals. It is essential that this natural 'experiment' is not disrupted, accidentally or intentionally, by human activities.

The Area was originally designated as Site of Special Scientific Interest (SSSI) No 18, following a proposal by the United States of America, which was adopted through Recommendation XIII-8 (1985). Recommendation XVI-7 (1991) extended the expiry date of SSSI 18 until 31 December 2001. Measure 3 (2001) extended the expiry date further until 31 December 2005. Measure 1 (2002) revised the original boundaries of the ASPA based on new data on the spatial distribution of the seals on the ice shelves. Decision 1 (2002) renamed and renumbered SSSI 18 as Antarctic Specially Protected Area No 137. Measure 9 (2008) updated the Management Plan to include recent census data on the seal colony, which led to a further revision of the boundary to include part of the Ross Ice Shelf in the north-east where seals were observed. Additional guidance on aircraft overflight and access was also included. Measure 7 (2013) updated the Management Plan with an improved map of White Island, and minor adjustments to provisions on aircraft access. The 2018 ATCM reaffirmed the Management Plan continued to remain in force.

The Area lies within Environment P – Ross and Ronne-Filchner ice shelves, based on the Environmental Domains Analysis for Antarctica and lies outside of the areas covered under the Antarctic Conservation Biogeographic Regions classification.

1. Description of values to be protected

An area of 150 km² of coastal shelf ice on the northwestern coast of White Island was originally designated following a proposal by the United States on the grounds that this locality contains an unusual breeding population of Weddell seals (Leptonychotes weddellii) which is the most southerly known, and which has been physically isolated from other populations by advance of the McMurdo Ice Shelf and Ross Ice Shelf (Map 1). The original boundaries were adjusted in 2002 (Measure 1) and again in 2008 (Measure 9) in light of new data recording the spatial distribution of the seals on the ice shelves. In the south, the boundary of the Area was shifted north and east to exclude the region north of White Strait where no observations of the seals have been recorded. In the north, the Area was extended to encompass an additional part of the Ross Ice Shelf in order to ensure inclusion of more of the region within which the seals may be found. The present Management Plan extended the boundary by 500 m east from the coastline, making the Area ~152.2 km².

The Weddell seal colony is small and appears to be quite isolated from other populattions because of its distance from the open ocean of McMurdo Sound, and as such it is highly vulnerable to any human impacts that might occur in the vicinity. There is no evidence that the colony was present in the early 1900s, as there is no mention of seals by naturalists who visited White Island many times during Scott's 1902, 1903 and 1910 expeditions. An ice breakout occurred in the region between 1947 and 1956, and the first two seals were observed near the northeastern end of the island in 1958 (R. Garrott, pers. comm. 2007). Year-round studies have detected only limited evidence of immigration or emigration of seals from the population, which appears to have grown to around 25 to 30 animals from a population of around 11 in the 1960s. Although several seals have moved between White Island and the Erebus Bay population to the north, it appears that the very low rate of exchange is limited by the challenge of moving the 20 km distance either above or below the ice.

The seals gain access to the sea below the ice shelf through pressure cracks, which are formed by tidal motion and movement of the McMurdo and Ross ice shelves. The series of cracks and ridging area is convoluted and dynamic, and while most seals are found along the coastal tide crack, it is likely they utilize the ridge crack leads extending off the coast and may move through there throughout the year.

The Weddell seals at White Island are on average greater in size and weight than their McMurdo Sound counterparts and have been shown to make more shallow dives. NW White Island is one of very few sites where Weddell seals are known to feed under shelf ice. The population has exceptional scientific value because of its period of physical isolation from interaction with other seals, thought to be around 60-70 years, and investigations of the extent to which the group may be considered a genetically distinct population are currently underway. Genetic techniques have been used to construct a complete pedigree for the NW White Island population. The results of these studies support the conclusion that the year in which the colony was founded is likely to have been around 60 years ago, which agrees with historical sightings. The colony offers unique opportunities for scientific insights into the effects of in-breeding on small isolated populations, as well as valuable control information for larger scale studies of population dynamics and environmental variability of Weddell seals. It is essential that this natural ‘experiment’ is not disrupted, accidentally or intentionally, by human activities.

NW White Island is relatively accessible by shelf ice from the nearby United States and New Zealand research stations at Hut Point, Ross Island. In addition, a flagged access route between these stations and Black Island traverses within approximately 2 km of the Area (Map 1).

The Area requires long-term special protection because of the exceptional importance of the Weddell seal colony, outstanding scientific values and opportunities for research, and the potential vulnerability of the Area to disturbance from scientific and logistic activities in the region.

2. Aims and objectives

Management at NW White Island aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human presence, disturbance and sampling in the Area;
- allow scientific research on the ecosystem within the Area, in particular on the Weddell seals, while ensuring protection from excessive disturbance, oversampling or other possible scientific impacts;
- allow other scientific research provided it is for compelling reasons that cannot be served elsewhere and that will not jeopardize the natural ecological system within the Area;
- prevent or minimize the possibility of introduction of non-native species (e.g. alien plants, animals and microbes) to the Area;
- minimize the possibility of the introduction of pathogens that may cause disease in faunal populations within the Area; and
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- Signs showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available in appropriate places, in particular at McMurdo Station, Scott Base and at the Black Island facilities;
- All pilots operating in the region, all personnel travelling overland to Black Island on the marked route across McMurdo Ice Shelf, and any other personnel travelling overland within 2 km of the boundary of the Area, shall be informed of the location, boundaries and restrictions applying to entry, overflight and landings within the Area;

- National programs shall ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and aeronautical charts;
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer required;
- Any abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area;
- The Area shall be visited as necessary (preferably no less than once every five years) to assess whether it continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate;
- National Antarctic Programs operating in the region shall consult together with a view to ensuring the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA No 137 NW White Island topography.

- Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 78° 00' S; 2nd 78° 12' S; Central Meridian: 167° 05' E; Latitude of Origin: 77° 30' S; Spheroid and datum: WGS84.

- Inset 1: Ross Sea region.

- Inset 2: Ross Island region, key features and nearby stations.

Coastlines and ice shelf source: Antarctic Digital Database (v7.7, SCAR, 2023). Ice free ground digitized from WorldView imagery in Map 2. Topographic contours on White Island were derived by Environmental Research & Assessment (2013) from a 4 m LiDAR DEM (estimated accuracy of ~10 m horizontally and ~1 m vertically) produced by OSU/NASA/USGS (Schenk et al. 2004). Survey marker positions are from LINZ (2000) and Denys & Pearson (2000). Observations of seal positions provided by J. Rotella (pers. comm. 2023).

Map 2: ASPA No 137 NW White Island – air access. Map specifications as for Map 1. Imagery WorldView-3 31 Oct 2022 ©Maxar 2022 provided by Polar Geospatial Center (NSF #2129685).

6. Description of the Area

6(i) Geographical coordinates, boundary markers and natural features

- *General description*

White Island, part of the McMurdo volcanic complex, is situated approximately 20 km SE of the edge of the McMurdo Ice Shelf and 25 km SE of Hut Point, the location of McMurdo Station (United States) and Scott Base (New Zealand) on Ross Island

(Inset 2, Map 1). The roughly triangular island is approximately 30 km long and 15 km wide at its maximum, and rises to a maximum elevation of 762 m in several locations (Map 1). The northern and western shores of White Island descend steeply, with water depths of 600 m occurring within 5 km of the island. The island is predominantly ice-covered with most of the rock outcrops being in the north. It is surrounded by the permanent shelf ice of the McMurdo Ice Shelf and Ross Ice Shelf, which is between 10 m and 100 m in thickness in this area. Black Island is situated 2.5 km west of White Island, separated by the shelf ice of White Strait. The GPS entry and exit points for the access route to Black Island from McMurdo through White Strait are 78° 12.0' S, 166° 50.0'E, and 78° 14.283' S, 166° 45.5' E respectively.

The westward movement of the McMurdo Ice Shelf is greatest at the northern end of White Island and movement of ice away from the NW coast ensures open water in cracks in the shelf at this locality is present year-round. The Weddell seal population uses the cracks for access to seawater and feeding grounds under the shelf ice, and inhabits and breeds in the region within approximately 5 km of their positions. The cracks occur parallel to and within a few hundred meters of the coast of White Island, and intermittently extend along the coast from the northern extremity of the island up to 15 km to the south.

- *Boundaries and coordinates*

The Area includes 152.2 km² of the shelf ice and open-water cracks of both the Ross Ice Shelf and McMurdo Ice Shelf up to 5 km offshore northeast, north and west from the White Island coast, and a strip of coastal land along the northwestern coastline of White Island. The northeastern boundary extends from the northeastern coast of Cape Spencer-Smith (78° 0.75' S, 167° 31.7' E; 50 m elevation) 5.8 km due east to 78° 0.75' S, 167° 46.6' E. The boundary then extends northwest and follows a line parallel to and 5 km from the coast, around Cape Spencer Smith and then heading southwest to 78° 05.0' S, 167° 00' E. The boundary then extends due south for 7.8 km to 78° 09.2' S, 167° 0.0' E, and thence 2.7 km east to Castellini Bluff on White Island (78° 09.2' S, 167° 07.0' E).

The boundary then extends northwards around White Island, following 500 m inland from the coastline around the general line of cliffs ranging in height between ~100 m to ~300 m to Cape Spencer Smith and thence to the northeastern limit of the Area. The White Island coast is distinguished by a change in surface slope where the transition between the floating ice-shelf and land occurs: the transition is in some places gradual and indistinct, and the exact position of the coast is not precisely known.

- *Weddell seal colony*

It was estimated there were 25-30 resident seals in 1981 (Castellini et al. 1984). A similar estimate of between 25-30 animals was made in 1991 (Gelatt et al. 2010). In 1991, an estimated 26 seals were greater than one year of age, 25 of which were of breeding age (>4) (Gelatt et al. 2010). Since 1991, 29 different females have produced 144 pups (1-13 pups per female; avg = 5) at White Island (J. Rotella pers. comm. 2023). In 2013 through 2022, 24 different females were sighted at White Island, and 11 of these individuals have produced pups (J. Rotella pers. comm. 2023). Between two and four live pups were recorded from 1963 to 1968 (Heine 1960; Caughley 1959), in 1981, and in 1991. Annual censuses since 1991 recorded between four and ten pups from 1991 to 2000, between one and five pups from 2001 to 2007, and between three and six pups from 2008 through 2022 (J. Rotella pers. comm. 2023). Pup mortality is high, possibly due to inbreeding, and pup production is low in comparison to the population in Erebus Bay (R.Garrott pers. comm 2008).

The seals are physically isolated by the barrier of the shelf ice, and it is difficult for seals to swim the 20 km distance under the ice to reach the seasonally open waters of McMurdo Sound: Weddell seals have been estimated to be capable of swimming a distance of around 4.6 km (2.5 nautical miles) on a single breath. The isolation of the colony is substantiated by tag observation data on Weddell seals in McMurdo Sound, where in more than 100,000 tag observations over a 20-year period no tagged seals from White Island have been observed in McMurdo Sound (Stirling 1967, 1971; Ward, Testa & Scotton 1999). These data suggest that the White Island seals do not generally traverse the 20 km distance to the open ocean over the surface of the shelf ice. However, there is at least one record of a yearling from the White Island colony found to have made the journey across to the Williams airfield close to McMurdo station (G. Kooyman pers. comm. 2007), and one female born in Erebus Bay near Turtle Rock was seen with a pup at White Island in 2022 (J. Rotella pers. comm. 2022). A recent genetic study found that seals at White Island showed consistent signs of reduced diversity compared to those in the Erebus Bay colonies (Miller et al. 2022).

Adult female seals begin to appear on the shelf ice in early November, one month later than other pupping areas in the southern Ross Sea. They pup at the NW extremity of the island during which time sub-adults and non-breeding adults can be found up to 15 km to the SW near open cracks on the west side of the island (Gelatt et al. 2010). Few adult male seals are observed on the sea-ice during this time (0 – 3 per year), as most remain in the water to establish and defend territories (J. Rotella pers. comm. 2023). The females remain on the ice until pups are weaned at about 6-8 weeks of age. After December, adults and sub-adults mix in the pupping area and along the cracks formed at the northwestern corner of the island.

The harsh surface conditions probably confine the seals to the water during the winter months. Winter surface temperatures reach as low as -60°C and it is thought that the seals expend considerable time maintaining open air holes in the cracks. This is considered to be a key factor limiting the population size (Yochem et al. 2009), with pups and sub-adults possibly excluded from use of the limited breathing holes by more dominant and aggressive adults. Some pups may be unable to maintain their own breathing holes and may become trapped on the ice surface if dominant seals do not allow them entry into the water (Castellini et al. 1992; Harcourt et al. 1998).

Studies have suggested that the Weddell seals at White Island have a diet similar to their counterparts at McMurdo Sound (Castellini et al. 1992). Studies of fish otoliths recovered from Weddell seal fecal samples have revealed a diet comprised primarily of the nototheniid fish Pleuragramma antarcticum, also with fish from the genus Trematomus (Burns et al. 1998). Invertebrates are thought to comprise the remainder of the diet, along with a cephalopod belonging to the family Mastogoteuthidae (Burns et al. 1998). Consumption of the latter was found to be considerably greater amongst White Island seals than those at McMurdo Sound (Castellini et al. 1992).

Other aspects of the physiology and behavior of seals at White Island appear to differ from nearby populations at McMurdo Sound and at Terra Nova Bay: the seals at White Island appear to be significantly fatter (Stirling 1972; Castellini et al. 1984), with recorded weights of up to 686 kg (1500 lb.) at White Island compared to no more than 500 kg at McMurdo Sound or Terra Nova Bay (Proffitt et al. 2008). On average adult female seals are considerably longer than those in McMurdo Sound, and young seals at White Island have been observed to exhibit faster growth rates than their McMurdo counterparts. Average diving depths at White Island are shallower than at McMurdo Sound (Castellini et al. 1992).

Observations of seal positions provided by M. La Rue (PGC, pers. comm. 2012) were made by visual inspection of six high resolution satellite images (Quickbird, WorldView 1 & 2, and GeoEye: imagery © 2010, 2011 Digital Globe) acquired in November of 2010 and 2011. Weddell seals tend to exhibit more stable haul-out behavior at this time of year. The satellite images were acquired between 0900-1100 hours local time, which corresponds with the period of lowest seal haul-out activity. Images were searched over a broad area extending up to approximately 10 km beyond the ASPA boundary. A combined total of nine seals were observed in three of the six images studied.

No seals were observed outside of the ASPA boundaries. No seals were detected in imagery acquired in early November, with all detections made in mid- and late-November imagery. It was not possible to determine whether an individual was counted more than once, or to distinguish adults from pups, in the analysis.

6 (ii) Access to the area

Pedestrian and vehicular access to the Area is from the Hut Point – Black Island marked route that passes approximately two kilometers from the boundary at its nearest point. Access to the Area from the marked route is across the ice shelf. Aircraft access to the Area is prohibited except in accordance with a permit, and all aircraft operating within or over the Area must follow the restrictions on overflight and landing set out in detail in Section 7(ii).

6(iii) Location of structures within and adjacent to the Area

There are no structures within the Area. Several small survey markers (LINZ 2000; Denys & Pearson 2000) are installed on White Island in close proximity to the Area (Map 1). Transantarctic Mountains Deformation Network (TAMDEF) WTE0 is installed at 78° 11.385' S, 167° 29.755' E at an elevation of 453.5 m. The marker comprises a threaded stainless steel rod embedded into a boulder and is identified by a yellow plastic disc. A Land Information New Zealand (LINZ) Antarctic Datum Unification Network Survey Mark named 'HEIN', comprising a brass pin grouted into rock, is located on Mount Heine at 78° 04.561' S, 167° 27.042' E at an elevation of 737.7 m.

6(iv) Location of other protected areas in the vicinity

The nearest protected areas to NW White Island are on Ross Island: Arrival Heights (ASPA No 122) adjacent to McMurdo Station and Discovery Hut (ASPA No 158) on the Hut Point Peninsula are the closest at 20 km to the northwest; Cape Evans (ASPA No 155) and Cape Royds (ASPA No 121) are 47 km and 55 km northwest respectively; and Tramway Ridge (ASPA No 130) near the summit of Mt. Erebus is 60 km to the north.

6(v) Special zones within the Area

An Air Access Restrcited Zone is defined within ~¼ nautical mile (500 m) of the northwestern White Island coastline along the eastern boundary of the Area (Map 2). Details on provisions applicable within the zone are given in Section 7(ii) under Aircraft access and Overflight.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a permit issued by an appropriate national authority. Conditions for issuing a permit to enter the Area are that:

- it is issued for scientific study of the Weddell seal ecosystem, or for compelling scientific reasons which cannot be served elsewhere, or for reasons essential to the management of the Area;
- the actions permitted are in accordance with this Management Plan;
- the activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the environmental, ecological and scientific values of the Area;
- the permit shall be issued for a finite period;
- the permit, or a copy, shall be carried when in the Area.

7(ii) Access to, and movement within, or over the Area

Access to and movement within the Area shall be on foot, by vehicle, or by aircraft.

- *on foot or by vehicle*

Special access routes are designated for access to the Area on foot or by vehicle over the shelf ice. Vehicles are permitted on the ice shelf but are strongly discouraged from approaching closer than 50 m from seals, and closer approaches should be on foot. Vehicle and pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize disturbance.

- *Aircraft access and overflight*

The Weddell seals at White Island are generally observed within a few hundred meters of the northwestern coastline, although may be present anywhere within the Area and occasionally have been observed on the ice shelf beyond the ASPA boundaries, and guidance for aircraft access is designed accordingly. Aircraft landings within the Area are prohibited unless authorised by permit. When aircraft entry into the Area is authorized by permit, aircraft shall operate within the Area according to strict observance of the following conditions (see Map 2):

- An Air Access Restricted Zone is defined within ~¼ nautical mile (500 m) of the NW White Island coastline along the eastern boundary of the Area (Map 2);
- All aircraft overflight below ~1650 feet (500 m) and landings within the Air Access Restricted Zone should be avoided to the maximum extent practicable unless authorized by permit;
- All aircraft, including Remotely Piloted Aircraft Systems (RPAS), overflight below ~1150 feet (350 m) and landings within ~380 yards (350 m) of the coastline or any seal(s) observed are prohibited unless authorized by permit;
- Reconnaissance of suitable landing sites for piloted aircraft should be made from above ~1650 feet (500 m) to ensure the required separation distance from the coastline and any seal(s) present is maintained when landing;
- RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

7(iii) Activities that may be conducted within the Area

- Scientific research that will not jeopardize the values of the Area;
- Essential management activities, including monitoring and inspection.

7(iv) Installation, modification or removal of structures / equipment

- Structures shall not be erected within the Area except as specified in a permit;
- Permanent structures or installations are prohibited, with the exception of permanent signs;
- All structures, scientific equipment or markers installed in the Area shall be authorized by permit and clearly identified by country, name of the principal investigator, year of installation and date of expected removal. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area;
- Installation (including site selection), maintenance, modification or removal of structures or equipment shall be undertaken in a manner that minimizes

disturbance to the values of the Area;

- Removal of specific structures / equipment for which the permit has expired shall be the responsibility of the authority which granted the original permit, and shall be a condition of the permit.

7(v) Location of field camps

Permanent field camps are prohibited within the Area. Temporary camp sites are permitted within the Area. There are no specific restrictions to a precise locality for temporary camp sites within the Area, although sites selected shall be more than 200 m from the ice-shelf cracks inhabited by the seals, unless authorized by permit when deemed necessary to the accomplishment of specific research goals.

7(vi) Restrictions on materials and organisms that may be brought into the Area

In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, restrictions on materials and organisms which may be brought into the area are:

- Deliberate introduction of animals (including Weddell seals from outside of this colony), plant material, micro-organisms and non-sterile soil into the Area is prohibited. Precautions shall be taken to prevent the accidental introduction of animals, plant material, micro-organisms and non-sterile soil from other biologically distinct regions (within or beyond the Antarctic Treaty area);
- Of particular concern are microbial and viral introductions from other seal populations. Visitors shall ensure that scientific and sampling equipment, measuring devices and markers brought into the Area are clean. To the maximum extent practicable, footwear and other equipment used or brought into the area (including backpacks, carry-bags, walking poles, tripods, and camping equipment) shall be thoroughly cleaned before entering the Area. Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016); CEP 2019), and in the Environmental Code of Conduct for terrestrial scientific field research in Antarctica (Resolution 5 (2018));
- Herbicides or pesticides are prohibited from the Area;
- Use of explosives is prohibited within the Area;
- Fuel, food, chemicals, and other materials shall not be stored in the Area, unless specifically authorized by permit and shall be stored and handled in a way that minimises the risk of their accidental introduction into the environment;
- All materials introduced shall be for a stated period only and shall be removed by the end of that stated period; and
- If a release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.

7(vii) Taking of, or harmful interference with, native flora and fauna

Taking of, or harmful interference with, native flora and fauna is prohibited, except in accordance with a permit issued under Article 3 of Annex II of the Protocol on Environmental Protection to the Antarctic Treaty.

Any proposed taking of, or harmful interference with, Weddell seals within the Area that are for purposes that could be achieved just as effectively on Weddell seals from populations outside of the Area should not be permitted.

Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica and, where applicable, follow stricter animal care or research standards or guidelines in accordance with national procedures.

7(viii) Collection or removal of anything not brought into the Area by the permit holder

- Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted if there is a reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, native flora or fauna that their distribution or abundance within the Area would be significantly affected;
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorized, may be removed unless the impact of removal is likely to be greater than leaving the material in situ: if this is the case the appropriate authority should be notified and approval obtained.

7(ix) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
- install or maintain signposts, markers, structures or scientific equipment;
- carry out protective measures.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority after the visit has been completed in accordance with national procedures and permit conditions;

- Such reports should include, as appropriate, the information identified in the visit report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan;
- Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organizing the scientific use of the Area;
- The appropriate authority should be notified of any activities / measures that might have exceptionally been undertaken, or anything removed, or of anything released and not removed, that were not included in the authorized permit.

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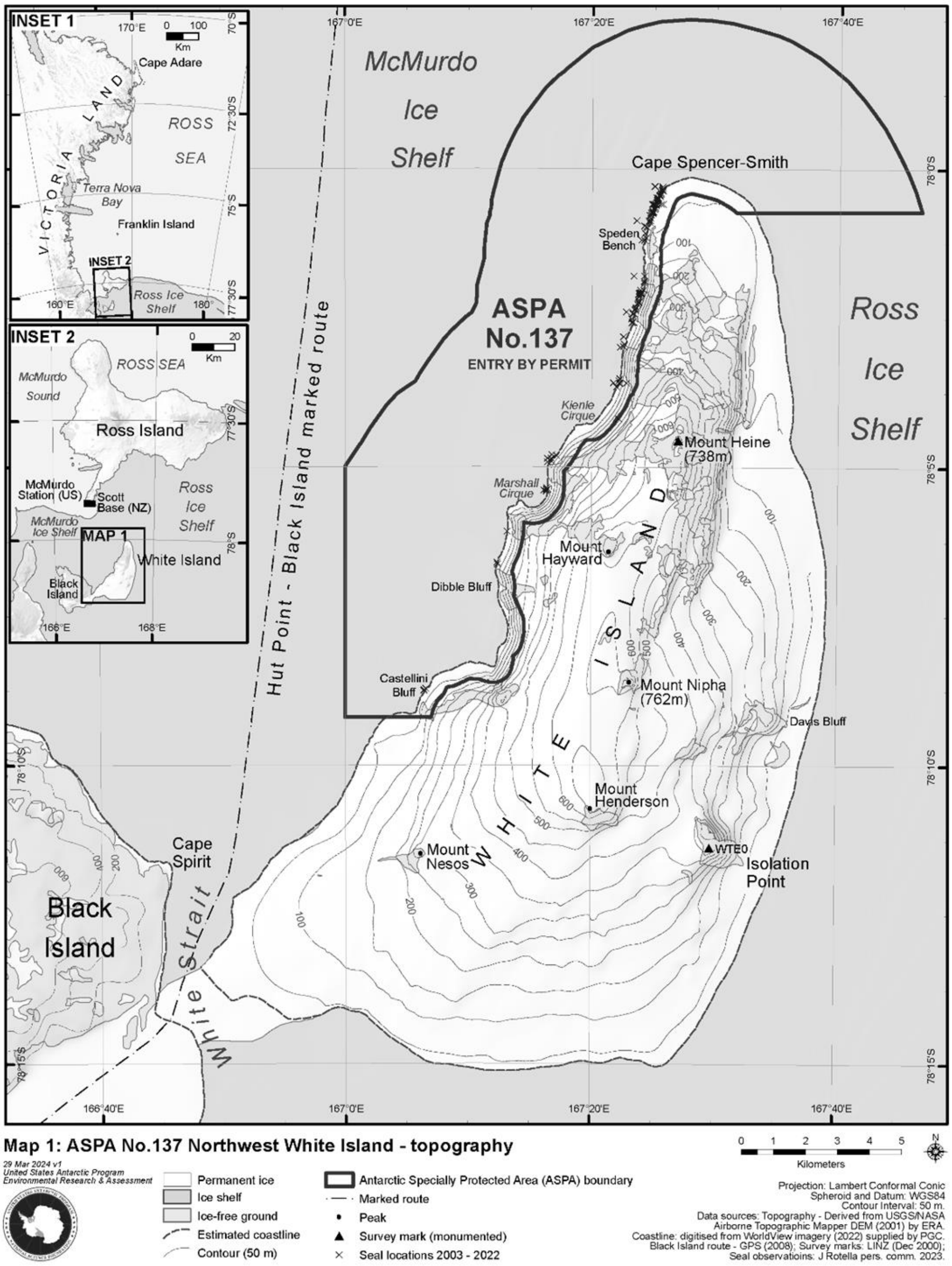
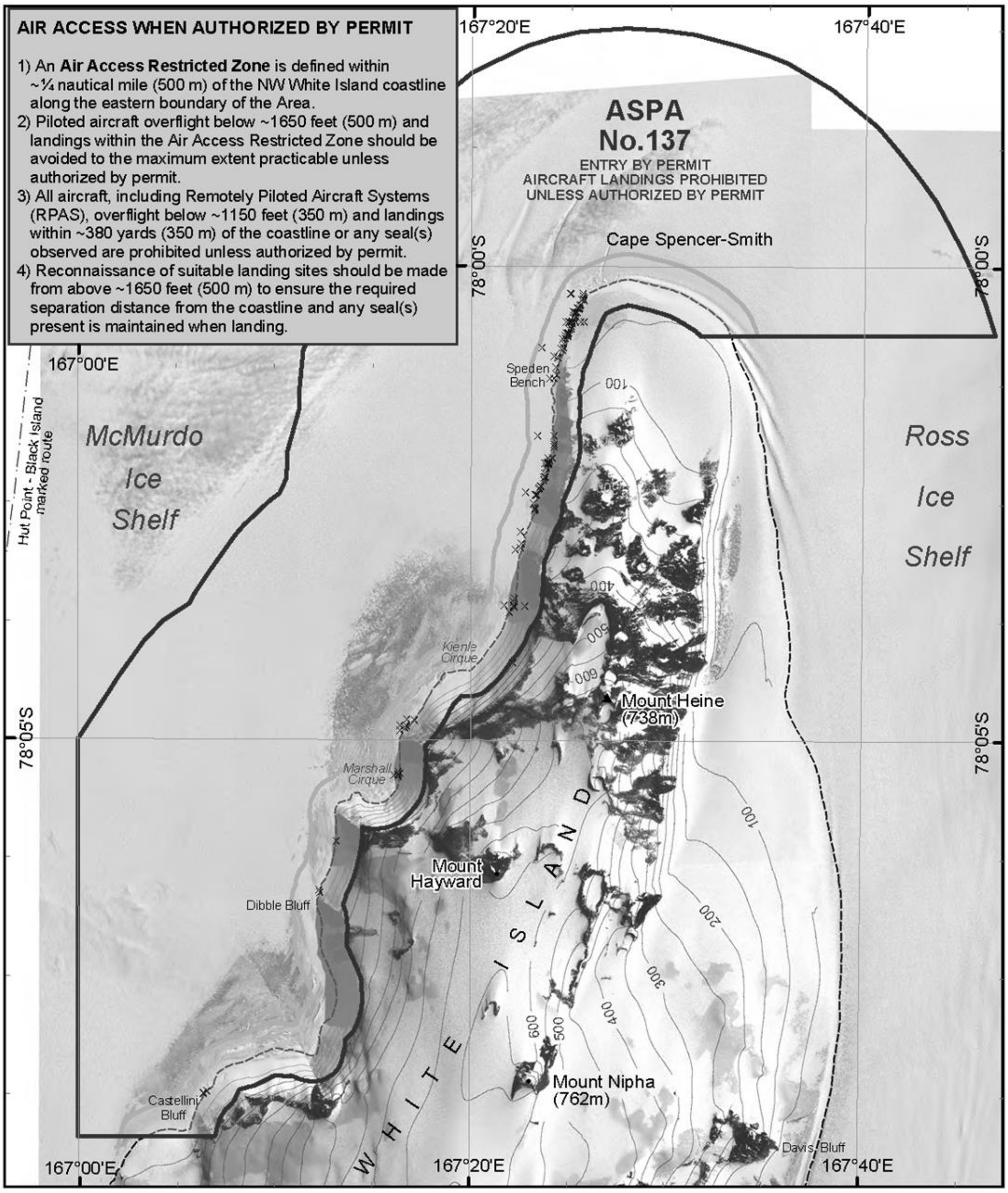


Map 1: ASPA No.137 Northwest White Island - topography



Map 2: ASPA No.137 Northwest White Island - air access

22 May 2024 v2
United States Antarctic Program
Environmental Research & Assessment

0 1 2 3 4 5
Kilometers
N

Estimated coastline
Contour (50m)
Marked route
Antarctic Specially Protected Area (ASPA) boundary
Air Access Restricted Zone (500 m from coastline)
× Seal locations 2003 - 2022

Projection: Lambert Conformal Conic
Spheroid and Datum: WGS84; Contour Interval: 50 m.
Data sources: Topography - Derived from USGS/NASA Airborne Topographic Mapper DEM (2001) by ERA.
Imagery: WorldView-3 31 Oct 2022 ©Maxar 2022 provided by Polar Geospatial Center (NSF #2129685);
Black Island route - GPS (2008);
Seal observatioins: J Rotella pers. comm. 2023.

Measure 6 (2024)

Antarctic Specially Protected Area No 141 (Yukidori Valley, Langhovde, Lützow-Holm Bay): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XIV-5 (1987), which designated Yukidori Valley, Langhovde, Lützow-Holm Bay as Site of Special Scientific Interest ("SSSI") No 22 and annexed a Management Plan for the Site;
- Recommendation XVI-7 (1991), which extended the expiry date of SSSI 22;
- Measure 1 (2000), which adopted a revised Management Plan for SSSI 22;
- Decision 1 (2002), which renamed and renumbered SSSI 22 as ASPA 141;
- Measures 7 (2014) and 3 (2019), which adopted revised Management Plans for ASPA 141;

Recalling that Recommendation XIV-5 (1987) was designated as no longer current by Measure 13 (2014);

Recalling that Recommendation XVI-7 (1991) did not become effective and was designated as no longer current by Decision 1 (2011);

Recalling that Measure 1 (2000) did not become effective and was withdrawn by Decision 3 (2017);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 141;

Desiring to replace the existing Management Plan for ASPA 141 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 141 (Yukidori Valley, Langhovde, Lützow-Holm Bay), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 141 annexed to Measure 3 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area No 141

YUKIDORI VALLEY, LANGHOVDE, LÜTZOW-HOLM BAY

Introduction

The Yukidori Valley (69º14'30"S, 39º46'00"E) is located in the middle part of Langhovde on the east coast of Lützow-Holm Bay, continental Antarctica, which is about 20 km south of the Japanese Syowa Station (69º00'22"S, 39º35'24"E) on the Ongul Islands (Map 1). The Valley is 2.0-2.5 km long from east to west, 1.8 km wide and contains a prominent melt stream and two lakes (Map 2).

The Area was originally designated in Recommendation XIV-5 (1987, SSSI No 22) after the proposal by Japan. A Management Plan for the Area was adopted under Recommendation XVI-7 (1991) and revised under Measure 1 (2000), Measure 3 (2019).

Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) the Area lies within Environment D – East Antarctic coastal geologic. In accordance with the Antarctic Conservation Biogeographic Regions classification (Resolution 3 (2017)), the Area lies within ACBR 5 - Enderby Land. The Yukidori valley is designated as ASPA to protect a fragile, typical continental Antarctic fellfield ecosystem and its component species, some of which are endemic to Antarctica, from the human activity in Antarctica. Additionally, long-term monitoring programs have been conducted in this valuable site.

1. Description of values to be protected

A fragile, typical continental fellfield ecosystem has developed in the Yukidori Valley. Field surveys of geological and biological sciences have been carried out in Langhovde since 1957 of the IGY period and a long-term monitoring program started in the Yukidori Valley area in 1984. More intensive studies have been carried out after the Area was designated as SSSI No 22 in 1987. Since 1984, the long-term monitoring program has continued in this Area, in particular to monitor temporal and spatial changes in vegetation of mosses and lichens (Map 2).

The values to be protected are those associated with this fragile, typical continental Antarctic fellfield ecosystem under quite harsh Antarctic environment, and the long-term scientific studies that have been carried out since 1984. Permanent quadrats for monitoring lichen and moss vegetation have been established in this typical continental ecosystem in relation to long-term environmental change. The Area requires protection in order to ensure that this long-term scientific monitoring program is not compromised. Based on these reason, the Area was designated in Recommendation XIV-5 (1987, SSSI No 22) after the proposal by Japan, and the Management Plan for the Area was adopted under Recommendation XVI-7 (1991). The human activity in this area will easily destroy the fragile ecosystem under the harsh environment in continental Antarctica, and it will take so long period or absolutely impossible to recover. By designed as ASPA, this valuable fellfield ecosystem should be protected and the value for research on the ecosystem and environmental monitoring.

The Yukidori Valley is inhabited by several thousand snow petrels. Excrement of snow petrels is important as a major supply of nutrients for mosses and lichens.

By the continuous environmental monitoring study in the ASPA area, the effect of global environmental change in Antarctica will be detected and it will contribute as a sentinel system for the whole world.

2. Aims and objectives

Management at Yukidori Valley aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow a continuation of long-term monitoring programs;
- avoid major changes to the structure and composition of the terrestrial vegetation, in particular the moss and lichen banks;
- prevent unnecessary human disturbance to the snow petrels, as well as to the surrounding environment, and
- minimise the possibility of introduction of alien plants, animals and microbes into the Area; and
- Allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities are to be undertaken to protect the values of the Area:

- Maps showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently at "Biological research hut" located outside of the western boundary of the Area, where copies of this Management Plan shall also be made available.
- Signs showing the location and boundaries of the Area and listing entry restrictions should be placed at the entry point at the western boundary of the Area to help avoid inadvertent entry.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer necessary.
- Information about the ASPA, including copies of the Management Plan, should be made available at all facilities operating in the region.
- Personnel (national programme staff, field expeditions, tourists and pilots) in the vicinity of, accessing or flying over the Area shall be specifically instructed, by their national program (or appropriate national authority) as to the provisions and contents of the Management Plan.

- All pilots operating in the region shall be informed of the location, boundaries and restrictions applying to entry and over-flight in the Area.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: Sôya Coast, Lützow-Holm Bay, East Antarctica.

Map 2: Yukidori Valley, Langhovde and the boundary of ASPA No 141.

Map 3: The biological research hut and surroundings.

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

The Yukidori Valley (69º00'30"S, 39º46'00"E) is situated in the middle part of Langhovde, on the east coast of Lützow-Holm Bay, Continental Antarctica. The Area encompasses 2.0-2.5 km by 1.8 km, located between a tongue of the ice cap and sea at the western end of the Valley. The fellfield ecosystem and long-term monitoring sites are contained entirely within Yukidori Valley, and the Area boundary is designed to afford protection to the entire valley/ catchment system. The Area does not include any marine area.

The location of the Area and its boundaries are shown on the attached maps (Map 2). It is described as all the land within the Area bounded by the following lines:

- The eastern boundary of the Area follows a straight line from 69º14'00"S, 39º48'00"E due south to 69º15'00"S, 39º48'00"E.
- The northern boundary of the Area follows a straight line from 69º14'00"S, 39º48'00"E due west to the coastline at 69º14'00"S, 39º44'20"E (Map 2-A).
- The southern boundary of the Area follows a straight line from 69º15'00"S, 39º48'00"E due west to the stream of Yatude Valley at 69º15'00"S, 39º45'20"E (Map 2-E).
- The western boundary of the Area between 69º14'00"S, 39º44'20"E (Map 2-A) and 69º15'00"S, 39º45'20"E (Map 2-E), is delineated by the high-water line of the coast, rope boundaries and stream of Yatude Valley.
- Map 2-A (69º14'00"S, 39°44'.20"E) to Map 2-B (69°14'31"S, 39°42'57"E): High-water line of the coast.
- Map 2-B (69°14'31"S, 39°42'57"E) to Map 2-C (69°14'38"S, 39°43'22"E): Rope boundaries.
- Map 2-C (69°14'38"S, 39°43'22"E) to Map 2-D (69°14'32"S, 39°43.01"E): Rope boundaries.
- Map 2-D (69°14'32"S, 39°43.01"E) to Map 2-E (69º15'00"S, 39º45'20"E): Stream of Yatude Valley.

- *Geology*

The Yukidori Valley contains a prominent melt stream and two lakes. The stream flows from the ice cap towards the sea through V-shaped and U-shaped sectors of the Valley and enters Lake Yukidori, in the middle of the Valley, 125 m above sea level; it then flows from the south-west corner of the lake and runs through the lower valley formed by steep cliffs. Sorted stone circles with mean diameter of 1 m are situated on moraines near the northwestern part of Langhovde Glacier to the east of Lake Higasi-Yukidori, which is located at the head of the Valley, about 200 m above sea level abutting the edge of the ice cap. Poorly-developed stone circles are found on fluvioglacial deposits in the Yukidori Valley. Small talus aprons and talus cones are located around Lake Yukidori. In the lower reaches of the Yukidori Valley, at on altitude of about 20 m, fluvioglacial terraces 20 to 30 m wide stand 2 to 3 m high above the present channel bed. These flat terraces consist of rather fine sand and gravel. There is a dissected deltaic fan formed at the mouth of the stream. The Valley is underlain by well-layered sequences of late Proterozoic metamorphic rocks, consisting of garnet-biotite gneiss, biotite gneiss, pyroxene gneiss and hornblende gneiss with metabasite. The foliation of the gneisses strike N10°E and dips monoclinally to the east (Map 3).

- *Flora and fauna*

Almost all of the plant species recorded from the Langhovde area occur within the Area. They include the mosses Bryum pseudotriquetrum (= Bryum algens), Bryum argenteum, Bryum amblyodon, Ceratodon purpureus, Hennediella heimii, Pottia austrogeorgica, Grimmia lawiana and lichens Usnea sphacelata, Umbilicaria antarctica, Umbilicaria decussata, Pseudephebe minuscula, and Xanthoria elegans. Four species of free living mites (Nanorchestes antarcticus, Protereunetes minutus, Antarcticola meyeri, Tydeus erebus), have been reported. There are over sixty species of microalgae, including species endemic to the Yukidori Valley, Cosmarium yukidoriense and a variety of Cosmarium clepsydra. Such vegetation is distributed all along the stream. Several pairs of the south polar skua (Catharacta maccormicki) and several thousand snow petrels (Pagodroma nivea; note "Yukidori" is Japanese for the snow petrel) breed at the cliff along the valley.

6(ii) Access to the area

Access to the Area is covered under section 7(ii) of this plan

6(iii) Location of structures within and adjacent to the Area

The biological research hut is located just outside the western boundary of the Area at (69º14'36"S, 39º42'59"E). The boundary of the Area near the hut is enclosed by ropes. It was constructed in 1986 near the beach at the mouth of the Valley so that there would be minimal impact on the flora, fauna, and terrain of the Area. There are three sites for microclimatic observations in the lower, middle and upper reaches of the stream within the Area. Microclimatic factors such as relative humidity and air temperatures at ground level, soil temperatures and temperatures at moss level are measured. Hexagon chambers made of acrylic fiber are installed at the vegetated area in the lower and middle reaches in order to assess vegetational and environmental changes. These sites are indicated in the attached maps.

6(iv) Location of other protected areas in the vicinity

None.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority. Conditions for issuing a Permit to enter the Area are that:

- it is issued for compelling scientific or educational reasons that cannot be served elsewhere, or for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- the actions permitted will not jeopardize the ecological or scientific values of the Area;
- any management activities are in support of the aims and objectives of the Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or an authorized copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- Permit shall be issued for a stated period;
- The appropriate authority should be notified of any activities/measures undertaken that weren't included in the authorized Permit.

7(ii) Access to, and movement within or over, the Area

- The area is situated about 20 km south from Syowa station. In winter, snow vehicle access route is settled on the frozen sea ice. In summer, helicopter is used to access from Syowa station and ice-breaker.
- Access route of snow vehicle and helicopter are shown in Map3. Heliport is located outside of the boundary at 69º14'37"S, 39º42'53"E.
- Vehicles are prohibited within the Area and helicopter should not land within the Area.
- Only those pedestrians with compelling research activities are allowed to enter at the entry point (Map 2-C).

- No pedestrian routes are designated within the Area, but persons on foot should at all times avoid walking on vegetated areas or disturbance to birds and natural features.
- The operation of aircraft over the Area should be carried out, as a minimum requirement, in compliance with the ‘Guidelines for the Operation of Aircraft near Concentrations of Birds’ contained in Resolution 2 (2004).
- Overflight of bird colonies within the Area by Remotely Piloted Aircraft Systems (RPAS) shall not be permitted unless for scientific or operational purposes, in accordance with the Permit and following the recommendations contained in the Environmental Guidelines for Operation of RPAS in Antarctica (Resolution 4, 2018) (available at: https://documents.ats.aq/recatt/att645_e.pdf).

7(iii) Activities which may be conducted in the Area, including restrictions on time or place

- Compelling scientific research which cannot be undertaken elsewhere and which will not jeopardize the ecosystem of the Area.
- Essential management activities, including monitoring.

7(iv) Installation, modification or removal of structures

- No structures are to be erected in the Area, or scientific equipment installed, except for essential scientific or management activities, as specified in the Permit.
- All markers, structures or scientific equipment installed in the Area must be clearly identified by country, name of the principal investigator or agency, year of installation and date of expected removal.
- All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area.
- Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area.
- Structures and installations must be removed when they are no longer required, or on the expiry of the permit, whichever is the earlier.

7(v) Location of field camps

Camping is prohibited within the Area. All the visitors stay in the biology research hut (69º14'36"S, 39º42'59"E) just outside the western boundary of the Area, or tent settled around the hut.

7(vi) Restrictions on materials and organisms which may be brought into the Area

No living animals, plant material, microorganisms or soils shall be deliberately introduced into the Area and the precautions listed in 7(x) below shall be taken to prevent accidental introductions. Further guidance can be found in the CEP Non-native species manual (Resolution 4 (2016)) and the SCAR Environmental code of conduct for terrestrial scientific field research in Antarctica (Resolution 5 (2018)). In view of the presence of breeding bird colonies in the Area, no poultry products, including products containing uncooked dried eggs, shall be taken into the Area.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radionuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Fuel is not to be stored in the Area, unless specifically authorized by Permit for specific scientific or management purposes. Anything introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of any introduction into the environment is minimized. If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ. The appropriate authority should be notified of anything released and not removed that was not included in the authorized Permit.

7(vii) Taking of, or harmful interference with, native flora and fauna

Taking or harmful interference with native flora and fauna is prohibited, except by Permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals is involved, the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica (Resolution 4 (2019)) should be used as a minimum standard.

7(viii) The collection or removal of materials not brought into the Area by the permit holder

Collection or removal of anything not brought into the Area by the Permit holder shall only be in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted in instances where it is proposed to take, remove or damage such quantities of soil, native flora or fauna that their distribution or abundance in the Area would be significantly affected. Anything of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorized, may be removed unless the impact of removal is likely to be greater than leaving the material in situ: if this is the case the appropriate authority should be notified.

7(ix) Disposal of waste

Liquid human wastes may be disposed of into the sea adjacent to the area. All other wastes should be removed from the Area. Solid human waste should not be disposed of to the sea, but shall be removed from the Area. No solid or liquid human waste shall be disposed of inland.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

- Permits may be granted to enter the Area to carry out biological monitoring and area inspection activities, which may involve the collection of a small number of samples or data for analysis or review.
- Any specific sites of long-term monitoring shall be appropriately marked on site and on maps of the Area. To help maintain the ecological and scientific values of the Area, visitors shall take special precautions against introductions. Of particular concern are microbial, animal or vegetation introductions sourced from soils, from other Antarctic sites, including stations, or from regions outside Antarctica. To the maximum extent practicable, visitors should ensure that footwear, clothing and any equipment particularly camping and sampling equipment- is thoroughly cleaned before entering the Area.
- Scientific activities shall be performed in accordance with the SCAR Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica (Resolution 5 (2018)). Geological research shall be undertaken in accordance with the SCAR Environmental Code of Conduct for Geosciences Field Research Activities in Antarctica (Resolution 1 (2021)).
- To avoid interference with long-term research and monitoring activities or duplication of effort, persons planning new projects within the Area should consult with established programs and/or appropriate national authorities.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and no later than six months after the visit has been completed.
- Such reports should include, as appropriate, the information identified in the visit report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)).
- Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan.
- Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the Management Plan and in organizing the scientific use of the Area.

8. Supporting documentation

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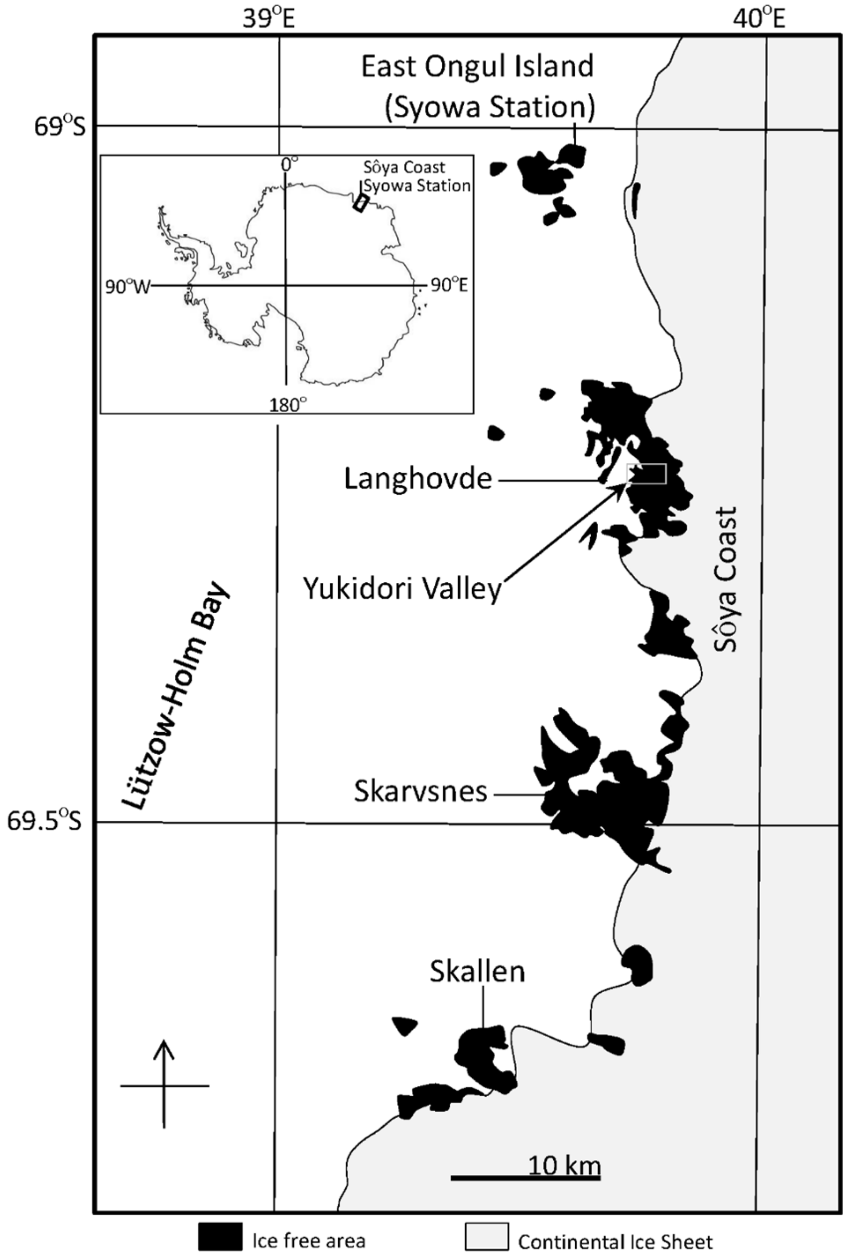
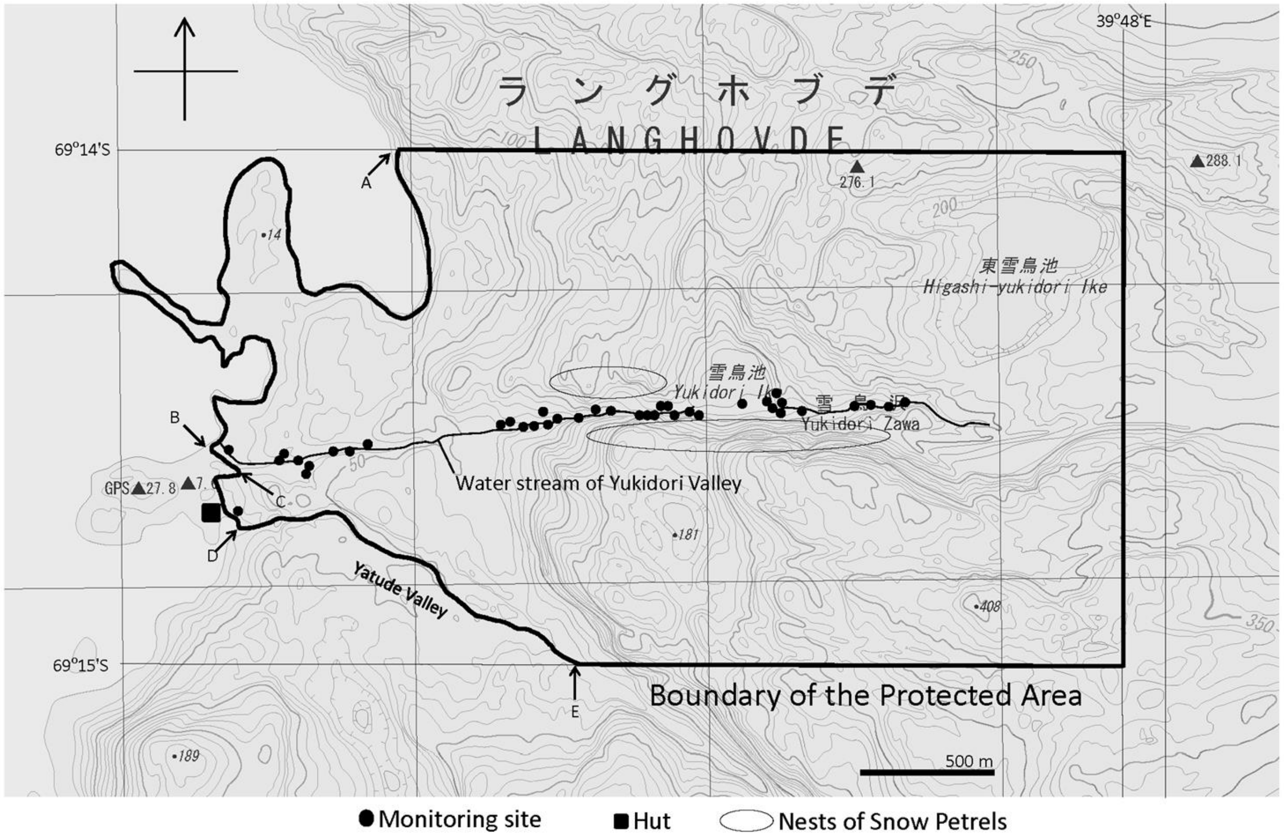
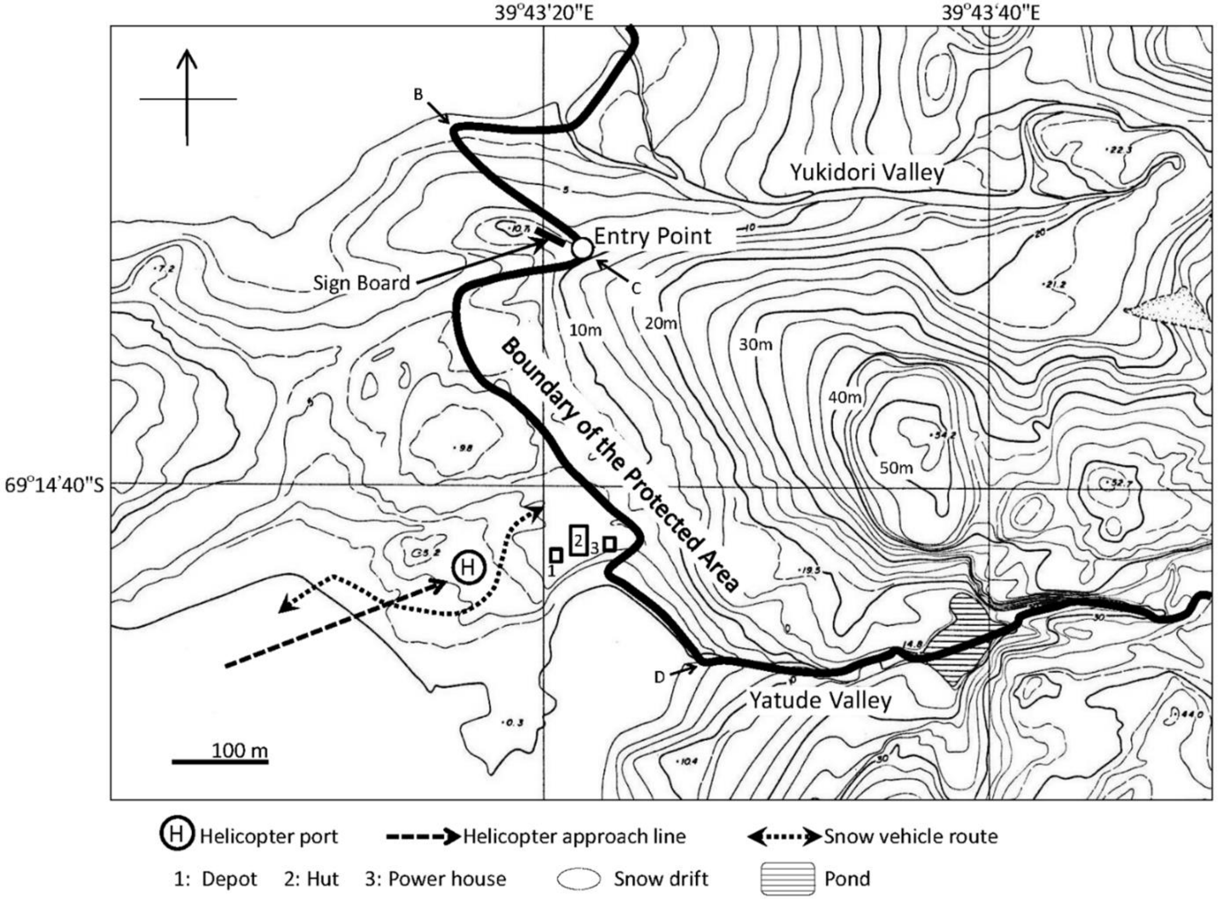


Map 1. The map of Soya Coast, Lutzow-Holm Bay, East Antarctica.
Universal Transverse Mercator projection. Spheroid and Datum: WGS84.



Map 2. Yukidori Valley, Langhovde and the boundary of the Protected Area.

Universal Transverse Mercator projection. Spheroid and Datum: WGS84.



Map 3. The biological research hut and surroundings.

Universal Transverse Mercator projection. Spheroid and Datum: WGS84.

Measure 7 (2024)

Antarctic Specially Protected Area No 142 (Svarthamaren): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XIV-5 (1987), which designated Svarthamaren as Site of Special Scientific Interest ("SSSI") No 23 and annexed a Management Plan for the Site;
- Resolution 3 (1996), which extended the expiry date of SSSI 23;
- Measure 1 (1999), which adopted a revised Management Plan for SSSI 23;
- Decision 1 (2002), which renamed and renumbered SSSI 23 as ASPA 142;
- Measures 2 (2004), 8 (2009), 8 (2014) and 4 (2019), which adopted revised Management Plans for ASPA 142;

Recalling that Recommendation XIV-5 was designated as no longer current by Measure 13 (2014);

Recalling that Resolution 3 (1996) was designated as no longer current by Decision 1 (2011);

Recalling that Measure 1 (1999) did not become effective and was withdrawn by Measure 8 (2009);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 142;

Desiring to replace the existing Management Plan for ASPA 142 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 142 (Svarthamaren), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 142 annexed to Measure 4 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area No 142

SVARTHAMAREN

Introduction

The Svarthamaren nunatak (71°53'16"S - 5°9'24"E to 71°56'10"S - 5°15'37"), part of the Mühlig-Hoffmanfjella in Dronning Maud Land, Antarctica, is protected as an Antarctic Special Protected Area (ASPA). The Area is approximately 7.5 km^2.

The nunatak holds one of the largest known seabird colony in the Antarctica. Between approx. 20,000 and 100,000 pairs of Antarctic petrels (Thalassoica antarctica) breed here annually and many non-breeders are also present during breeding season (November-March). Svarthamaren is the largest petrel colony in Dronning Maud Land, where more than 60% of the entire Antarctic petrel population might breed. In addition, between 1000 and 2000 pairs of snow petrel (Pagodroma nivea) and between 50 and 150 pairs of south polar skua (Catharacta maccormicki) are breeding here. This is one of the largest concentrations of South polar skuas in Antarctica.

Primary purpose: To avoid human induced changes to the population structure, composition and size of the seabird colonies present at the site, to allow for undisturbed research on the adaptations of the Antarctic petrel, snow petrel and south polar skua to the inland conditions in Antarctica.

1. Description of values to be protected

The Area was originally designated in Recommendation XIV-5 (1987, SSSI No 23) after a proposal by Norway based on the following factors, which still give relevant grounds for designation:

- the fact that the colony of Antarctic petrel (Thalassoica antarctica) is one of the largest known inland seabird colony on the Antarctic continent;
- the fact that the colony constitutes a large proportion of the known world population of Antarctic petrel; and
- the fact that the colony is an exceptional “natural research laboratory” providing for research on the Antarctic petrel, snow petrel (Pagodroma nivea) and south polar skua (Catharacta maccormicki), and their adaptation to breeding in the inland/interior of Antarctica.

2. Aim and objectives

The aim of managing Svarthamaren is to:

- avoid human induced changes to the population structure, composition and size of the seabird colonies present at the site;
- prevent unnecessary disturbance to the seabird colonies, as well as to the surrounding environment;

- monitor to understand the extent and mechanisms of the ongoing decline in the Antarctic petrel population;
- allow for undisturbed research on the adaptations of the Antarctic petrel, snow petrel and south polar skua to the inland conditions in Antarctica (Primary Research);
- allow access for other scientific reasons where the investigations cannot be carried out elsewhere and will not damage the objectives of the bird research; and
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area.

The focus of the Primary Research in Svarthamaren ASPA is as follows:

- improve the understanding of how natural as well as anthropogenic changes in the environment affect the spatial and temporal distribution of animal populations, and, furthermore, how such changes affect the interaction between key species in the Antarctic ecosystem.

3. Management activities

Management activities at Svarthamaren shall:

- ensure that the seabird colonies are adequately monitored, to the maximum extent possible by non-invasive methods;
- ensure that all visitors to the Area are properly informed about the boundaries of the Area;
- allow erection of signs/posters, border markers, etc. in connection to the site, and ensure that such signs or markers, if erected, are serviced and maintained in good condition;
- include visits as necessary to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.

Any direct intervention management activity in the area must be subject to an environmental impact assessment before any decision to proceed is taken.

4. Period of Designation

Designated for an indefinite period.

5. Maps and Illustrations

Map A:

- Projection: Stereographic South Pole
- Spheroid: WGS 1984
- (EPSG code: 3031)
- The map is rotated 7.2 degrees to the left.

Map B:

- Projection: Transverse Mercator, UTM zone 31S
- Spheroid: WGS 1984
- (EPSG code: 32731)
- The map is rotated 2 degrees to the left.

Insert map (Antarctica):

- Projection: Stereographic South Pole
- Spheroid: WGS 1984
- (EPSG code: 3031).

6. Description of Area

6(i) Geographic co-ordinates, boundary markers and natural features

The Svarthamaren ASPA is situated in Mühlig-Hoffmannfjella, Dronning Maud Land, stretching from approx. 71°53'16"S - 5°9'24"E to the north-east to approx. 71°56'10"S - 5°15'37"E in the south-east. The distance from the ice front is about 200 km. The Area covers approximately 7.5 km², and consists of the ice-free areas of the Svarthamaren nunatak, including the areas in the immediate vicinity of the ice-free areas naturally belonging to the nunatak (i.e. rocks). The Area is shown in Map B.

The Norwegian field station Tor is located in the Svarthamaren nunatak at lat. 71°53'22"S, 5°9'34"E, immediately outside the Area.

The main rock types in the Area are coarse and medium grained charnockites with small amounts of xenoliths. Included in the charnockitoids are banded gneisses, amphibolites and granites of the amphibolite facies mineralogy. The slopes are covered by decomposed feldspathic sand. The north-eastern side of the Svarthamaren nunatak is dominated by scree slopes (slope 31°-34º), extending 240 m upwards from the base of the mountain at about 1600 m above sea level. The major features of this area are two rock amphitheatres inhabited by breeding Antarctic petrels. It is this area which makes up the core of the protected site.

No continuous weather observations have been carried through in the Area, but air temperature generally range between -5º and -15ºC during the summer season (Dec-Feb).

The flora and vegetation at Svarthamaren are sparse compared with other areas in Mühlig-Hofmannfjella and Gjelsvikfjella to the west of the site. The only plant species occurring in abundance, but peripherally to the most manured areas, is the foliose green alga, Prasiola crispa. There are a few lichen species on glacier-borne erratics 1-2 km away from the bird colonies: Candelariella hallettensis (= C. antarctica), Rhizoplaca (= Lecanora) melanophthalma, Umbilicaria spp. and Xanthoria spp. Areas covered with Prasiola are inhabited by collembola ASPA No 142: Svarthamaren Cryptopygus sverdrupi) and a rich fauna of mites (Eupodes anghardi, Tydeus erebus) protozoan, nematodes and rotifers. A shallow pond measuring about 20 x 30 m, lying below the middle and largest bird sub-colony at Svarthamaren, is heavily polluted by petrel carcasses, and supports a strong growth of a yellowish-green unicellular algae, Chlamydomonas, sp. No aquatic invertebrates have yet been recorded.

The colonies of breeding seabirds are the most conspicuous biological element in the Area. The north-eastern slopes of Svarthamaren are occupied by a densely populated colony of Antarctic petrels (Thalassoica antarctica) divided into three separate sub-colonies.

The total number of Antarctic petrel breeding pairs varies a lot from year to year. While it used to be >100,000 in the 1990s (with large inter-annual fluctuations), this number has however been much lower in the last decades, ranging between approximately 20,000 and 100,000 breeding pairs. In addition, approximately 1000-2000 pairs of snow petrels (Pagodroma nivea) and 50-150 pairs of south polar skuas (Catharacta maccormicki) breed in the area, with numbers also varying from year to year. Time-series on breeding population size are too short for the snow petrel and south polar skua to assess their population trend. The two main breeding areas of Antarctic petrels are situated in the two rocky amphitheatres. The main breeding areas of snow petrels are located in separate parts of the scree-slope that are characterised by larger rocks. Most of the south polar skuas nest on the narrow strip of flat, snow-free ground below the scree-slopes.

The main breeding areas of seabirds are indicated in Map B. Readers should, however, be aware that birds are also found in other areas than these densely populated areas.

Based on the Environmental Domains Analysis for Antarctica (2007, Morgan et al.) both Environments T- Inland continental geologic - and U- North Victoria Land geologic - are found to be represented at Svarthamaren (2009, Harry Keys, pers. comm.). Svarthamaren belongs to Antarctic Conservation Biogeographic Region 6 – Dronning Maud Land (ACBR 6) (2012, Aleks Terauds et al.). Antarctic Important Bird Area No 112 Svarthamaren is identified within the Area.

6(ii) Restricted zones within the Area

None

6(iii) Location of structures within the Area

A weather station is located at the edge of the main petrel colony. During the austral winter only the mast (2 meters high) remains, while the station proper is installed during the summer season. The mast has not been permanently fixed into the ground and can easily be removed. A weather station and four time-lapse cameras are located at the edge of the main Antarctic and snow petrel colonies. These instruments are permanent, and record data all year round. Intermittently there will be non-permanent instruments installed and used in context of time-limited monitoring and research projects. With this exception there are no structures within the Area.

6(iv) Location of other Protected Areas within close proximity

None

7. Permit Conditions

Permits may be issued only by appropriate national authorities as designated under Annex V, Article 7 of the Protocol on Environmental Protection to the Antarctic Treaty. Conditions for issuing a permit to enter the Area are that:

- the actions permitted are in accordance with this Management Plan;
- the permit, or a copy, shall be carried within the area;
- any permit issued shall be valid for a stated period; and
- a visit report is supplied to the authority named in the permit.

7(i) Access to and movement within the Area

Access to the area is restricted by the following conditions:

- no pedestrian routes are designated, but persons on foot shall at all times avoid disturbances to birds, and as far as possible also to the sparse vegetation cover in the Area;
- vehicles are prohibited in the Area;
- no flying of helicopters or other aircraft over the Area is allowed;
- helicopter landings are not allowed within the boundaries of the ASPA. Landings associated with activities at the field station Tor should preferably take place at the north-eastern tip of the Svarthamaren nunatak; and
- the use of Remotely Piloted Aircraft Systems (RPAS) within the Area is not allowed. Exemptions can be granted for research and management activities provided these are not in conflict with the aim and objectives of this Management Plan. Such use of RPAS should be in accordance with the Environmental Guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (ATCM Resolution 4 (2018) or any subsequent updated version).

7(ii) Activities that are or may be conducted within the Area, including restrictions on time and place

The following activities may be conducted within the Area in accordance with permit:

- primary biological research programs for which the area was designated;
- essential management activities, including monitoring and inspection;

- other research programs of a compelling scientific nature that cannot be carried out elsewhere and that will not interfere with the bird research in the Area; and
- if required, posting of warning signs informing about danger of rock avalanches to ensure safety of visitors in some areas within the Area.

7(iii) Installation, modification or removal of structures

No structures are to be erected in the Area, or scientific equipment installed, except for equipment essential for scientific or management activities, including Automatic Weather Stations (AWS) for scientific purposes. Such structures can only be installed as specified in a permit.

7(iv) Location of field camps

No field camps should be established within the Area.

7(v) Restrictions on materials and organisms which may be brought into the Area

- no living animals or plant material shall be deliberately introduced into the Area;
- no poultry products, including food products containing uncooked dried eggs, shall be taken into the Area;
- no herbicides or pesticides shall be brought into the Area. Any other chemicals (including fuel), which may be introduced for a compelling scientific purpose specified in the permit, shall be removed from the Area before or at the conclusion of the activity for which the permit was granted; and
- all materials introduced shall be for a stated period, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized.

7(vi) Taking or harmful interference with native flora and fauna

Taking or harmful interference with native flora and fauna is prohibited, except in accordance with a permit issued in accordance with Annex II to the Protocol of Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals is involved, SCAR Code of Conduct for Use of Animals for Scientific Purposes in Antarctica should be used as a minimum standard.

It is recommended that those responsible for the primary research in the Area should be consulted before a permit is granted for taking of birds for purposes not associated with the primary research. Studies requiring taking of birds for other purposes should be planned and carried through in such a manner that it will not interfere with the objectives of the bird research in the Area.

7(vii) Collection and removal of anything not brought into the Area by the Permit holder

Material may be collected or removed from the Area only in accordance with a permit, except that debris of man-made origin should be removed and that dead specimens of fauna may be removed for laboratory examination.

7(viii) Disposal of waste

All wastes, including human wastes, are to be removed from the Area.

7(ix) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities which may involve the collection of small amounts of plant material or small numbers of animals for analysis or audit, to erect or maintain notice boards or to undertake protective measures.

7(x) Requirements for reports

Parties should ensure that the principal holder of each permit issued submit to the appropriate authority a report describing the activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form suggested by SCAR. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the Management Plan and in organizing the scientific use of the Area.

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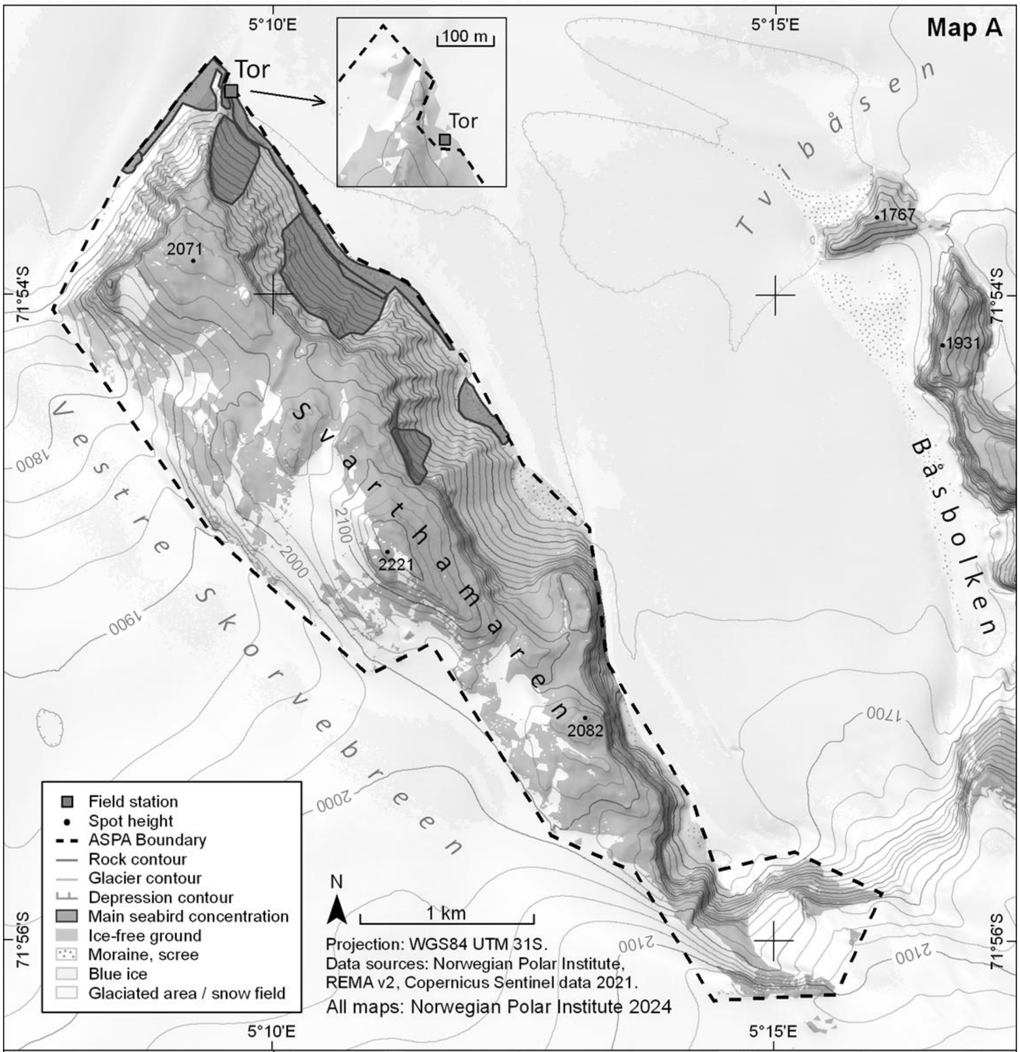
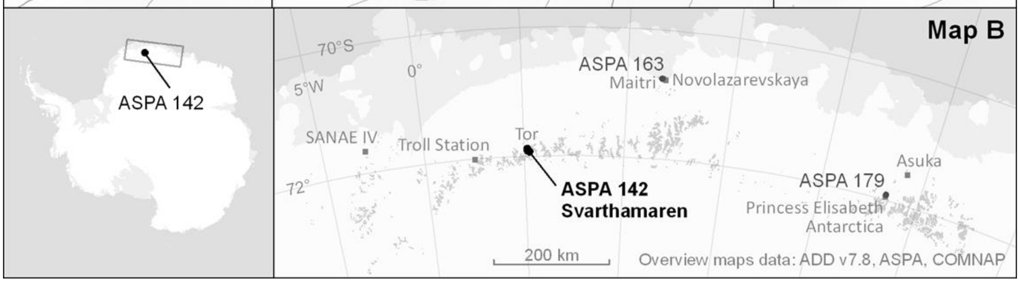
ASPA 142: Svarthamaren. Boundaries and Main Seabird Concentrations





Measure 8 (2024)

Antarctic Specially Protected Area No 151 (Lions Rump, King George Island, South Shetland Islands): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XVI-2 (1991), which designated Lions Rump, King George Island, South Shetland Islands as Site of Special Scientific Interest ("SSSI") No 34 and annexed a Management Plan for the Site;
- Measure 1 (2000), which annexed a revised Management Plan for SSSI 34;
- Decision 1 (2002), which renamed and renumbered SSSI 34 as ASPA 151;
- Measures 11 (2013) and 5 (2019), which adopted revised Management Plans for ASPA 151;

Recalling that Measure 1 (2000) did not become effective and was withdrawn by Decision 3 (2017);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 151;

Desiring to replace the existing Management Plan for ASPA 151 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 151 (Lions Rump, King George Island, South Shetland Islands), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 151 annexed to Measure 5 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area No 151

LIONS RUMP, KING GEORGE ISLAND, SOUTH SHETLAND ISLANDS

Introduction

Lions Rump (62°08'S; 58°07'W) is located on the southwestern coast of King George Island, South Shetland Islands, covering an area of approximately 1.61 km².

The Area takes its name from the distinctive rocky hill lying between the southern extremity of King George Bay and Lions Cove.

The Area was originally designated as Site of Special Scientific Interest No 34 fthrough Recommendation XVI-2 (1991, SSSI No 34) after a proposal by Poland on the grounds that it contains diverse biota and geological features and is a representative example of the terrestrial, limnological, and littoral habitats of the maritime Antarctic. The Area was designated primarily to protect its ecological value. It is also valuable as a reference site with diverse avian and mammalian Antarctic fauna, against which disturbance at sites situated near locations of human activity can be measured.

A revised Management Plan was adopted in Measure 1 (2000). The site was redesignated ASPA No 151 in Decision 1 (2002). Further revised Management Plans were adopted in Measure 11 (2013) and Measure 5 (2019).

Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)), ASPA No 151 lies within Environment A (Antarctic Peninsula northern geologic), which is a small, terrestrial environment around the northern Antarctic Peninsula consisting entirely of ice-free land cover and sedimentary geology (Morgan et al. 2007). Other protected areas containing Domain A include ASPA No 111, ASPA No 128 and ASMA No 1 (Morgan et al. 2007).

According to the Antarctic Conservation Biogeographic Regions classification (Resolution 6 (2012), updated in Resolution 3 (2017)), the Area lies within the Antarctic Conservation Biogeographic Region ACBR3 in the north-western Antarctic Peninsula.

There are five other ASPAs on King George Island and seven more on other islands of the South Shetland Archipelago, but only one of them (ASPA No 128 Western Shore of Admiralty Bay) represents both the same Environmental Domain A and the same primary reason for designation (area with important or unusual assemblages of species, including major breeding colonies of native birds or mammals) (Morgan et al. 2007) as ASPA No 151. In contrast to ASPA No 128, Lions Rump is located approximately 30 km from the nearest station and has been subjected to minimal disturbance from human activity. Therefore, ASPA No 151 complements ASPA No 128 by protecting against human impacts.

The Area is considered to be sufficiently large to provide adequate protection to the values described below. The biological, geological and scientific values of Lions Rump are vulnerable to human disturbance (e.g., trampling, oversampling, disturbance of wildlife). Therefore, it is important that human activities in the Area are managed to minimize the risk of impacts.

The earliest information about penguin populations at Lions Rump was given by Stephens in 1958 (Croxall and Kirkwood 1979). Later studies were conducted by Jabłoński (1984), Trivelpiece et al. (1987), Ciaputa and Sierakowski (1999) and Korczak-Abshire et al. (2013). Between 2007 and 2021, a monitoring program for birds and pinnipeds was carried out in the Area according to CCAMLR standard methods, and since 2014, Lions Rump has been one of the CEMP (CCAMLR

Ecosystem Monitoring Program) camera network sites. In 2014/2015 and 2016/2017, aerial surveys by the RPAS were conducted in the Area (Zmarz et al. 2015), and since 2019, RPAS surveys have been conducted as part of regular monitoring to perform penguin population censuses and estimate the size of the breeding population of southern elephant seals in the area.

In 1989/90, 2004, 2007 and 2008, botanical studies were conducted in the Area, and vegetation maps of the Area were generated, revealing changes in lichen spatial distribution caused by climatic changes (Olech 1993, 1994, pers. comm., Olech and Slaby 2016). An attempt to estimate the ages of lichen colonization on the oldest moraines of the White Eagle Glacier was made (Angiel and Dąbski 2012).

Ornithogenic soils in the penguin rookery area at Lions Rump were described by Tatur (1989) and then included in regional pedological synthesis (Tatur 2002). The surface loamy weathering cover of the Area has not yet been described in different soil categories. In 1988, when investigations preceding the establishment of ASPA No 151 were conducted, the southern part of the Area was covered by glaciers. Due to the retreat of the White Eagle Glacier as a result of regional climate change, a new ice-free, postglacial landscape has appeared (Angiel and Dąbski 2012).

Paleogene and Neogene rocks from the Area and its close surroundings provide important data for world glacial history. The sequence consists of sedimentary and volcanic rocks from preglacial Eocene terrestrial and freshwater sediments to the onlapping sequence of early Oligocene diamictite and Miocene pillow lavas. Eocene sedimentary, pyroclastic and andesite rocks covering a main part of the Area belong to the “Lions Cove Formation” (Birkenmajer 1980, 1981, 1994; 2001; Birkenmajer et al. 1991a, b). The “Lions Cove Formation” was excluded from the “Lions Rump Group” of Barton (1961, 1965). The Eocene age for the “Lions Cove Formation” was proposed by Smellie et al. (1984) and confirmed by K–Ar determinations (Pańczyk and Nawrocki 2011, Tatur et al. 2009, Krajewski et al. 2009, Krajewski et al. 2010, Tatur et al. 2010., Krajewski et al. 2011). Oligocene tillites and glaciomarine sediments of the “Polonez Cove Formation” (see Birkenmajer 2001) border the Area forming steep rocky walls from the west, south and east sides. The central part of the area is covered by the youngest Miocene andesite lavas and pillow lavas that form hummocks along cliffs (K–Ar dating from the Ace Group, pers. comm.).

1. Description of values to be protected

Lions Rump was first designated a protected area as a representative of the terrestrial, limnological and littoral ecosystems of King George Island, possessing diverse biota and rock formations (volcanic and sedimentary rocks important for world geological history). In the Antarctic Protected Areas Database, it is characterized as an area with important or unusual assemblages of species, including major breeding colonies of native birds or mammals.

The original goals for designating the Area are still relevant.

The breeding avifauna of the Area are diverse and numerous, including three pygoscelid penguin species (Adélie penguin (Pygoscelis adeliae), Gentoo penguin (Pygoscelis papua) and Chinstrap penguin (Pygoscelis antarcticus), as well as eight other bird species, such as cape petrel (Daption capense), Wilson's storm petrel (Oceanites oceanicus), black-bellied storm petrel (Fregetta tropica), snowy sheathbill (Chionis albus), south polar skua (Catharacta maccormicki), brown skua (Catharacta antarctica lonnbergi), kelp gull (Larus dominicanus), and Antarctic tern (Sterna vittata).

Furthermore, southern elephant seals (Mirounga leonina), Weddell seals (Leptonychotes weddellii), leopard seals (Hydrurga leptonyx), crabeater seals (Lobodon carcinophagus), and fur seals (Arctocephalus gazella) rest and/or breed on the beaches.

ASPA No 151 includes unique preglacial Eocene and partially glacial Oligocene sequences. The continental glacial sequence of the "Polonez Formation" (tillites and glacial diamicts bearing erratic clasts) provides the oldest known hard evidence of the coming Cenozoic glaciation (28-32 SIS dating). Outcrops providing hard data of this event should be protected; collecting petrified wood, rare leaves, layers of coal representing lustros (vitrinite) brown-coal multiphase and volcanic bombs from tuff deposits in the Area should be limited to the necessary minimum. Eocene flora (Mozer 2013) are identical to flora cropping from the other side of White Eagle Glacier (Zastawniak 1981, 1990) and are consistent with regional floristic patterns (Pool et al. 2001).

Lions Rump contains rich lichen flora and numerous stands of two native vascular plants, namely, Colobanthus quitensis and Deschampsia antarctica. The lichen biota of the Area consist of 140 taxa, making it one of the most diverse sites in the Antarctic (Olech 2001; Olech and Słaby 2016).

The original values of the Area regarding the marine bottom fauna cannot be confirmed as one of the primary reasons for special protection of the Area because there is a lack of new data available describing these communities. However, future research may uncover new data. Therefore, the marine boundary of the Area has not been redefined.

The Area has not been subjected to frequent visits, scientific research or sampling. The human presence in the Area is currently limited to a few people carrying out monitoring research during several one-day visits between late October and March and short visits by other scientists. Therefore, the Area may be regarded as a reference site for future comparative studies.

2. Aims and objectives

Management of the Area aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;

- allow scientific research in the Area, provided it is for compelling reasons that cannot be served elsewhere and provided that it will not jeopardize the natural ecological system in the Area. Invasive practices used during biological research are excluded in this area;
- allow visits for management purposes in support of the aims of the Management Plan;
- prevent or minimize the introduction and dispersal of nonnative species (plants, animals and microbes);
- preserve the Area as a reference site for future comparative studies.

3. Management activities

The following management activities should be undertaken to protect the values of the Area:

- Visits should be made as necessary to assess whether the ASPA continues to serve the purposes for which it was designated and to ensure that management and maintenance measures are adequate.
- The Management Plan shall be reviewed at least every five years and updated as needed.
- A copy of this Management Plan shall be made available at Arctowski Station (Poland: 62°09'34"S, 58°28'15"W), Comandante Ferraz Station (Brazil: 62°05'07"S, 58°23'32"W), Machu Picchu Station (Perú: 62°05'30"S, 58°28'30"W), Copacabana Field Station (USA: 62°10'45” S, 58°26'49” W), Hennequin Point Refuge (Ecuador: 62°07'16"S, 58°23'42"W) and in the refuge proximate to the area (62°07'54"S, 58°09'20"W).
- The staff authorized to access the Area shall be specifically instructed on the conditions of this Management Plan.
- Markers, signs and other structures erected within the Area for scientific or management purposes should be secured and maintained in good condition and removed when no longer needed.
- Approach distances to fauna must be respected, except when scientific projects may require otherwise and this is specified in the relevant permits.
- All scientific and management activities within the Area should be subject to an Environmental Impact Assessment (Annex I of the Protocol on Environmental Protection to the Antarctic Treaty).
- Where appropriate, National Antarctic Programmes are encouraged to coordinate activities to prevent excessive sampling of biological and geological material within the Area, to prevent or minimize the danger of introduction and dispersal of nonnative species and to minimize environmental impacts, including cumulative impacts.

4. Period of designation

The Area is designated for an indefinite period.

5. Maps

Map 1. The location of Lions Rump in relation to King George Island.

Map 2. Lions Rump in greater detail.

Map 3. Vegetation map of Lions Rump.

Map 4. Geological map of Lions Rump.

6. Description of the area

6(i) Geographical coordinates, boundary markers and natural features

The Area is located on the southern coast of King George Bay, King George Island, on the South Shetlands Islands (Maps 1, 2). It is described as all land and sea falling within the area bounded by the following coordinates:

- 62°07'39.18"S, 58°09'1.79"W;
- 62°07'51.92"S, 58°06'59.15"W;
- 62°08'07.24"S, 58°09'16.94"W;
- 62°08'18.24"S, 58°07'35.22"W;
- 62°08'23.12"S, 58°07'23.07"W.

The Area includes littoral and sublittoral zones extending from the eastern end of Lajkonik Rock to the most northerly point of Twin Pinnacles. From this point, the boundary extends to the easternmost end of the columnar plug of the Lions Head to the east of the White Eagle Glacier. On land, the Area includes the coast with raised beaches, freshwater pools and streams on the south side of King George Bay, around Lions Cove, and the moraines and slopes, which lead to the foreland of White Eagle Glacier, which then moves westward to a small moraine that protrudes through the ice cap southeast of the Sukiennice Hills.

The ice-free area of ASPA No 151 exhibits a range of geomorphological features, including beaches of various widths and lengths, moraines, hills and inland rocks (Map 4). The highest point rises to the altitude of c. 190 m. Geologically, Lions Rump area is composed mainly of tuff, fuffite, lahar-bearing wood and andesite basalt lava layers interbedded and deposited inside a tectonic paleovalley. In the upper part of this sequence, andesite lava flow (42-45 Ma K–Ar dating) preceded by lahars occurred. These terrestrial pyroclastics were exposed to alluvial erosion, and valleys were ultimately filled with massive conglomerate (Conglomerate Bluff). All the complexes of Eocene "Lions Cove Formation" rocks were cut by younger andesite dykes (Lions Rump). The "Lions Cove Formation" is topped by glaciomarine clastic sediments of the "Oligocene Polonez Cove Formation" (Krakowiak and Low Head Members). Oligocene rocks form steep walls surrounding the Area. The Area is largely covered by glacial moraines and slope loamy deposits. The front of the White Eagle Glacier is marked by large, dome-shaped moraine ridges belonging to several Holocene stages of glacial advance and retreat. Eocene sediments were affected by complex alterations related to postmagmatic changes, weathering processes and low-grade metamorphism.

Chloritization, palagonization and zeolitization are observed in all the sediments. The terrestrial Eocene and glaciomarine Oligocene rocks are covered by Miocene andesite lava flows and pillow lava flows (c. 20 Ma, ACE group pers. com.). This volcanic rock occupies the central part of the ASPA No 151 territory, and most of it forms the Sukiennice Hills.

Large numbers of penguins breed throughout the Area. In 2018/19, there were 3,473 occupied nests of Adèlie penguins (Pygoscelis adeliae), 3,789 occupied nests of Gentoo penguins (Pygoscelis papua), and 42 occupied nests of Chinstrap penguins (Pygoscelis antarcticus) (Polish Antarctic Station Report 2018/19). In the 2023/24 season, 2716 Adèlie penguin nests, 3769 Gentoo penguin nests and 39 Chinstrap penguin nests were recorded (Polish Ecological Monitoring program). Since 1995/96, a decrease in the Adèlie penguin breeding population and an increase in the Gentoo penguin breeding population have been observed. The Chinstrap population is not large enough to detect any statistically significant changes (Angiel and Korczak 2008; Angiel and Korczak-Abshire 2011; Zmarz et al. 2015).

There are 8 other bird species breeding in the Area (cape petrel (Daption capense), Wilson's storm petrel (Oceanites oceanicus), black-bellied storm petrel (Fregetta tropica), snowy sheathbill (Chionis albus), south polar skua (Catharacta maccormicki), brown skua (Catharacta antarctica lonnbergi), kelp gull (Larus dominicanus), and Antarctic tern (Sterna vittata)). In 2018/19, the most numerous were kelp gulls (17 nests), cape petrels (8 nests) and Antarctic terns (12 nests) (Polish Antarctic Station Report).

Elephant seals (Mirounga leonina), Weddell seals (Leptonychotes weddellii), leopard seals (Hydrurga leptonyx), crabeater seals (Lobodon carcinophagus), and fur seals (Arctocephalus gazella) rest and/or breed on the beaches. In October 2022, two harems and 97 pups of elephant seals were observed in the Area. In addition, the 1665 individuals of fur seals on March 13, 2021 were observed in the Area (Polish Antarctic Station Report).

Approximately 13 taxa of macroalgae were found in the littoral zone of the Area. The most common of these algae were green algae (Monostroma hariotti), red algae (Georgiella confluens, Iridaea cordata and Leptosarca simplex), and brown algae (Adenocystis utricularis and Ascoseira mirabilis). There are rich and abundant bottom fauna in the marine part of the Area, with bivalves being the dominant group. Both Amphipoda and Polychaeta also contributed significantly to benthic faunal abundance. The species composition and proportion of endemics indicate that King George Bay is transitional between the Antarctic and Subantarctic (unpublished data). The marine part of the Area is shallow, with many skerries and rocks, and is not accessible to ships.

The lichen (lichenized fungi) biota of the Area consisted of 140 taxa (Map 3). Moreover, 11 lichenicolous fungal species were recorded. The most diverse genera were Caloplaca (19 species), Buellia (9 species) and Lecanora (8 species). The highest species richness was found in places with diversified habitats, e.g., with rocks, near penguin colonies or in places where birds perch. The lowest species richness was found in recently deglaciated terrain (young moraines) or in snowbeds. Since 1988/90, changes in lichen spatial distribution caused by glacial retreat and resulting water deficit have been observed. Liverworts have little importance in local plant communities. They occur mostly in moss banks. Fungi are rare or uncommon. Knowledge of freshwater algae in this area is poor.

6(ii) Access to the Area

Access should be provided by small boats landing outside the Area. The accessible beach is situated outside the western boundary of the Area, in front of the refuge (62°07'54"S, 58°09'20"W).

Access to the Area from the recommended landing site should be on the foot.

Helicopters may land in the Area only in cases of emergency. The suggested landing site is a flat area 50-100 m east of the refuge on both sides of the Area boundary. The changeable distributions of marine mammals, snow patches and stream tributaries should be considered during landing. Landing on vegetation or near wildlife should be avoided to the greatest extent possible. To avoid overflying breeding sites, the approach should preferably be from the north or west.

Overflight operations by fixed-wing aircraft and helicopters should be carried out, as a minimum requirement, in accordance with the “Guidelines for the Operation of Aircraft near Concentrations of Birds” contained in Resolution 2 (2004).

6(iii) Location of structures within the Area

A signboard is located on the wall of the refuge outside the western border of the Area.

A four-berth wooden refuge (62°07'54"S, 58°09'20"W) constructed by Poland is located on a flat marine gravel terrace approximately 50 m outside the western boundary of the Area.

The nearest scientific research stations are located ca. 30 km west (Arctowski Station – Poland, 62°09'34"S, 058°28'15"W) and northwest (Comandante Ferraz – Brazil, 62°05'07"S, 58°23'32"W) from the Area.

6(iv) Location of other Protected Areas within close proximity

ASPA No 125, Fildes Peninsula, King George Island (25 de Mayo), and ASPA No 150, Ardley Island, Maxwell Bay, King George Island (25 de Mayo), lie approximately 50 km west of Lions Rump. ASPA No 171 Narebski Point, Barton Peninsula, King George Island lies approximately 40 km west of Lions Rump. ASPA No 132, Potter Peninsula, King George Island (25 de Mayo), South Shetland Islands, lies approximately 35 km to the west. ASMA No 1, Admiralty Bay, King George Island and ASPA No 128, on the western shore of Admiralty Bay, King George Island, South Shetland Islands, lie approximately 20 km to the west.

7. Permit conditions

7(i) General permit conditions

Permits may be issued only by appropriate national authorities as designated under Annex V Article 7 of the Protocol on Environmental Protection to the Antarctic Treaty.

Conditions for issuing a permit for the Area are that:

- it is issued only for a compelling scientific purpose which cannot be served elsewhere; or
- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardize the natural ecological system or scientific values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the permit, or an authorized copy, must be carried within the Area;
- a permit is issued for a stated period only;
- a report is supplied to the authority named in the Permit;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the Permit.

7(ii) Access to and movement within or over the Area

Access to, and movement within the Area shall be on foot from the direction of the recommended landing site on the beach near the refuge.

Access shall be limited in order to avoid disturbance to birds, and damage to vegetation and geological features.

Land vehicles are prohibited in the Area. Helicopters may land only in case of emergency (see 6(ii)).

Overflight of bird colonies within the Area by Remotely Piloted Aircraft Systems (RPAS) shall not be permitted unless for scientific or operational purposes, and in accordance with a permit issued by an appropriate national authority. Guidance can be found in Environmental Guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

No pedestrian routes are designated within the Area, but persons on foot should at all times avoid disturbance to birds and mammals, and damage to vegetation and paleontological (marine fauna in Polonez Cove Formation, wood and rare leaves in lahars) and geological (erratics) evidences.

7(iii) Activities which are or may be conducted within the Area, including restrictions on time and place

- Compelling scientific research which cannot be conducted outside the Area, and which will not damage or interfere with any aspect of the Area's biological, geological, or aesthetic values.
- Essential management activities, including monitoring.

7(iv) Installation, modification or removal of structures

No new structures are to be erected in the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a Permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation.

All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of the field camps

Camping is prohibited in the Area.

A four-berth wooden refuge constructed by Poland is located on a flat marine gravel terrace ca 50 m outside the western boundary of the Area (62º07'54"S, 58º09'20"W). The refuge is used mostly by Polish researchers monitoring birds and pinnipeds in the Area. Additional camping outside the Area is possible on non-vegetated sites near the refuge. Care should be taken to minimize disturbance to wildlife.

7(vi) Restrictions on materials and organisms which may be brought into the Area

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. Special care must be extended to ensure that non-native grass Poa annua that is present in the vicinity of Arctowski Station will not be inadvertently introduced to the Area. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. Introduction of non-sterile soil is prohibited.

To the maximum extent practicable, footwear, outer clothing, backpacks and other equipment used or brought into the Area shall be thoroughly cleaned before entering the Area. CEP Non-native Species Manual and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species shall be used for further guidance. Potential non-native species spotted in the Area should be reported to the appropriate authorities.

In view of the presence of breeding bird colonies within the Area no poultry products, including food products containing uncooked dried eggs, shall be released into the Area or into adjacent sea.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable should be avoided.

Fuel or other chemicals shall not be stored in the Area unless specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental spill into the environment, and their quantity shall be kept to the minimum needed for scientific or management purposes specified in the Permit.

Materials introduced into the Area shall be for a stated period only and shall be removed by the end of that stated period.

If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ. The appropriate authority should be notified of anything released and not removed that was not included in the authorised Permit.

7(vii) Taking or harmful interference with native flora and fauna

Taking or harmful interference with native flora and fauna is prohibited, except by Permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Where taking of or harmful interference with animals is involved, the SCAR Code of Conduct for Use of Animals for Scientific Purposes in Antarctica should be used as a minimum standard.

Information on taking and harmful interference will be duly exchanged through the Antarctic Treaty Information Exchange system.

To prevent human disturbance of the breeding penguin colony, visitors shall not approach within 10 m of the colony during breeding season, unless authorised by Permit for specific scientific or management purposes.

7(viii) Collection and removal of anything not brought into the Area by the Permit holder

Collection or removal of anything not brought into the Area by the permit holder shall only be in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs.

Permits shall not be granted if there is reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, sediment, flora or fauna that their distribution or abundance within the Area would be significantly affected.

Other material of human origin likely to compromise the values of the Area (e.g. plastic debris) which was not brought into the Area by the permit holder or otherwise authorised, may be removed from the Area unless the environmental impact of the removal is likely to be greater than leaving the material in situ; if this is the case the appropriate Authority must be notified and approval obtained.

7(ix) Disposal of waste

All wastes, including human waste, shall be removed from the Area.

7(x) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

Permits may be granted to enter the Area to carry out scientific research, monitoring and site inspection activities, which may involve the collection of small number of samples for analysis, to erect and maintain signpost, or to carry out protective measures.

Scientific activities shall be performed in accordance with SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica.

Any specific sites of long-term monitoring shall be appropriately marked, and the markers or signs maintained.

To avoid interference with long-term research and monitoring activities, consultations and exchange of information with established programs working at Lions Rump are recommended.

7(xi) Requirements for reports

The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and no later than six months after the visit has been completed.

Such reports should include, as appropriate, the information identified in the Visit Report form contained in Appendix 2 to the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2/2011).

If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.

Parties should, wherever possible, deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organising the scientific use of the Area.

The relevant authority should be notified of any activity undertaken, any measure taken or material released and not removed which are not covered by a permit.

8. Supporting documentation

COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species – ATCM XXXIV - CEP XIV, Buenos Aires (avaible at: https://www.comnap.aq/Shared%20Documents/checklistsbrochure.pdf)

Environmental Guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica. Resolution 4 (2018) - ATCM XLI - CEP XXI, Buenos Aires (available at: https://www.ats.aq/devAS/info_measures_listitem.aspx?lang=e&id=679)

Guidelines for the Operation of Aircrafts near Concentrations of Birds in Antarctica. Resolution 2 (2004) – ATCM XXVII - CEP VII, Cape Town (available at: http://www.ats.aq/documents/recatt/Att224_e.pdf)

Non-Native Species Manual. Resolution 4 (2016) – ATCM XXXIX – CEP XIX, Santiago (available at: https://www.ats.aq/devAS/info_measures_listitem.aspx?lang=e&id=640)

SCAR Code of Conduct for the Use of Animals for Scientific Purposes (available at: http://www.scar.org/treaty/atcmxxxiv/ATCM34_ip053_e.pdf)

SCAR's Environmental Code Of Conduct For Terrestrial Scientific Field Research In Antarctica. Resolution 5 (2018) - ATCM XLI - CEP XXI, Buenos Aires (avaible at: https://www.ats.aq/devAS/info_measures_listitem.aspx?lang=e&id=680)

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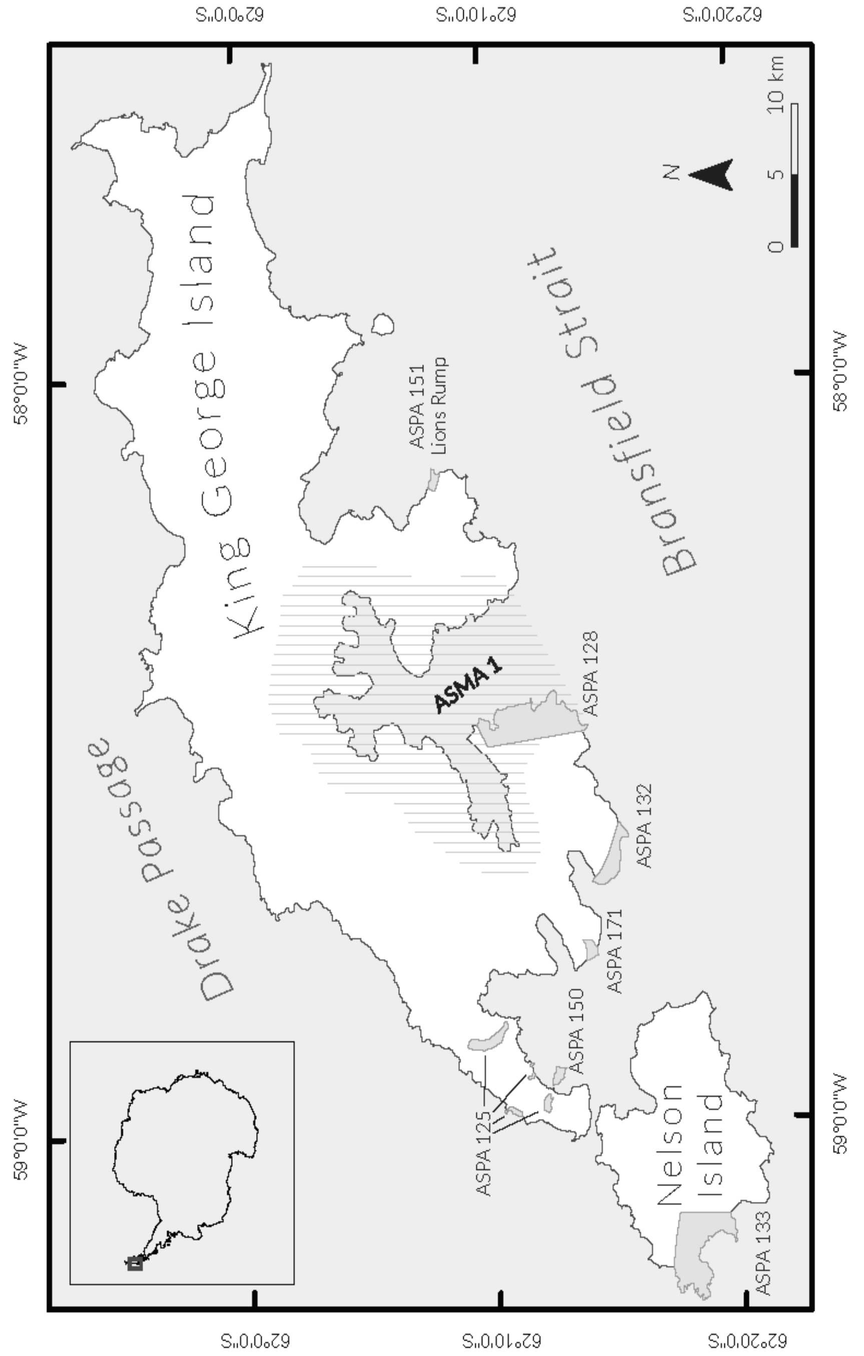
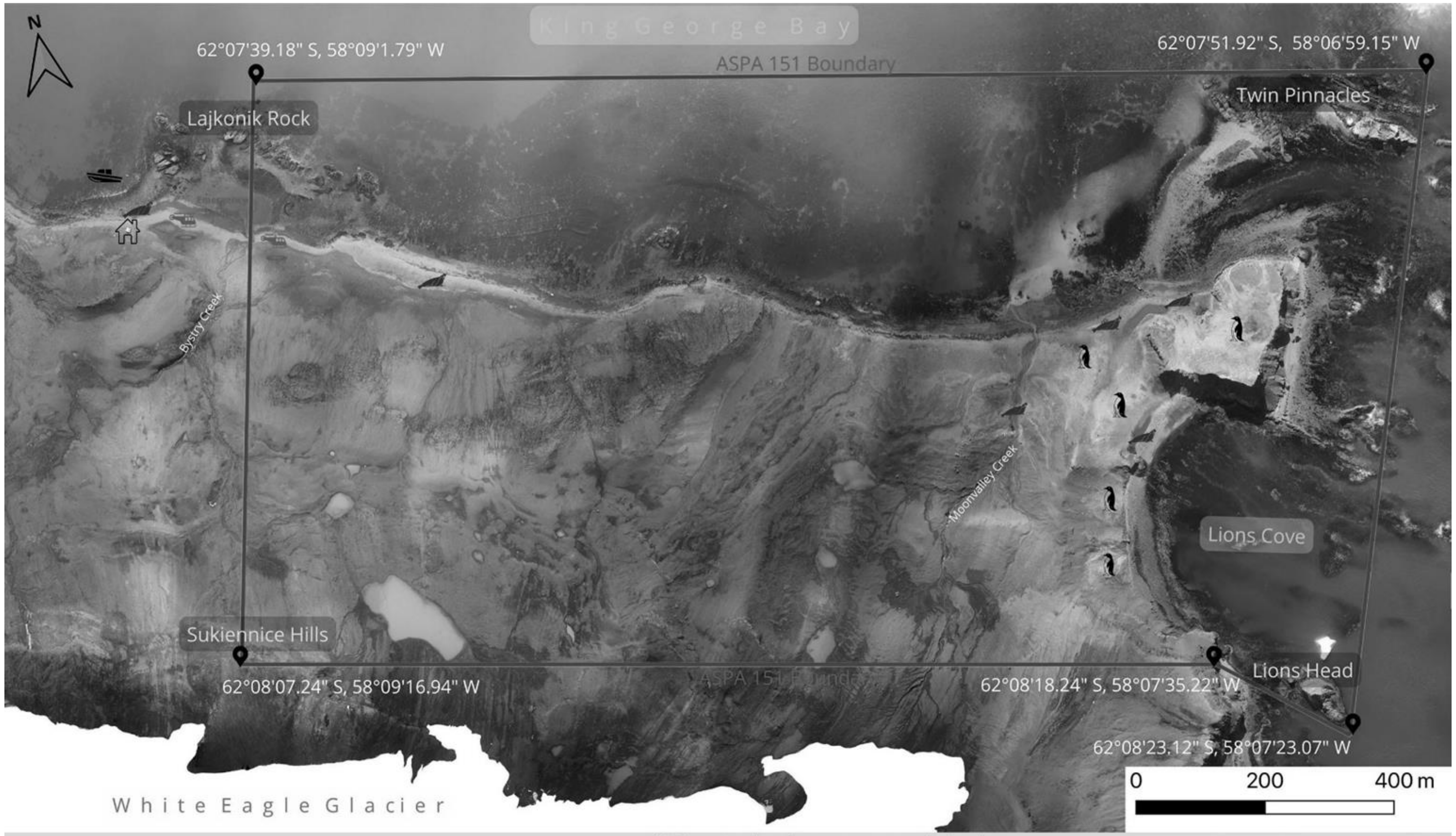


Map. 1. The location of ASPA 151 Lions Rump in relation to King George Island

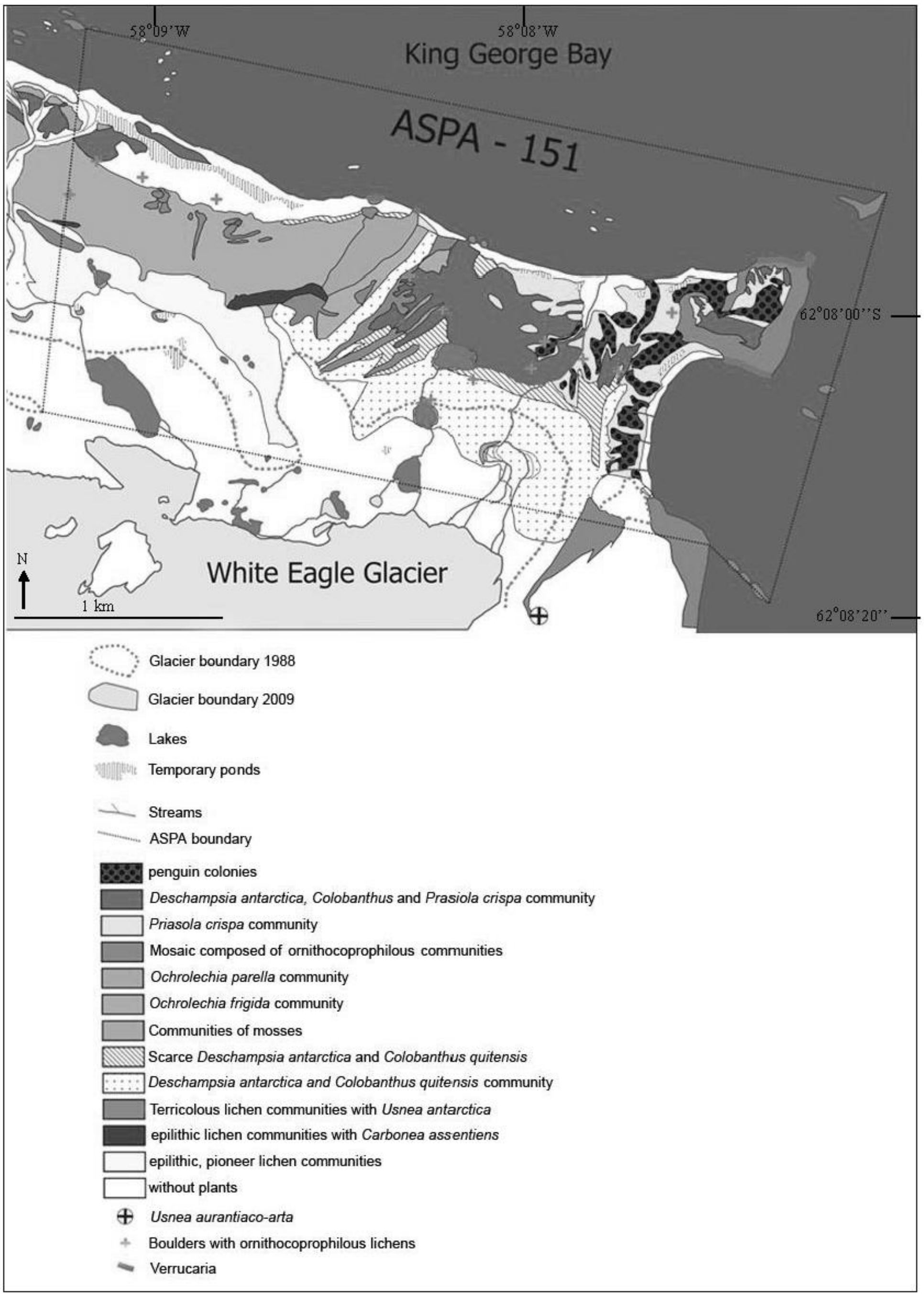


Explanation of symbols and additional information:

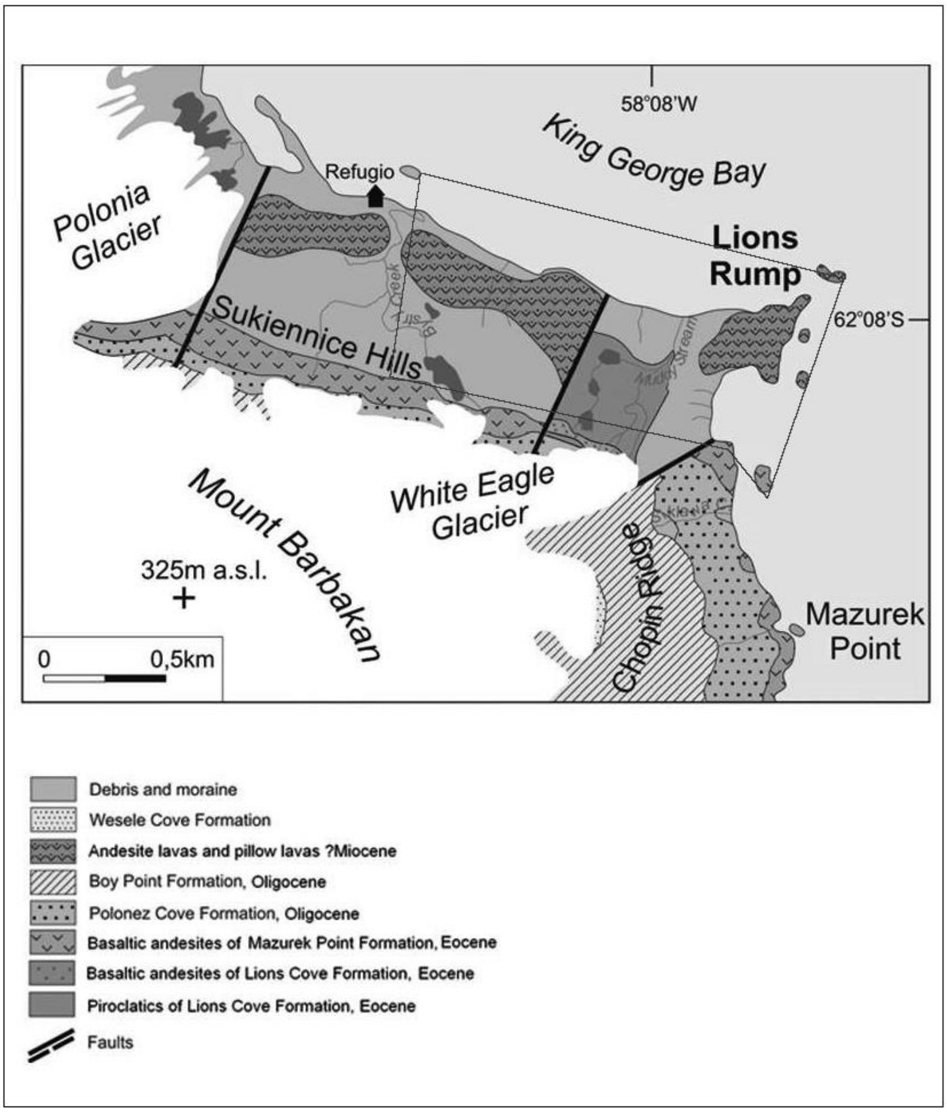
Aerial photos for the ortomosaic were taken on 10 Feb. 2024 (1:02-1:45 p.m. UTC-3).

Helicopter landing area - only in the case of safety and rescue operations. The presence of birds and pinnipeds should be ruled out before the landing approach.

- Landing place for small boats
- Field refuge
- Southern elephant seals' breeding site
- Penguin's breeding site



Map 3. Vegetation map of Lions Rump



Map 4. Geological map of Lions Rump

Measure 9 (2024)

Antarctic Specially Protected Area No 154 (Botany Bay, Cape Geology, Victoria Land): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Measure 3 (1997), which designated Botany Bay, Cape Geology, Victoria Land as Site of Special Scientific Interest ("SSSI") No 37 and adopted a Management Plan for the Site;
- Decision 1 (2002), which renamed and renumbered SSSI 37 as ASPA 154;
- Measures 2 (2003), 11 (2008), 12 (2013) and 6 (2019), which adopted revised Management Plans for ASPA 154;

Recalling that Measure 3 (1997) did not become effective and was withdrawn by Measure 6 (2011);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 154;

Desiring to replace the existing Management Plan for ASPA 154 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 154 (Botany Bay, Cape Geology, Victoria Land), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 154 annexed to Measure 6 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area No 154

BOTANY BAY, CAPE GEOLOGY, VICTORIA LAND

Introduction

Botany Bay, Cape Geology is situated in the south western corner of Granite Harbour, southern Victoria Land (77° 0.230' S, 162° 32.870' E; Map 1, Inset 1 and 2). The Area is extremely rich botanically for such a high-latitude location and is one of the richest sites in the whole of continental Antarctica. There is a high diversity and abundance of lichens (at least 30 species) and mosses (9 species) with abundant growths of algae (at least 85 taxa). The Area also has a diverse community of invertebrates (collembola, mites, nematodes, rotifers and protozoa) and a colony (in excess of 40 pairs) of south polar skua (Catharacta maccormicki). The Area is the type locality for the collembola Gomphiocephalus hodgsoni Carpenter, the lichen Caloplaca coeruleofrigida Sochting and Seppelt and the lichen Buellia frigida.

In addition to the biological values described, the Area contains within it the remains of a rock shelter and associated artefacts of historical importance (from the British Antarctic Expedition 1910-1913), known as Granite House, designated as Historic Site and Monument (HSM) No 67 in Measure 4 (1995).

Botany Bay, Cape Geology was originally designated in Measure 3 (1997) as Site of Special Scientific Interest (SSSI) No 37. New Zealand proposed the designation on the grounds that the Area is an extremely rich botanical refuge for such a high latitude location, with a lichen and moss species diversity and abundance that is unique for southern Victoria Land. The site was re- designated Antarctic Specially Protected Area (ASPA) No 154 in Decision 1 (2002). The Management Plan was revised and adopted in Measure 2 (2003), Measure 11 (2008), Measure 12 (2013), and Measure 6 (2019).

The primary reason for the designation of Botany Bay, Cape Geology as an Antarctic Specially Protected Area is to protect the Area's unusual ecological features and its exceptional scientific and historic values.

1. Description of values to be protected

In the Ross Sea region, areas of abundant mosses and lichens have been identified at Cape Bird, Ross Island (ASPA 116), Beaufort Island (ASPA 105), Canada Glacier in the Taylor Valley (ASPA 131), Kar Plateau in Granite Harbour, Edmonson Point (ASPA 165) and Cape Hallett (ASPA 106). While these sites have a high vegetation ground cover and biomass, the diversity of species present is considerably lower than that found at Botany Bay.

Botany Bay is extremely rich botanically and is also one of the most diverse sites in the whole of continental Antarctica. The terrestrial lichen and moss flora of Botany Bay comprises one liverwort, nine mosses and at least 30 lichens (Annex 1). There are abundant growths of algae (at least 85 taxa), although the algal flora is not considered particularly unusual for the locality. The Area also has large populations of invertebrates (collembola, mites, nematodes, rotifers and protozoa). The genetic diversity of springtails on the continent varies between refugia which is in contrast with Ross Island and Beaufort Island where separate populations share the genetic structure. Analysis has found the population at Granite Harbour shares some haplotypes with the population at Cape Bird, suggesting the Granite Harbour population may have been a colonization source for Ross Island (Stevens and Hogg, 2003).

There is a colony (in excess of 40 pairs) of south polar skua (Catharacta maccormicki). No other birds are known to breed in the Area but Adélie penguins (Pygoscelis adeliae) have been reported as seen moulting in the Area and have been suggested as possible vectors for transferring populations of springtails between Granite Harbour and Ross Island (Stevens and Hogg, 2003).

The Area is the type locality for the collembolan Gomphiocephalus hodgsoni Carpenter, the lichen Caloplaca coeruleofrigida Sochting and Seppelt and the lichen Buellia frigida Darb.

The structure and development of the moss and lichen communities at Botany Bay is similar to that found more than 10° of latitude further north. The Area contains by far the most southerly record of the liverwort Cephaloziella varians, the lichen Turgidosculum complicatulum and the mosses Bryoerythrophyllum recurvirostrum and, possibly, Ceratodon purpureus. Most are about three degrees of latitude further south than the nearest record to the north in the Terra Nova Bay region.

The boulder beach has rich populations of both epilithic and endolithic lichens. Of great significance is the size (up to 15 cm diameter) of some lichen thalli. At high latitudes, macrolichens are rare and scattered. Botany Bay is exceptional as there is an abundance of several macrolichens including Umbilicaria aprina, Xanthoria elegans, Physcia caesia and several forms of microlichens.

With regards to chasmoendolithic algae, both green and blue-green growths of the species Gloeocapsa cf. punctata and Chroococcidiopsis sp. are co-dominant in the area with Prasiococcus calcarius and Desmococcus olivaceus found close to the shore-line. Additionally, small ribbons of Prasiola sp. are present where water was likely to have flushed the rock surface for a sufficient duration.

The formation of thin algal crusts has previously been reported (Broady, 2005) and recent visits (K080-1819-C Antarctica New Zealand Science Report) have found a surprisingly high abundance of biological soil crusts dominated by Cyanobacteria and possibly green algae. The species composition of crusts requires investigation, and work is underway to characterize their extent, distribution and persistence.

The rich flora is the result of a comparatively warm microclimate produced by the unusual sheltered nature of the Area being protected from the southerly and easterly polar winds but fully open to the brightest sun to the north. Different species assemblages or associations within the Area are determined by nutrient input from the skua colony, the occurrence of the source of water, whether solely from snowmelt from the ice field or snowfall, or from some form of melt stream, and by the regularity and speed of water flow and the type of substrate, especially whether it is loose gravel or solid rock.

Under the influence of a changing climate (both global and local), increases in volume and shifts in location of water flow through or over the vegetation would inevitably lead to changes in the vegetation distribution, diversity and abundance. The Area would be ideal for assessing the impacts of climate change on continental Antarctic terrestrial ecosystems dominated by moss and lichen vegetation.

In addition to the biological values described, the Area contains within it the remains of a rock shelter and associated artefacts of historical importance, known as Granite House. The shelter was constructed using a natural hollow in the rocks, with walls built up from granite boulders and a roof of seal skins in 1911 for use as a field kitchen by Griffith Taylor's western geological party during the British Antarctic Expedition of 1910-1913. It was enclosed on three sides with granite boulder walls and used a sledge to support a seal-skin roof. The stone walls of the shelter have since partially collapsed and numerous artefacts have disappeared. In January 2012 parts of the walls remained, but the roof had collapsed and the seal skins had blown some way down the beach. The shelter still contains corroded remnants of tins, a seal skin and some fabrics.

The shelter and associated artefacts are vulnerable to disturbance and therefore access is managed with an Access Zone within the Area, which is subject to access restrictions. A tent site used by the Western Geological Party under Griffith Taylor, is identifiable as a flat gravel area with a number of stones that were used to weigh down the tent valance. This area is outside the Access Zone and is subject to access restrictions.

The primary reason for the designation of Botany Bay, Cape Geology as an Antarctic Specially Protected Area is to protect the limited geographical extent of the ecosystem, the unusual ecological features, and the exceptional scientific and historic values of the Area. The vulnerability of the Area to disturbance through trampling, sampling, pollution or alien introductions, are such that the Area requires long-term special protection.

2. Aims and objectives

Management at Botany Bay aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research on the ecosystem and elements of the ecosystem in particular on lichen and moss species, algae, invertebrates and skuas while ensuring protection from over- sampling;
- allow other scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardize the natural ecological system in the Area;
- preserve a part of the natural ecosystem of the Area as a reference area for future comparative studies;
- prevent or minimise the introduction to the Area of alien plants, animals and microbes;
- allow visits to the historic site Granite House, but under strict control by Permit;
- allow conservation visits to other historic sites, but under strict control by Permit;
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- Information on the location of the Area, stating special restrictions that apply, shall be displayed prominently, and a copy of this Management Plan shall be made available, at National Antarctic Programme stations that operate in the vicinity of the Area.
- Signs illustrating the location and boundaries, with clear statements of entry restrictions, shall be placed at appropriate locations on the boundary of the Area to help avoid inadvertent entry.
- Markers, signs or other structures (e.g. cairns) erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- The Area shall be visited as necessary, and no less than once every five years, to assess whether it continues to serve the purposes for which it was designated and to ensure that management and maintenance activities are adequate.
- National Antarctic Programmes operating in the Area shall consult together with a view to ensuring the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: ASPA No 154 Botany Bay: Regional overview

- Map specifications: Projection - Lambert conformal conic. Standard parallels – 1st 77° 35' S; 2nd 77° 38' S. Central Meridian – 163° 00' E. Latitude of Origin – 78° 00' S. Spheroid and horizontal datum: WGS84.

Map 2: ASPA No 154 Botany Bay: Topography

- Map specifications are the same as those in Map 1.

Map 3: ASPA No 154 Botany Bay: Air access guidance

- Map specifications are the same as those in Map 1.

Map 4: ASPA No 154 Botany Bay: Access Zone

- Map specifications are the same as those in Map 1, except: Standard parallels – 1st 77° 00' S, 2nd 77° 02' S; Central Meridian – 162° 34' E.

Map 5A: ASPA No 154 Botany Bay: Moss Density

- Map specifications are the same as those in Map 4.

Map 5B: ASPA No 154 Botany Bay: Lichen Density

- Map specifications are the same as those in Map 4.

6. Description of the Area

6(i) Geographical coordinates, boundary markers and natural features

Cape Geology is situated in the south-western corner of Granite Harbour, southern Victoria Land, at 77° 0.230' S, 162° 32.870' E approximately 100 km north-west of Ross Island (Map 1, Insets). The Area consists of raised boulder beach terraces, weathered rocky steppes and irregular rock platforms around Cape Geology, rising rapidly to the south to include a well-defined elevated cirque containing a small ice field. The ice field provides a regular supply of meltwater over the Area. The Area faces north and is well protected from strong winds. The intensity of the solar radiation is increased by reflection from the sea ice that normally remains in Granite Harbour until the end of January. Consequently, the site has warmer than expected air temperatures sometimes reaching almost 10°C in January. The most extensive vegetation occurs on the sheltered raised beach terrace known as Botany Bay.

The bedrock geology at Cape Geology has been described as a porphyritic grey biotite-granite, with phenocrysts of orthoclase of reddish colour, casting the weathered rock with a reddish tinge.

The boundaries of the Area include the water catchment and encompass the elevated cirque from the small ice field down to the coastline (Map 1). The northwest boundary of the Area is marked by a brass plaque in a boulder along the shoreline (M1, 77° 0.316' S, 162° 31.883' E) 400 m southwest of Cape Geology. The west boundary is defined by a line extending first 260 m south southeast from M1 to a large boulder (marked by a cairn) with terrier bolt (M2, 77° 0.450' S 162° 33.133' E) at an elevation of 118 m on the ridge above the campsite; thence the boundary extends 250 m up this ridge to a point at 162 m elevation marked by an iron tube with bamboo pole. The west boundary extends a further 300 m up this ridge to a large pointed rock at 255 m elevation (77° 0.667' S, 162° 31.767' E) near the edge of the permanent ice field. The boundary then extends 150 m south across the ice field to the west edge of a prominent line of exposed rock and moraine in the southwest corner of the Area at 325 m elevation. The south boundary follows this line of rock east until the exposure is buried by the ice-field, thence southeast across the ice field for 500 m to the edge of a second and more prominent exposure at an elevation of just over 400 m (M3, 77° 0.983' S, 162° 33.367' E). The boundary follows the upper edge of this exposure and then crosses the ice field southeast to an elevation of approximately 325 m where the ice-free eastern boundary ridge and the ice field converge, (77° 01.267' S, 162° 34.250' E). The east boundary follows the ridge crest for 1,550 m in a northeast direction to a low point on the ridge approximately 392 m (M4, 77° 0.217' S, 162°36.167' E) where the east boundary turns to descend due north to the coast at the eastern extremity of the boulder beach of Botany Bay (M5, 77° 0.200' S, 162° 36.200' E). The mean high-water mark of the coastline forms the northern boundary of the Area between M1 and M5.

The Area also supports a pedestrian Access Zone and Restricted Zone (Maps 2 and 4). The Access Zone has been designated to allow access to Granite House while the Restricted Zone has been designated to protect the most extensive area of vegetation in the Area at Botany Bay. The density of moss and lichen is highest in the Access and Restricted Zone of Botany Bay (Map 5A and B) and the Restricted Zone has been designated to preserve part of the Area as a reference site for future comparative studies. A vegetation distribution map for the Restricted Zone can be found in Seppelt et al., 2010.

Under the Environmental Domains Analysis (Resolution 3 (2008)) the Area is Environment S – McMurdo – South Victoria Land geologic. Environment Domain S includes known areas of abundant mosses and lichens at Cape Bird, Ross Island (ASPA 116), Beaufort Island (ASPA 105) and Canada Glacier in the Taylor Valley (ASPA 131).

Under the Antarctic Conservation Biogeographic Region (Resolution 3 (2017)) the Area is in Region 9: South Victoria Land.

6(ii) Access to the Area

Access to the Area is generally via helicopter with a designated helicopter landing site 60 m outside of the Area (77° 00.347' S, 162° 31.795' E; Map 2-5) adjacent to the designated camp site. Specific helicopter access requirements are outlined in Section 7(ii).

Vehicles are prohibited within the Area and access shall be by foot. Access should preferably be from the designated camp site following the preferred corridor of the Access Zone, 10 to 20 m from the coast, which is relatively devoid of vegetation. Visitors shall not venture south of Granite House to the Restricted Zone, unless specifically authorised by Permit.

6(iii) Location of structures within and adjacent to the Area

The only structures known to exist in the Area are Granite House and the associated artefacts, the boundary survey mark at M1 and other boundary markers (i.e. cairns, iron tube markers). At the designated camp site, there is a large wooden platform with materials stored beneath and an automatic weather station is installed further down the beach. The designated camp site is marked by several circle of rocks and the designated helicopter landing site is marked with rocks and is a cleared section of the beach.

6(iv) Location of other protected areas in the vicinity

Botany Bay lies within Antarctic Specially Managed Area (ASMA No 2), McMurdo Dry Valleys. The nearest protected area to Botany Bay is ASPA 123 Barwick and Balham Valleys, 50 km away in a southwest direction.

6(v) Special zones within the Area

- *Restricted Zone*

The most extensive area of vegetation occurs on the sheltered raised beach terrace known as Botany Bay. This embayment and a portion of the Area directly above Botany Bay is designated as a Restricted Zone in order to preserve part of the Area as a reference site for future comparative studies. The remainder of the Area, which is similar in biology, features and character, is generally more available for research programmes and sample collection.

The western boundary of the Restricted Zone is defined by a line from a marker (iron tube in rock, 20 m from mean high water mark, elevation 8 m) at the west side of Botany Bay (Map 2), extending southwest for 170 m up to a second iron tube marker on the crest of the adjacent ridge (87 m). This boundary extends 100 m to a third iron tube and a cairn (98 m), thence 50 m to a large flat rock in the centre of the main flush (marked '1' on Map 2). The southern boundary of the Restricted Zone extends from the flat rock in the flush in a straight line 820 m to the first of two prominent boulders closely adjacent to each other, approximately in the middle of the ice-free slopes above Botany Bay (marked '2' on Map 2 at 165 m). The eastern boundary extends 300 m from there to a large rock at 135 m elevation (marked '3' on Map 2), thence northeast down slope to the northeast boundary point (M5, 5 m). The northern boundary of the Restricted Zone is the mean high water mark of Botany Bay and is coincident with the northern boundary of the Area.

Access to the Restricted Zone is allowed only for compelling scientific or management (such as inspection or review) purposes, which cannot be served elsewhere in the Area.

- *Access Zone*

In order to allow access to the rock shelter known as Granite House (HSM No 67), a pedestrian Access Zone has been designated to protect historic artefacts and plant communities within the vicinity, while also allowing access to the rock shelter.

The Access Zone is a corridor 10 to 20 m wide extending from the north western boundary near the campsite to Cape Geology, following parallel to the coast for ~480 m (Map 4).

At Cape Geology, the Access Zone extends southwards for 80 m in a corridor ranging from 20 to 30 m wide, following a low rocky ridge from the coast to the rock shelter. The boundaries are marked on Map 4. The shelter was constructed by members of the 1910-1913 British Antarctic Expedition, and used between December 1911 and January 1912 while the party carried out geological and biological exploration in the vicinity.

Access to the Access Zone may be allowed by Permit, subject to the conditions of this Management Plan.

7. Permit conditions

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority. Conditions for issuing a Permit to enter the Area are that:

- outside of the Restricted and Access Zones, access may be permitted only for scientific study of the ecosystem, or for compelling scientific reasons that cannot be served elsewhere, or for conservation at historic sites, or for essential management purposes consistent with plan objectives such as inspection or review;
- access to the Restricted Zone may be permitted only for compelling scientific or management reasons that cannot be served elsewhere in the Area;
- access to the Access Zone may be permitted for scientific, management, historical, educational or recreational purposes;
- the actions permitted will not jeopardise the ecological, scientific or historic values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or an authorised copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- permits shall be issued for a stated period.

7(ii) Access to, and movement within or over, the Area

Vehicles are prohibited within the Area and all movement within the Area should be on foot.

- *Access by aircraft*

- There is a designated helicopter landing site 60 m outside of the Area (77° 0.347' S, 162° 31.795' E Maps 2-5).
- The preferred helicopter approach is over sea ice when present (Maps 1 and 3).
- When approaching over sea ice, where practicable fly at least a ¼ nautical mile (460 m) from the coastline to minimise potential disturbance to breeding birds.
- When necessary to make an overland approach to the designated landing site, the preferred approach is from the west in the New Glacier region when practicable. Should an overland approach from the West in the New Glacier region not be practicable (e.g. owing to fog or other unfavourable conditions), the preferred approach to the designated landing site is over the ASPA although aircraft should maintain an operating elevation of at least 150 ft (50 m) Above Ground Level and avoid hovering within the ASPA (Maps 1 and

3).

- Helicopter landings within the ASPA are prohibited.
- Overflight of the Area lower than 50 m (150 ft) above ground level is prohibited. Hovering over the Area is not permitted lower than 50 m (150 ft) above ground level.
- Use of helicopter smoke grenades within the Area is prohibited unless necessary for safety, and all grenades should be retrieved.
- Overflight and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

\- *Access on foot*

- Access into the Area should preferably be from the designated camp site following the preferred corridor of the Access Zone, 10 to 20 m from the coast, which is relatively devoid of vegetation (Map 4).
- Visitors must ensure footwear, clothing and equipment is thoroughly cleaned before entering the area.
- Visitors should avoid walking on visible vegetation, or cause unnecessary disturbance to bird populations.
- Care should be exercised walking in areas of moist ground, where foot traffic can easily damage sensitive soils, plant and algal communities, and degrade water quality.
- Visitors should walk around such areas, on ice or rocky ground.
- Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise impacts.

\- *Access by vehicle*

- Vehicles are strictly prohibited from entering the Area.

\- *Access to the Access Zone*

- Access to the Access Zone should preferably be from the northern coast at Cape Geology, following the ridge leading up to Granite House (Map 4), avoiding areas of dense lichen growth to either side and as far as possible, the foliose lichen species which are characterised by flat leafy forms, compared with the crustose forms which adhere very closely to the substrate.
- An alternative route may be used from the designated camp site and helicopter landing site, along a preferred walking route 10 to 20 m from the coast, if sea-ice travel is unsafe (Map 4). Note that several areas of dense lichen growth lie close to and inland from the Access Zone (e.g. approximately halfway between the designated camp site and Cape Geology), and these should be avoided unless access is required for science

or management.

- Unless specifically authorised by Permit, visitors are prohibited from entering the historic shelter, and are limited to access and viewing from the rock ridge designated for access from the coast in order to prevent damage to the rich vegetation within the Access Zone.
- Visitors shall not venture south of Granite House, unless specifically authorised by Permit.
- A maximum of 10 people is permitted to enter the Access Zone at any one time, and a maximum of 5 people is allowed in the viewing area overlooking Granite House at any one time (Map 4).

7(iii) Activities which may be conducted in the Area

Activities which may be conducted within the Area include:

- compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the ecosystem of the Area;
- essential management activities, including monitoring;
- activities with the aim of preserving or protecting the historic artefacts within the Area.

7(iv) Installation, modification, or removal of structures

- No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons, and for a pre-established period, as specified in a Permit.
- All markers, structures or scientific equipment installed in the Area must be clearly identified by country, name of the principal investigator or agency, year of installation and date of expected removal.
- All such items should be free of organisms, propagules (e.g. seeds, eggs of invertebrates) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area.
- Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit.

7(v) Location of field camps

Camping within the Area is prohibited and should be at a site outside of the Area, 100 m from the northwest corner (Maps 2, 4 and 5) and adjacent to the designated helicopter landing site. This camp site has been disturbed by previous activities and visitors should reoccupy these disturbed positions for tents and other facilities.

7(vi) Restrictions on materials and organisms which may be brought into the Area

In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, to avoid compromising the ecological values, specifically the unique biological assemblages, for which the Area is protected, the following restrictions apply to all activities in the Area:

- Deliberate introduction of plants, animals, microorganisms and non-sterile soil into the Area is prohibited and precautions shall be taken to prevent against accidental introductions.
- No poultry products shall be brought into the Area.
- No herbicides or pesticides shall be brought into the Area.
- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel is not to be stored in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted.
- All materials introduced into the Area shall be for a stated period only and shall be removed by the end of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016); CEP 2019).

7(vii) Taking of, or harmful interference with native flora or fauna

Taking of, or harmful interference with, native flora and fauna is prohibited, except in accordance with a Permit issued in accordance with Annex II of the Protocol on Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(viii) The collection or removal of materials not brought into the Area by the permit holder

Material may be collected or removed from the Area only in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Material of human origin likely to compromise the values of the Area, and which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed from the Area unless the environmental impact of the removal is likely to be greater than leaving the material in situ: if this is the case the appropriate authority must be notified and approval obtained.

Unless specifically authorised by Permit, visitors to the Area are prohibited from interfering with or from handling, taking, damaging or attempting restoration of Granite House or any artefacts found within the Access Zone. Evidence of recent changes, damage or new artefacts observed should be notified to the appropriate national authority. Relocation or removal of artefacts for the purposes of preservation, protection or to re-establish historical accuracy is allowable solely by Permit.

7(ix) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims and objectives of the Management Plan

Permits may be granted to enter the Area to:

- carry out monitoring and Area inspection activities, which may involve the collection of small samples or data for analysis or review;
- erect or maintain signposts, structures or scientific equipment;
- for management activities;
- carry out management and conservation activities, especially those associated with the Historic Sites.

Any specific sites of long-term monitoring shall be appropriately marked on site and on maps of the Area. A GPS position should be obtained for lodgement with the Antarctic Data Directory System through the appropriate national authority.

To help maintain the ecological and scientific values of the isolation and relatively low level of human impact at the Area visitors shall take special precautions against introductions. Of particular concern are microbial, animal or vegetation introductions sourced from soils from other Antarctic sites, including stations, or from regions outside Antarctica. To the maximum extent possible, visitors shall ensure that footwear, clothing and any equipment – particularly camping and sampling equipment – is thoroughly clean before entering the Area.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority after the visit has been completed in accordance with national procedures and permit conditions;
- Such reports should include, as appropriate, the information identified in the visit report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan;
- Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organizing the scientific use of the Area;
- The appropriate authority should be notified of any activities / measures that might have exceptionally been undertaken, or anything removed, or of anything released and not removed, that were not included in the authorized permit.

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Annex 1: Bryophytes and lichens of the Botany Bay-Cape Geology region, Granite Harbour, Victoria Land, Antarctica (from Seppelt et al., 2010).

HEPATICAE (Liverwort)
[1]*Cephaloziella varians**

MUSCI (Moss)
*Bryoerythrophyllum recurvirostrum**
[2]*Bryum argenteum var. muticum*
Bryum pseudotriquetrum
*Ceratodon purpureus**
[3]*Didymodon brachyphyllus*
Grimmia plagiopodia
Hennediella heimii
Schistidium antarctici
[4]*Syntrichia sarconeurum*

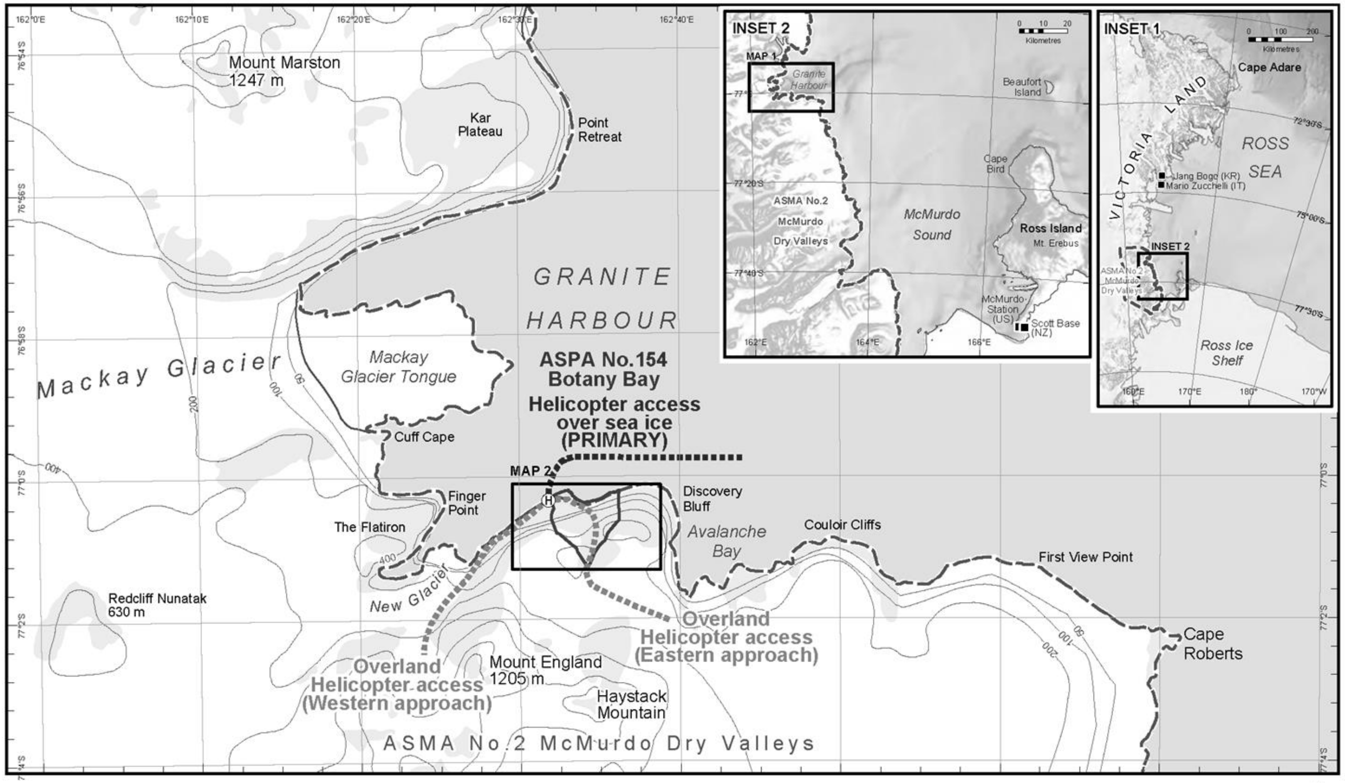
LICHEN
Acarospora gwynnii
Amandinea petermannii
Buellia frigida
[5]*Buellia* cf. *papillata*
[6]*Buellia subfrigida*
Caloplaca athallina
Caloplaca citrina
Caloplaca coeruleofrigida
Caloplaca cf. *schofieldii*
Caloplaca saxicola
Candelariella flava
[7]*Carbonea vorticosa*
Lecanora expectans
Lecanor mons-nivis
Lecidea andersonii
Lecidea cancriformis
Lecidella siplei
[8]*Leproloma cacuminum*
Physcia caesia
Physcia dubia
Rhizocarpon geminatum
Rhizocarpon geographicum
Rhizoplaca melanophthalma
Rhizoplaca cf. *priestleyi*
Sarcogyne privigna
*Turgidosculum complicatulum**
Umbilicaria aprina
[9]*Xanthomendoza borealis*
Xanthoria elegans

[1] *Cephaloziella varians* has previously been referred to as *C. exiliflora* (Bednarek-Ochyra et al., 2000).
[2] *Bryum argenteum var. muticum* has previously been referred to as *Bryum subrotundifolium* (Ochyra et al., 2008).
[3] *Didymodon brachyphyllus* has previously been referred to as *Didymodon gelidus* (Ochyra et al., 2008). [4] *Syntrichia sarconeurum* has previously been referred to as *Sarconeurum glaciale* (Ochyra et al., 2008). [5] *Buellia* cf. *papillata* has previously been referred to as *Buellia grimmiae*.

[6] *Buellia subfrigida* has previously been referred to as *Aspicilia glacialis* (Seppelt et al., 1995) and *Hymenelia glacialis* (Ovstedal and Lewis Smith, 2001).

[7] *Carbonea vorticosa* has previously been referred to as *Lecidea blackburnii* (Seppelt et al., 1995).

[8] *Leproloma cacuminum* has previously been referred to as *Lepraria* sp.
[9] *Xanthomendoza borealis* has previously been referred to as *Xanthoria mawsonii* (Lindblom and Sochting, 2008).
**** The most southerly record of these species.***



Map 1: ASPA No. 154 Botany Bay: Regional overview

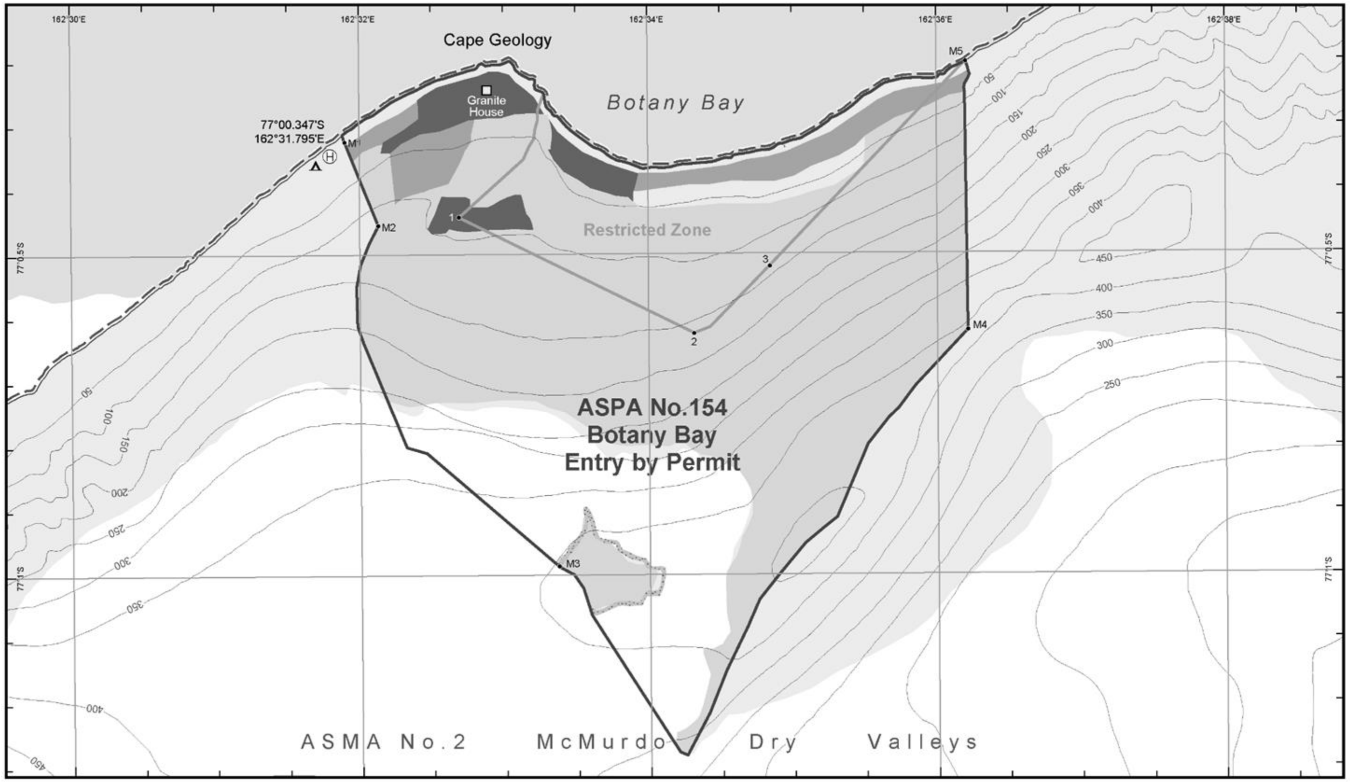
Environmental Research & Assessment
Issued 08 Mar 2019

Antarctica New Zealand

Kilometres: 0–5

Coastline · Contour · Ocean · Permanent ice · Ice free ground · ASMA boundary · ASPA boundary · Station · Helicopter landing site · Preferred helicopter access route over sea ice · Preferred helicopter access route over land

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: ASPA boundary, HLS: Gateway Antarctica;
Contours, Ice free ground: ADD v.5.0;
Helicopter access routes: Jan 2019;
ASMA boundary: ERA Antarctic Protected Area Database v.4.



Map 2: ASPA No. 154 Botany Bay: Topography

Environmental Research & Assessment
Issued 07 May 2019

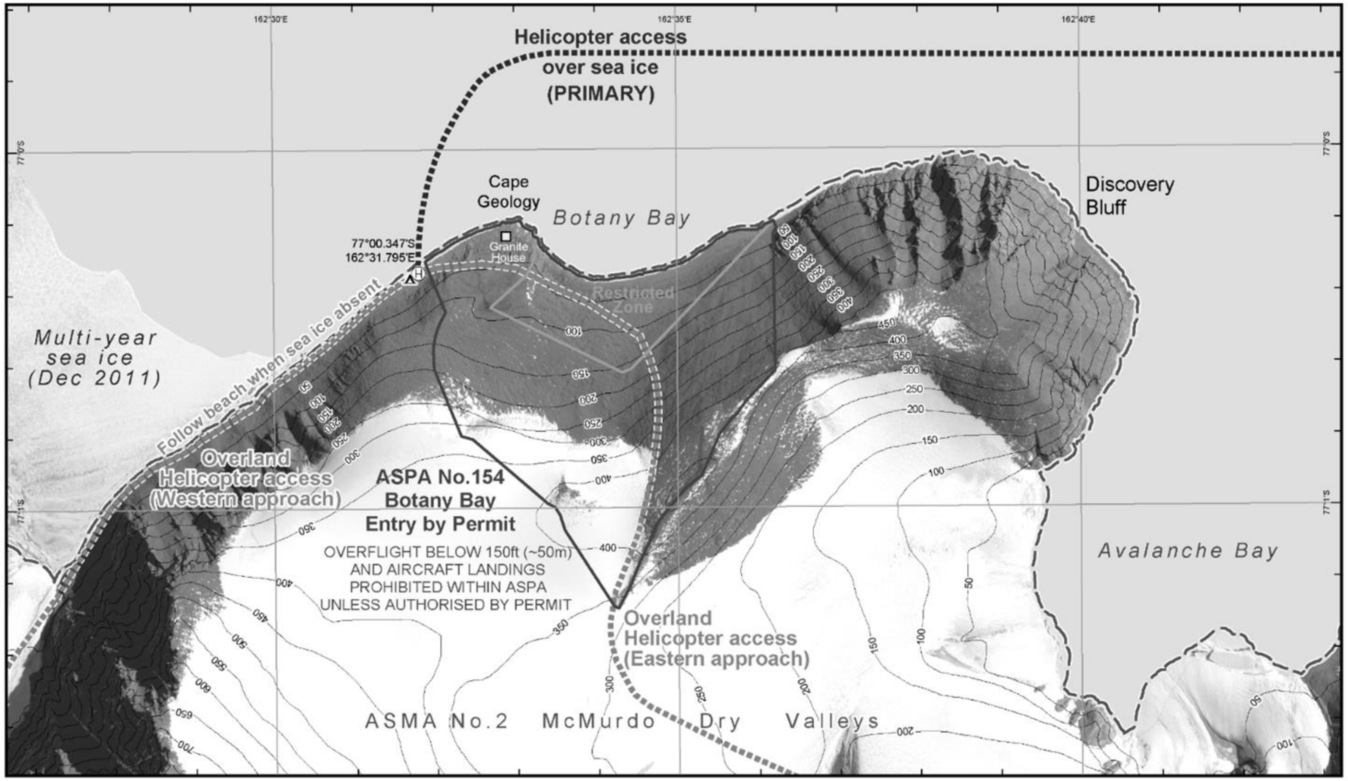
Antarctica New Zealand

- Coastline
- Contour (50 m)
- Ocean
- Permanent ice
- Ice free ground
- Moraine
- ASMA boundary
- ASPA boundary
- Restricted Zone
- Boundary point
- Helicopter landing site
- Designated camp site
- Historic feature

Vegetation density (within ASPA only)
- 0.1% - 23%
- 23.1% - 46%
- 46.1% - 70%

0 500 Metres N

Projection: Lambert Conformal Conic; Spheroid & horizontal datum: WGS84; Data sources: Boundaries, physical, human and historic features: Gateway Antarctica; Vegetation: K518 (07/08); ASMA boundary: ERA Antarctic Protected Area Database v.4.



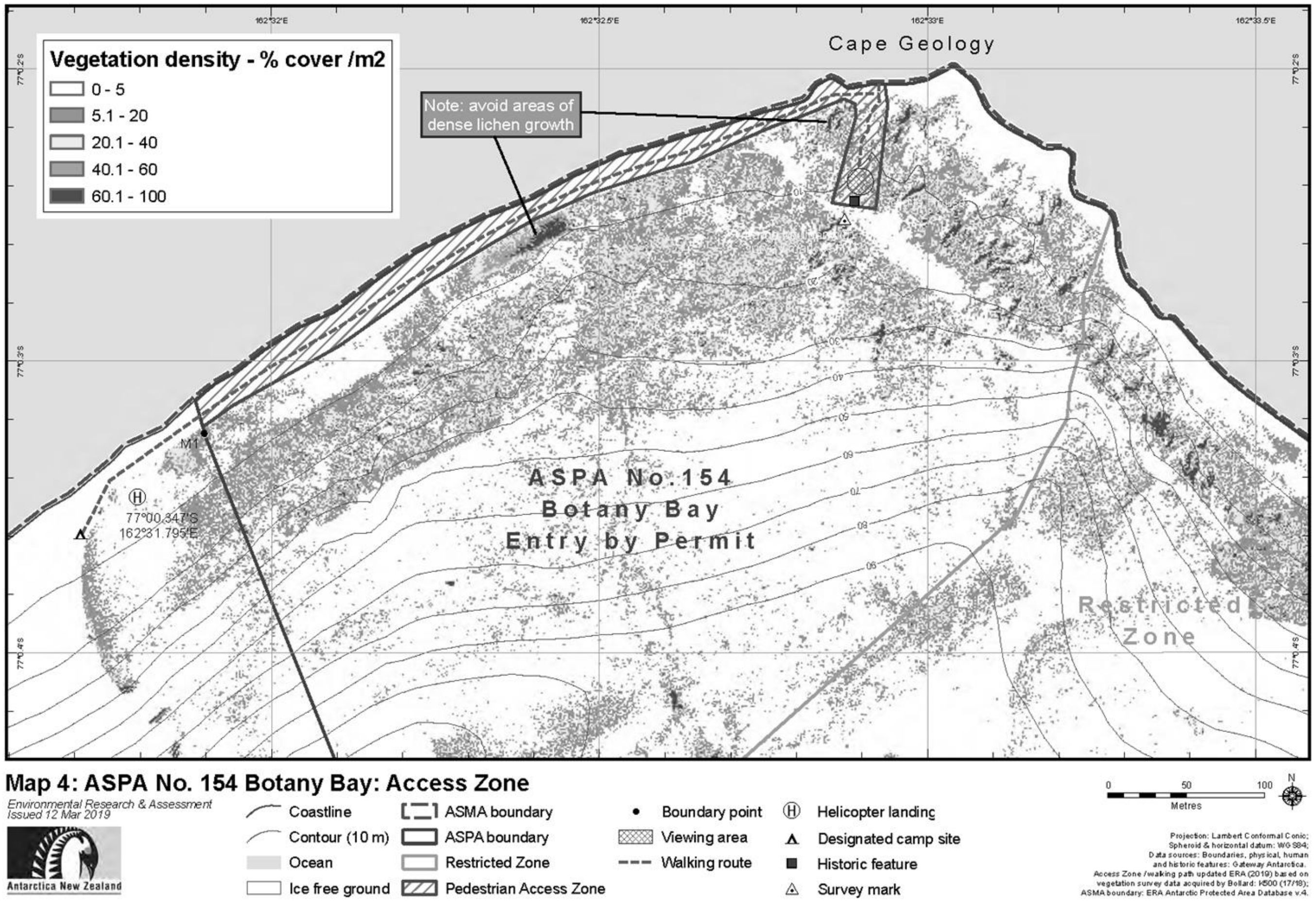
Map 3: ASPA No. 154 Botany Bay: Air access guidance

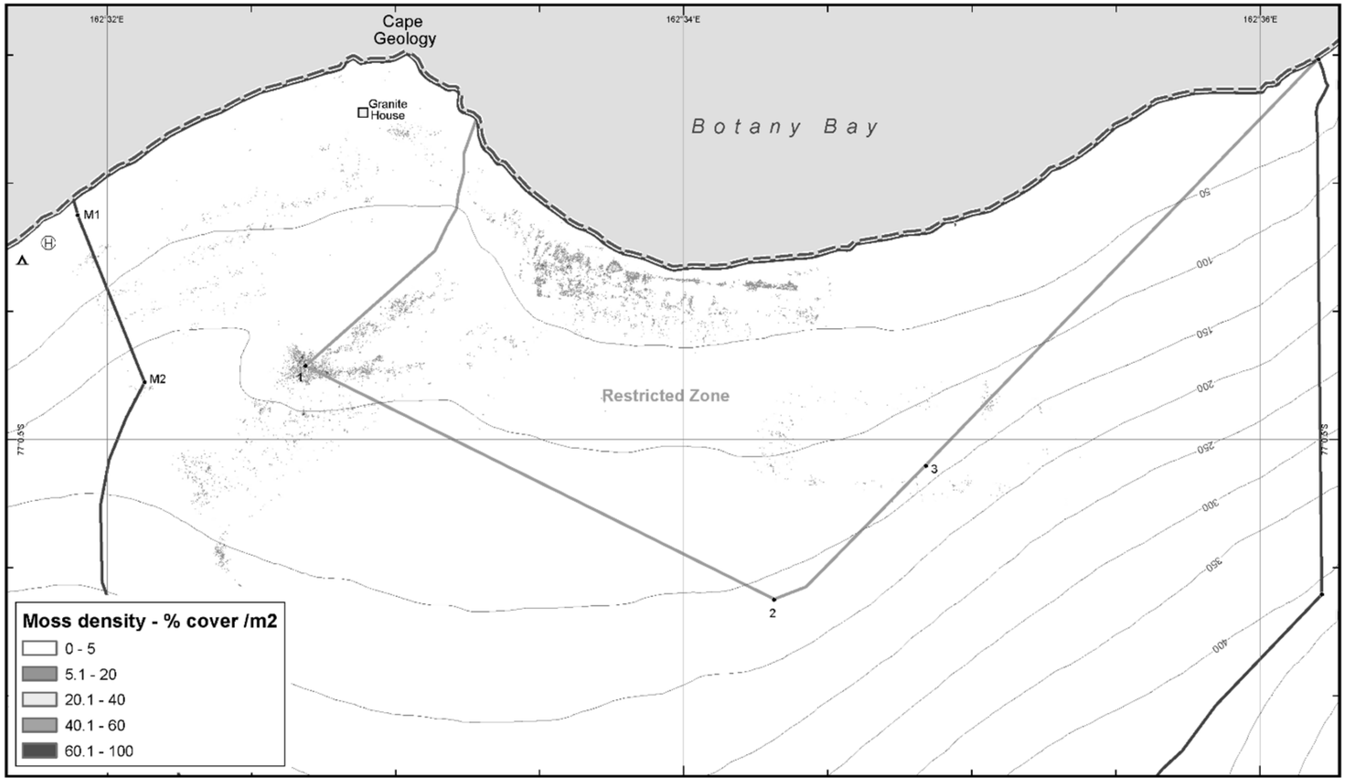
Environmental Research & Assessment
Issued 12 Mar 2019

0 500 1000
Metres

- Contour (50 m)
- Ocean
- ASMA boundary
- ASPA boundary
- Restricted Zone
- Helicopter landing site
- Designated camp site
- Historic feature
- Preferred helicopter access route over sea ice
- Preferred helicopter access route over land

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: Boundaries, human & historic features:
Gateway Antarctica; Helicopter access: ERA (Sep 2016);
Contours: USGS 50K series;
ASMA boundary: ERA Antarctic Protected Area Database v.4;
Base imagery: WorldView-2 10 Dec 2011 (Imagery © 2011 Digital Globe).


162°32'E
162°32.5'E
162°33'E
162°33.5'E
77°0.2'S
77°0.3'S
77°0.4'S
Cape Geology
Vegetation density - % cover /m2
0 - 5
5.1 - 20
20.1 - 40
40.1 - 60
60.1 - 100
Note: avoid areas of dense lichen growth
ASPA No.154
Botany Bay
Entry by Permit
Restricted Zone
M1
77°00.347'S
162°31.795'E
0
50
100
Metres
N
Map 4: ASPA No. 154 Botany Bay: Access Zone
Environmental Research & Assessment
Issued 12 Mar 2019
Antarctica New Zealand
Coastline
Contour (10 m)
Ocean
Ice free ground
ASMA boundary
ASPA boundary
Restricted Zone
Pedestrian Access Zone
Boundary point
Viewing area
Walking route
Helicopter landing
Designated camp site
Historic feature
Survey mark
Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: Boundaries, physical, human and historic features: Gateway Antarctica.
Access Zone / walking path updated ERA (2019) based on vegetation survey data acquired by Bollard: K500 (17/18);
ASMA boundary: ERA Antarctic Protected Area Database v.4.



Map 5A: ASPA No. 154 Botany Bay: Moss density

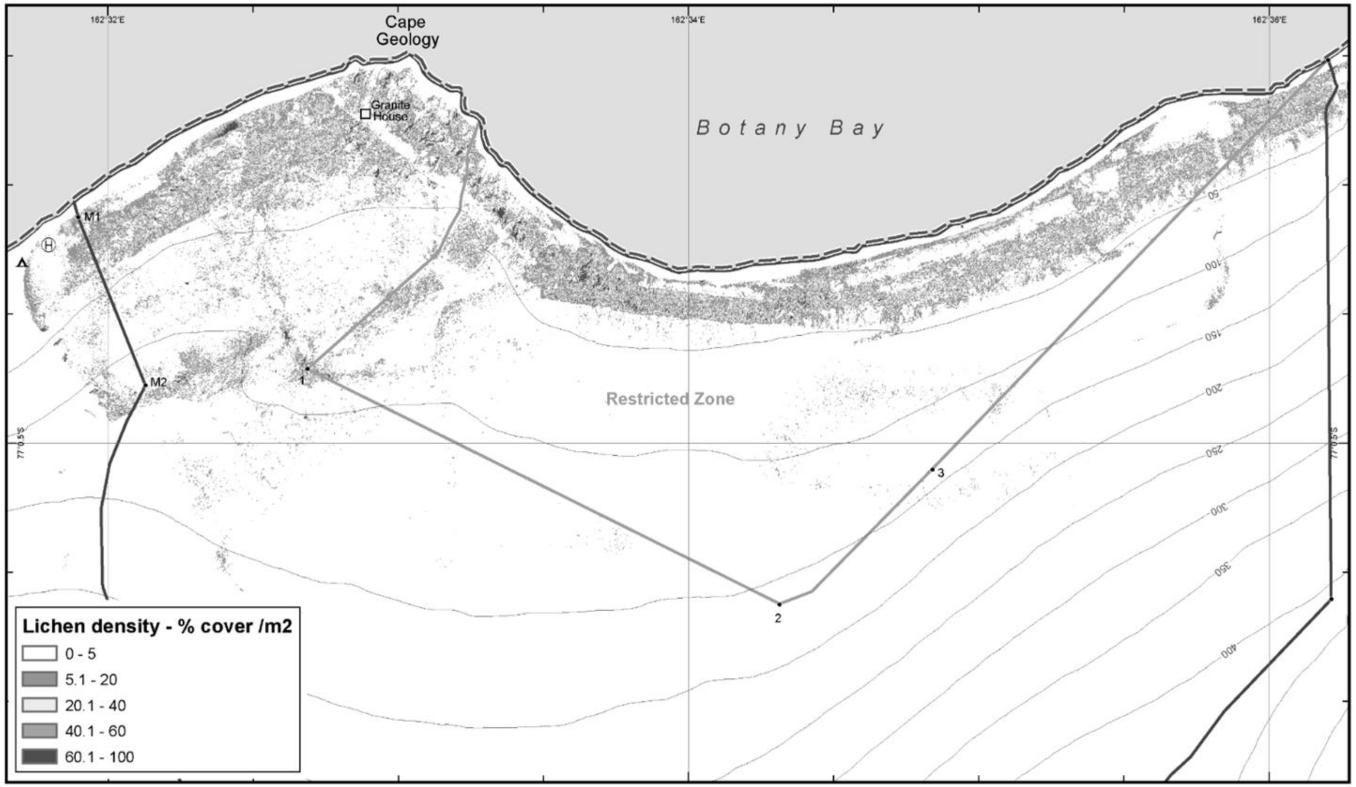
Environmental Research & Assessment
Issued 12 Mar 2019

Antarctica New Zealand

Coastline
Contour (50 m)
Ocean
Ice free ground
ASMA boundary
ASPA boundary
Restricted Zone
Boundary point
Helicopter landing site
Designated camp site
Historic feature

0 500
Metres
N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources:
Boundaries, human and historic features: Gateway Antarctica;
Contours: USGS 50K series;
Vegetation: survey data acquired by Bollard, K500 (17/18);
ASMA boundary: ERA Antarctic Protected Area Database v.4



Map 5B: ASPA No. 154 Botany Bay: Lichen density

Environmental Research & Assessment
Issued 12 Mar 2019

Antarctica New Zealand

- Coastline
- Contour (50 m)
- Ocean
- Ice free ground
- ASMA boundary
- ASPA boundary
- Restricted Zone
- Boundary point
- Helicopter landing site
- Designated camp site
- Historic feature

0 500
Metres
N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources:
Boundaries, human and historic features: Gateway Antarctica;
Contours: USGS 50K series;
Vegetation: survey data acquired by Bollard, K500 (17/18);
ASMA boundary: ERA Antarctic Protected Area Database v.4

Measure 10 (2024)

Antarctic Specially Protected Area No 160 (Frazier Islands, Windmill Islands, Wilkes Land, East Antarctica): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Measure 2 (2003), which designated Frazier Islands, Windmill Islands, Wilkes Land, East Antarctica as ASPA 160 and adopted a Management Plan for the Area;
- Measures 13 (2008) and 14 (2013), which adopted revised Management Plans for ASPA 160;

Recalling that the Committee for Environmental Protection ("CEP") XXII (2019) reviewed and continued without changes the Management Plan for ASPA 160, which is annexed to Measure 14 (2013);

Noting that the CEP has endorsed a revised Management Plan for ASPA 160;

Desiring to replace the existing Management Plan for ASPA 160 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 160 (Frazier Islands, Windmill Islands, Wilkes Land, East Antarctica), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 160 annexed to Measure 14 (2013) be revoked.

Management Plan for Antarctic Specially Protected Area No 160

FRAZIER ISLANDS, WINDMILL ISLANDS, WILKES LAND, EAST ANTARCTICA

Introduction

The Frazier Islands comprise three islands located approximately 18 km offshore from Australia's Casey station, in East Antarctica (see Map A). The islands support the largest of only four known breeding populations of southern giant petrels (Macronectes giganteus) on continental Antarctica and were designated as an Antarctic Specially Protected Area under Measure 2 (2003) for the sanctuary of the birds. The Management Plan for the Area was revised under Measure 13 (2008) and Measure 14 (2013).

Following first visitation of the islands in 1956, the southern giant petrel colonies at the Frazier Islands were visited intermittently on various occasions from late November to late March. Due to limited access, Nelly Island was visited most frequently. Occupied nests were counted in December in the period from 1989-2001, across all three islands.

Apart from visits for seabird observations, the Frazier Islands have been visited very infrequently. On average, a visit for seabird observations occurred every two years from the late 1950s until the mid-1980s, when a formal management strategy was implemented within the Australian Antarctic Program to minimise human disturbance to breeding colonies of southern giant petrels in the vicinity of Australia's Antarctic stations (see Appendix 1).

From 1989 to 2001, the Frazier Islands were visited five to six times to count occupied nests. However, the visits varied in time from December to March, making the comparison of results difficult.

From 2011 to 2014, four automated cameras were installed at Nelly Island to gain insights into the phenology of the breeding cycle of southern giant petrels. The obtained results show that southern giant petrels are present for most of the year and are seen at known nest sites in early July. Pair formation commences in August, followed by a pre-laying period of about 83 days. The laying period lasts from 23-31 October, and chicks start to hatch in late December. Chicks are guarded until mid- to late January and fledge in late March to early April.

1. Description of values to be protected

The Area is primarily designated to protect the breeding population of southern giant petrels, which is the largest known in the continental Antarctic.

In 2008, the world breeding population of southern giant petrels was estimated at 54,000 pairs. More recent analysis of trend data for the global population over the past three generations (64 years) gives a best case estimate of a 17% increase and a worst-case scenario of a 7.2% decline; declines consequently do not approach the threshold for classification as Vulnerable on the IUCN Red List of Threatened Species and the species has been down-listed from Near Threatened to Least Concern (BirdLife International, 2012).

The southern giant petrel is listed in Annex 1 of the Agreement on the Conservation of Albatrosses and Petrels (ACAP), a multilateral agreement that seeks to conserve albatrosses and petrels by coordinating international activity to mitigate known threats to their populations, and in Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals.

In East Antarctica, southern giant petrels are uncommon. The species is at the southern limit of its distribution range. The most recent estimate of the total population at the Frazier Islands was 237 breeding pairs in 2011. Colonies are found on all three of the islands in the group (Nelly, Dewart and Charlton Islands), the largest occurs on Dewart Island. In 2011, automatic cameras were temporarily installed on Nelly Island to establish the breeding chronology and success of the southern giant petrels (Map B), and were removed in 2014.

The Frazier Islands are one of only four known breeding localities of southern giant petrels around the coastline of continental Antarctica and are the only known site in nearly 3000 km of coastline between Davis station and Dumont d'Urville station. The other three continental breeding colonies are located near the Australian stations of Mawson (Giganteus Island, Rookery Islands, ASPA 102) and Davis (Hawker Island, ASPA 167), and near the French Dumont d'Urville station (Pointe-Géologie Archipelago, ASPA 120). The southern giant petrels on the Antarctic continent comprise less than 1% of the global breeding population. The current population for continental Antarctica is estimated at approximately 300 pairs, with 2-4 pairs on Giganteus Island (2007), approximately 45 pairs on Hawker Island (2010), 8-9 pairs at Pointe Géologie archipelago (2005) and 237 pairs on the Frazier Islands (2011). However, incidental observations at the coast near Mawson station indicate there may be additional colonies that have not yet been discovered.

The Area also supports breeding colonies of Adélie penguin (Pygoscelis adeliae) (and several other species of flying birds.

2. Aims and objectives

Management of the Area aims to:

- minimise human disturbance to the breeding colonies of southern giant petrels to assist further the protection of the population in the wild;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in that Area;
- preserve the Frazier Islands as a reference area for future comparative studies with other breeding populations of southern giant petrels;
- prevent or minimise the introduction to the Area of alien plants, animals and microbes to the Area; and
- minimise the possibility of the introduction of pathogens which may cause disease in fauna populations within the Area.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- a copy of this Management Plan made available at Casey station;

- markers, signs and structures erected within the Area for scientific or management purposes, and secured, maintained in good condition and removed when no longer required;
- abandoned equipment or materials removed to the maximum extent possible provided it does not adversely impact on the values of the Area;
- visitation of the Area as necessary (outside the mid-April to mid-September breeding season of southern giant where practicable, and no less than once every five years where practicable) to assess whether the Area continues to serve the purposes for which it is designated and to ensure that management activities are adequate; and
- review of the Management Plan at least every five years with updating as required.

4. Period of designation

This area is designated for an indefinite period.

5. Maps

Map A: Antarctic Specially Protected Areas, Windmill Islands, East Antarctica.

Map B: Antarctic Specially Protected Area No 160 Frazier Islands – Topography and Bird Distribution.

- Map specifications:

- Projection: UTM Zone 49

- Horizontal Datum: WGS84.

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

- *General description*

The Frazier Islands are located at latitude 66°14'S, longitude 110°10'E (Map A). The three islands (Nelly, Dewart and Charlton) lie in the eastern part of Vincennes Bay, approximately 18 km to the west north-west of Casey station. Nelly Island is the largest of the three islands (approximately 0.35 km² in area) and was named for the presence of several colonies of southern giant petrels or "Nellies". The Area comprises the entire terrestrial area of the three islands, with the seaward boundary at the low water mark (Map B). The total area of the Antarctic Specially Protected Area is approximately 0.6 km². There are no boundary markers.

- *Environmental Domains Analysis*

The Frazier Islands are not classified in accordance with the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)).

- *Antarctic Conservation Biogeographic Regions*

The Frazier Islands are located within Biogeographic Region 7 East Antarctica (Resolution 6 (2012)).

- *Important Bird Areas in Antarctica*

The Frazier Islands do not represent an Important Bird Area (Resolution 5 (2015)).

- *Southern Giant Petrels*

The breeding season for southern giant petrels at the Frazier Islands usually commences in late October to mid-November and extends through to April. Yearlings and adults can be present as early as July. Banded chicks from the Frazier Islands dispersed throughout the Southern Hemisphere and have previously been recovered in New Zealand, South America, Easter Island, and South Africa within nine months of departure.

In the mid-1980s, a management strategy was implemented by the Australian Antarctic Program for all three southern giant petrels breeding localities in the vicinity of Australia's stations, to minimise human disturbance. With the development of new technology (such as automated cameras), detailed information can now be obtained with little or no human presence during the breeding period.

In December 2011, 80 breeding pairs were observed on Nelly Island including two banded birds, 130 breeding pairs on Dewart Island, and 27 breeding pairs on Charlton Island. Four automatic cameras temporarily installed on Nelly Island from 2011 to 2014 assisted with establishing/understanding key breeding parameters.

- *Other birds*

Nelly Island supports the largest and most varied avian community of the three islands; snow petrel (Pagodroma nivea), cape petrel (Daption capense), Antarctic petrel (Thalassoica antarctica), Wilson's storm-petrel (Oceanites oceanicus), southern fulmar (Fulmarus glacialoides), and South Polar skua (Catharacta maccormicki) all breed on the island. South Polar skua nests have also been observed on Dewart Island.

In 1961/62, 100 Adélie penguin (Pygoscelis adeliae) nests were reported in one colony on Nelly Island. During the 1989/90 season, three colonies were recorded on the north-west ridge of Nelly Island with a total of 554 nests. This increase corresponds with those recorded for most other Adélie penguin populations in the Windmill Islands region during the period from 1959/60 to 1989/90. In the 2001/02 season, approximately 1000 Adélie penguin pairs were estimated to be breeding on Nelly Island. A brief inspection of the Adélie penguin colonies in 2005/06 suggested that the breeding population continues to increase.

- *Marine mammals*

Recorded sightings of marine mammals at the Frazier Islands are scarce. In 1968, three Weddell seals (Leptonychotes weddellii) were observed on an ice floe located between Nelly and Dewart Islands. Orcas (killer whale: Orcinus orca) were also sighted offshore from the islands, including a large pod in late 2011. A few leopard seals (Hydrurga leptonyx) were sighted on sea ice near Nelly Island and a small number of Weddell seals were recorded on the sea ice near the Frazier Islands in the 2001/02 season (Appendix 2).

- *Climate*

The climate at the Frazier Islands is characteristic of that experienced at the Windmill Islands and other Antarctic coastal locations in the region. At Casey station, located 18 km to the east south-east of the Frazier Islands group, mean temperatures are 0.3°C for the warmest month and -14.9°C for the coldest month. Precipitation is low and the high albedo of the exposed rock surfaces results in persistent ice-free areas that provide attractive nesting sites for the avifauna.

- *Geology and geography*

The topography of the Frazier Islands is characterised by steep cliffs rising from the sea. The highest peak on Nelly Island is approximately 65 m. There is a broad 'U' shaped ice-filled valley on both Nelly and Dewart Islands.

The geology of the Frazier Islands is typical of the Windmill Islands group and is characterised by the layered schists and finely crenulated gneisses of the Windmill metamorphics. The geological character of the Frazier Islands developed as a result of two phases of metamorphosis at 1400-1310 Ma and about 1200 Ma of pre-existing volcanics, greywacke and shale. On Nelly Island there are steep cliffs of biotite and gneiss. A red sandstone erratic occurs in the 'U' shaped valley on Nelly Island below the 30 m contour. Highly polished glacial striae in the gneisses provide evidence of recent glaciation and indicate the former direction of ice flow of 265º and 280º T. Surface sediments consist of fine gravelly sand located in bedrock depressions.

- *Vegetation*

Vegetation recorded at Nelly Island comprises at least 11 species, including lichens Buellia frigida, Usnea antarctica, Rhizoplaca melanophthalma, Candelariella flava, a terrestrial alga Prasiola crispa, an indeterminate green crust that is thought to be a mixture of fungal hyphae and green alga Desmococcus olivaceus, and several species of snow algae including Chlorococcum sp., Chloromonas polyptera, Chlorosarcina antarctica, Prasiococcus calcarius (Appendix 2). There are no published records of terrestrial invertebrates on the Frazier Islands; however, no surveys have been undertaken.

6(ii) Access to the Area

Depending on sea ice conditions, access to the vicinity of the Frazier Islands can be gained by small boat, in accordance with section 7(ii) of this plan. Sea ice conditions are usually too unstable for over sea ice access by vehicles.

6(iii) Location of structures within and adjacent to the Area

There are no permanent structures within or adjacent to the Area and none are to be erected. Four automatic cameras were temporarily located in proximity to the southern giant petrel colony but were removed in 2014.

6(iv) Location of other protected areas in the vicinity

Other protected areas in the vicinity include (see Map A):

- ASPA No 135, Northeast Bailey Peninsula (66°16’59.9"S, 110°31’59.9"E): located approximately 18 km to the east-south-east;
- ASPA No 136, Clark Peninsula (66º15’S, 110º36’E): located approximately 15 km to the east-south-east; and
- ASPA No 103, Ardery Island and Odbert Island (66°22’20"S, 110°29’10"E): located approximately 20 km to the south-east.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry to the Area is prohibited except in accordance with a permit issued by an appropriate national authority. Conditions for issuing a permit to enter the Area are that:

- the activities permitted give due consideration, via the environmental impact assessment process, to the continued protection of the values of the Area;
- the actions permitted are in accordance with this Management Plan and its objectives and provisions;
- permits shall be issued for a finite period;
- permits shall be carried when in the Area;
- permit holders shall notify the permitting authority of any activities or measures undertaken that were not authorised by the permit;
- a visit report must be supplied to the authority that approved the permit, as soon as practicable after the visit to the Area has been completed (but no later than six months after the visit has been completed); and
- all census and GPS data should be made available to the permitting authority and to the Party responsible for the development of the Management Plan.

Additional conditions for the Frazier Islands, consistent with this Management Plan's objectives and provisions, may be included by the permitting authority, including (but not limited to) the following:

- permits to enter the Area during the non-breeding period for southern giant petrels (from 1 May to 30 September) may be issued for compelling scientific research or essential management purposes; and
- permits to enter the Area during the breeding period for southern giant petrels (from 1 October to 30 April) may be issued for the purpose of conducting censuses.

7(ii) Access to, and movement within, or over the Area

- Vehicles are prohibited within the Area and all movement within the Area should be on foot.
- The only permitted access to the Frazier Islands is by watercraft. Boats used to visit the islands must be left at the shoreline and movement within the Area is by foot only. Only personnel who are required to carry out scientific/management work in the Area should leave the landing site.
- Any movement within the Area is to be consistent with the minimum approach distances to nesting birds specified in Appendix 3. Persons shall not approach closer than is necessary to obtain census data or biological data from any nesting southern giant petrels, and in no case closer than 20 m.
- To reduce disturbance to wildlife, noise levels including verbal communication are to be kept to a minimum. The use of motor-driven tools and any other activity likely to generate noise and thereby cause disturbance to nesting birds is prohibited within the Area during the breeding period for southern giant petrels (from 1 October to 30 April).
- Landing of aircraft in the Area is prohibited at any time.
- Sea-ice conditions are usually too unstable to permit aircraft landings, however permission to land a single-engined helicopter adjacent to the Area may be granted for essential scientific or management purposes when sea-ice conditions are suitable and only if it can be demonstrated that disturbance will be minimal, at a distance of no less than 930 m from any breeding colony of bird or seal (emergencies exempted). Only personnel who are required to carry out work in the Area should leave the helicopter.
- Overflights of the islands during the breeding season are prohibited, except where essential for scientific or management purposes. Such overflights are to be at an altitude of no less than 930 m (3050 ft) for single-engine helicopters and fixed-wing aircraft, and no less than 1500 m (5000 ft) for twin-engine helicopters.
- Clothing (particularly all footwear) and field equipment shall be thoroughly cleaned before and after entering the Area.
- The operation of Remotely Piloted Aircraft Systems (RPAS) over the Area should be carried out, as a minimum requirement, in compliance with the 'Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (v 1.1) contained in Resolution 4 (2018).

7(iii) Activities which may be conducted within the Area

Activities which may be conducted within the Area include:

- compelling scientific research which cannot be undertaken elsewhere;
- sampling, but this should be the minimum required for the approved research programs;
- essential management activities, including monitoring, erection of signs, removal of structures/materials, and visits to assess the effectiveness of the Management Plan and management activities; and
- essential operational activities in support of scientific research or management within or beyond the Area.

Wherever practicable, censuses are to be conducted from outside the southern giant petrel colonies. In most cases, there are vantage points from where the nesting southern giant petrels may be counted. Access to the Area should be limited to the minimum amount of time and personnel reasonably required to undertake the census. Boat operators and other support personnel should remain at the landing site for safety reasons.

7(iv) Installation, modification, or removal of structures

Permanent structures and installations are prohibited within the Area. Temporary structures and installations may only be established in the Area for compelling scientific or essential management reasons and for a pre-established period, as specified in a permit.

Any temporary structure or installation established in the Area must be:

- first cleaned of organisms, propagules (e.g. seeds, eggs) and non-sterile soil;
- made of materials that do not impact on the surrounding environment, and can withstand Antarctic conditions;
- installed, maintained, modified and removed in a manner that minimises disturbance (and does not cause more damage than benefit) to the values of the Area;
- clearly identified by country, name of the principal agency/investigator, date of installation and date of expected removal;
- reported to the permitting authority if left in situ (GPS coordinates of long-term monitoring makers should be lodged with the Antarctic Data Directory System through the appropriate national authority); and
- removed when they are no longer required, or before the expiry of the permit, whichever is earlier.

7(v) Location of field camps

Camping is prohibited within the Area (except in an emergency).

7(vi) Restrictions on materials and organisms which may be brought into the Area

The following restrictions apply:

- No living animals, plant material, microorganisms or non-sterile soils shall be deliberately introduced into the Area. Appropriate precautions, such as the thorough cleaning of footwear and equipment, must be taken to prevent accidental introduction.
- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- Chemicals may be introduced for scientific or management purposes specified in a permit, and shall be removed from the Area at or before the conclusion of the permitted activity.
- Permanent or semi-permanent fuel depots are not allowed. Fuel must not to be stored in the Area unless it is required for essential purposes connected with the activity for which the permit has been granted. All such fuel must be stored in sealed and bunded containers removed from the Area at or before the conclusion of the permitted activity.
- Boat refuelling is permitted at shoreline landing sites. A small amount of fuel is permitted for an emergency stove and must be handled in a way that minimises the risk of the accidental introduction of the fuel into the environment. Any chemical which may be introduced for compelling scientific purposes, as authorised in a permit, shall be removed from the Area, at or before the conclusion of the activity for which the permit was granted. The use of radionuclides or stable isotopes is prohibited.
- Any materials or supplies introduced for a stated period shall be removed at or before the conclusion of the stated period, and shall be stored and handled so that the risk of dispersal into the environment is minimised.

7(vii) Taking of, or harmful interference with, native flora and fauna

The taking of, or harmful interference with, native flora and fauna is prohibited except in accordance with a permit. Where the taking of, or harmful interference with, animals is involved, this action should be conducted in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica as a minimum standard.

Disturbance of southern giant petrels should be avoided. Visitors should be alert to changes in wildlife behaviour, especially changes in posture or vocalisation. If birds are showing signs of wanting to leave the nest, all persons shall retreat immediately.

7(viii) The collection or removal of material not brought into the Area by the permit holder

Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material in situ. If such material is found, the appropriate national authority must be notified. Where possible, photographic documentation should be obtained and included in the site visit report.

7(ix) Disposal of waste

All wastes, including human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to carry out the following measures, provided they do not adversely impact on the values of the Area:

- the collection of samples for analysis or review;
- the establishment or maintenance of scientific and/or logistical equipment, infrastructure and signposts; and
- other protective measures.

7(xi) Requirements for reports

The principal permit holder for each permit issued shall submit to the permitting authority a report describing the activities undertaken no later than six months after the visit has been completed. Such reports should include, as appropriate, the information identified in the Visit Report form contained in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage; to be used both in any review of the Management Plan and in organising the scientific use of the Area.

Additionally, visit reports should provide detailed information on census data, locations of any new colonies or nests not previously recorded, a brief summary of research findings, and copies of photographs taken of the Area.

8. Supporting documentation

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Appendix 1: Southern giant petrel populations at the Frazier Islands, Antarctica

Note: To the extent possible, each observation below has been validated by a review of the primary data records. The comments indicate where variations from published literature were identified. Further consideration of each observation would be required before using and of these data in analyses.

Date	Nelly Island	Dewart Island	Charlton Island	Source	Comment
21 & 22 Jan 1956	250 N	not visited	not visited	Unpublished data: J Bunt 2008 pers. comm.; Law (1958)	Counted at four separate colonies on higher parts of Nelly Island. Notes say that most nests contained chicks. Many of these nests could be old nests.
24 &25 Jan 1959	25 N	not visited	not visited	Unpublished data: Bird log Magga Dan-Wilkes & Oates Land Voyage (Jan-Mar 1959); Unpublished data: Biology report for Wilkes, (1959/60- 1960-61), R Penny.	It is not clear whether these observations are all chicks, but Penny comments that some of them were chicks.
15 Dec 1959	60 A	not visited	not visited	Unpublished data: Biology report for Wilkes, Appendix F (1961) M. Orton; Creuwels et al. (2005)	20 other birds were associated with nests.
12 Feb 1960	46 C	not visited	not visited	Unpublished data: Biology report for Wilkes, (1959/60- 1960-61), R Penny; Unpublished data: Biology report for Wilkes, Appendix F (1961) M. Orton.	Orton reports that there were 47 chicks on Nelly Island when according to Penny (1960) there were 46.
15 Dec 1960	not visited	60 N	not visited	Unpublished data: Biology report for Wilkes, Appendix F (1961) M. Orton; Woehler et al. (1990); Creuwels et al. (2005)	20 other birds were associated with nests. Woehler et al..(1990) and Creuwels et al. (2005) have both quoted directly from R. Penny's unpublished report.
22 Mar 1961	34 C	10 C	no data	Unpublished data: Biology report for Wilkes, Appendix F (1961) M. Orton; Unpublished data: Biology: giant petrel Wilkes report (1961); Creuwels et al. (2005)	All chicks observed on Nelly Island were banded. Only a subset of the chicks observed at Dewart Island were banded.
23 Nov 1962	11 eggs	not visited	not visited	Unpublished data: Davis and Mawson station biology log records (1962)	This count appears to have been a subset of the population only.
21 Jan 1964	10 C	not visited	not visited	Unpublished data: Wilkes station report, biology log records (1964), Murray	Birds were observed on the north-east ridge, with about 20 occupied nests in this area, and more on the lower area on the southern side of the ridge. There were many old and uninhabited nests.
7 Mar 1968	72	no data	not visited	Unpublished data: Bird Log Nella Dan (1967-8) Vol. 1; Shaughnessey (1971); Murray & Luders (1990)	This count is the total for all four colonies found on Nelly Island. There is a map of their location in the field notes.
20 & 21 Jan 1972	52 C	53 C	10-20 N (aerial survey only)	Murray (1972)	Land survey primarily for banding. 49 of 52 chicks seen were banded on Nelly Island. 51 of 53 chicks seen were banded on Dewart Island. Please note counts quoted in Murray & Luders (1990) are incorrect.
31 Jan 1974	27 BC	no data	no data	Unpublished data: Biology report for Casey (1974) Jones; Murray & Luders (1990); Woehler et al. (1990); Creuwels et al. (2005)	All peer-reviewed papers appear to have reported an incorrect count of a total of 76, however only 27 chicks were banded in this season.
13-17 Feb 1977	27 C	43 C	no data	Cowan (1979); Murray & Luders (1990); Woehler et al. (1990); Creuwels et al. (2005)	All peer-reviewed papers appear to have reported the wrong count. Cowan is the original reference, where data has gone straight to peer-reviewed publication.
25 Jan 1978	48 C	48 C	6 C	Cowan (1979); Murray & Luders (1990); Woehler et al. (1990); Creuwels et al. (2005)	

Date	Nelly Island	Dewart Island	Charlton Island	Source	Comment
30 Jan & 2 Feb 1979	35 (method unknown)	46 (method unknown)	5 (method unknown)	Murray & Luders (1990); Woehler et al. (1990); Creuwels et al. (2005)	The earliest reference to this work is Murray & Luders (1990), but they did not do the original counts. For Nelly, Woehler et al. (1990) and Creuwels et al. (2005) further report the chick count as 37 and not 35 as reported in Murray & Luders (1990). Further work is required to know which figure reflects the correct count. K. de Jong's original data cannot be located.
18 Jan 1980	43 C	10 (method unknown)	no data	Murray & Luders (1990); Woehler et al. (1990); Creuwels et al. (2005)	Original data not located. Creuwels et al. (2005) note that the census data from Dewart Island and Charlton Island are confused with banding data.
28 & 29 Nov 1983	63 AON	68 AON	9 AON	Unpublished data: Casey station report (1983); Woehler et al. (1990); Creuwels et al. (2005)	Woehler et al. (1990) conducted the survey.
25 & 26 Jan 1984	52 (method unknown)	not visited	not visited	Woehler et al. (1990); Creuwels et al. (2005)	Original data not located.
3 & 6 Mar 1985	64 C	69 C	no data	Woehler et al. (1990); Crewels et al. (2005)	Original data not located.
14 Feb 1986	59	50	9	Woehler et al. (1990); Creuwels et al. (2005)	Census type cannot be attributed to any island. Original data not located.
23 Dec 1989	73 AON	106 AON	14 AON	Woehler et al. (1990); Creuwels et al. (2005)	Apparently occupied nests (AON) may contain a proportion of failed or non- breeding nest sites (Creuwels et al. 2005).
18 Feb 1996	11 C	not visited	not visited	Creuwels et al. (2005)	
23 Dec 1997	96 AON	104 AON	21 AON	Creuwels et al. (2005)	Apparently occupied nests (AON) may contain a proportion of failed or non- breeding nest sites (Creuwels et al. 2005).
26 Dec 1998	95 AON	103 AON	17 AON	Creuwels et al. (2005)	
14 Mar 1999	66 C	82 C	11 C	Creuwels et al. (2005)	
26 Dec 2001	93 AON	135 AON	20 AON	Creuwels et al. (2005)	
14 Dec 2005	100 ON	149 ON	25 ON	Unpublished data: E.J. Woehler	
12 &13 Dec 2011	80 ON	130 ON	27 ON	Unpublished data: John van den Hoff	Four automatic cameras installed on Nelly Island

'A' = count of adults, 'AON' = apparently occupied nests, 'BC' = banded chicks, 'C' = count of chicks, 'N' = count of nests,

'ON' = occupied nests

Appendix 2: Biota recorded at the Frazier Islands

	Nelly Island	Dewart Island	Charlton Island
Seabirds			
Adélie penguin (*Pygoscelis adeliae*)	c.>1400 (2005)		
Antarctic petrel (*Thalassoica antarctica*)	P		
Cape petrel (*Daption capense*)	P	P (2001)	P (2001)
Snow petrel (*Pagodroma nivea*)	P	P	
Southern giant petrel (*Macronectes giganteus*)	100N (2005)	149N (2005)	25N (2005)
Wilson's storm petrel (*Oceanites oceanicus*)	P		
South Polar skua (*Catharacta maccormicki*)	1N (2005)	1N (2005)	
Southern fulmar (*Fulmarus glacialoides*)	P	P	
Mammals			
Leopard seal (*Hydrurga leptonyx*)	X (2001)		
Weddell seal (*Leptonychotes weddellii*)	X (2001)		
Orca (killer whale: *Orcinus orca*)	Small pod observed close to island (2005)		
Lichens			
Buellia frigida	R		
Usnea antarctica	R		
Rhizoplaca melanophthalma	R		
Candelariella flava	R	R	
Moss			
Bryum pseudotriquetrum	R		
Algae			
Indeterminate green crust	F		
Prasiola crispa	F		
Chlorococcum sp.	F		
Chloromonas polyptera	F		
Chlorosarcina antarctica	R		
Prasiococcus calcarius	F		

Census data for breeding seabirds provided where available, 'P' indicates recorded breeding seabirds but no census data available, 2001 indicates observations in December 2001 visit, 2005 indicates observations from December 2005 visit, 'X' indicates recorded on or near the island, 'N' a count of nests, 'R' rare, and 'F' frequent. Data compiled from records held by the Australian Antarctic Data Centre, ANARE records 1968, Appendix 1, Melick et al. 1994, Seppelt, R. pers. comm., Ling, H. pers. comm., Woehler, E.J. pers. comm., and Woehler, E.J. and Olivier, F. unpublished data (December 2001), Woehler, E.J. unpublished data (December 2005).

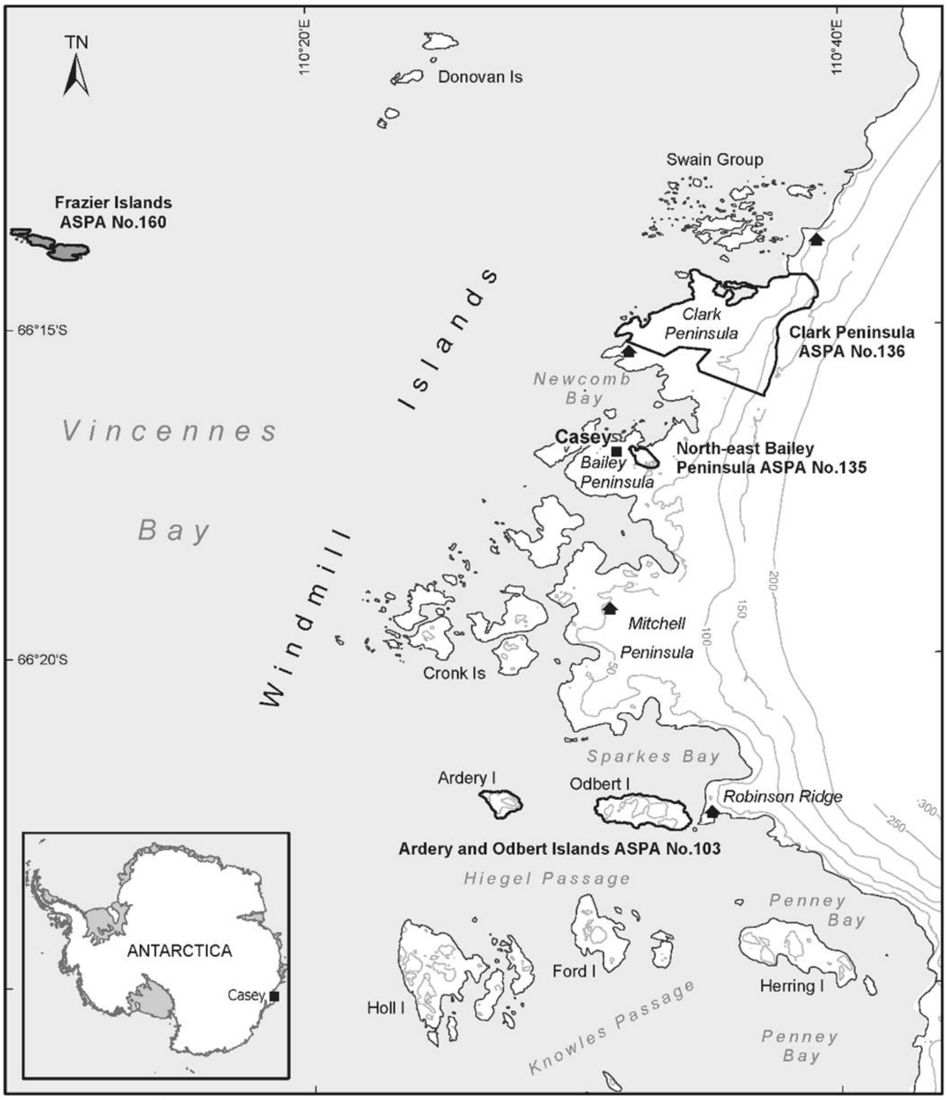
Appendix 3: Minimum wildlife approach distances

The minimum (closest) approach distances, as set out below, are to be maintained when approaching any wildlife on, or in the vicinity of the Frazier Islands unless a closer approach distance is authorised in a permit. These distances are a guide, and should an activity disturb wildlife, a greater distance is to be maintained.

Species	Approach distance (on foot)
Giant petrels	100 m
Other penguins in colonies Moulting penguins Seals with pups Seal pups on their own, Prions and petrels on nest, South polar skua on nest	30 m
Penguins on sea ice Non-breeding adult seals	5 m

Map A: Antarctic Specially Protected Areas, Windmill Islands, East Antarctica

Australian Government
Department of Climate Change, Energy, the Environment and Water
Australian Antarctic Division



Station
Refuge
Coastline
Contour (50 metre interval)
ASPA boundary
Frazier Islands ASPA No. 160

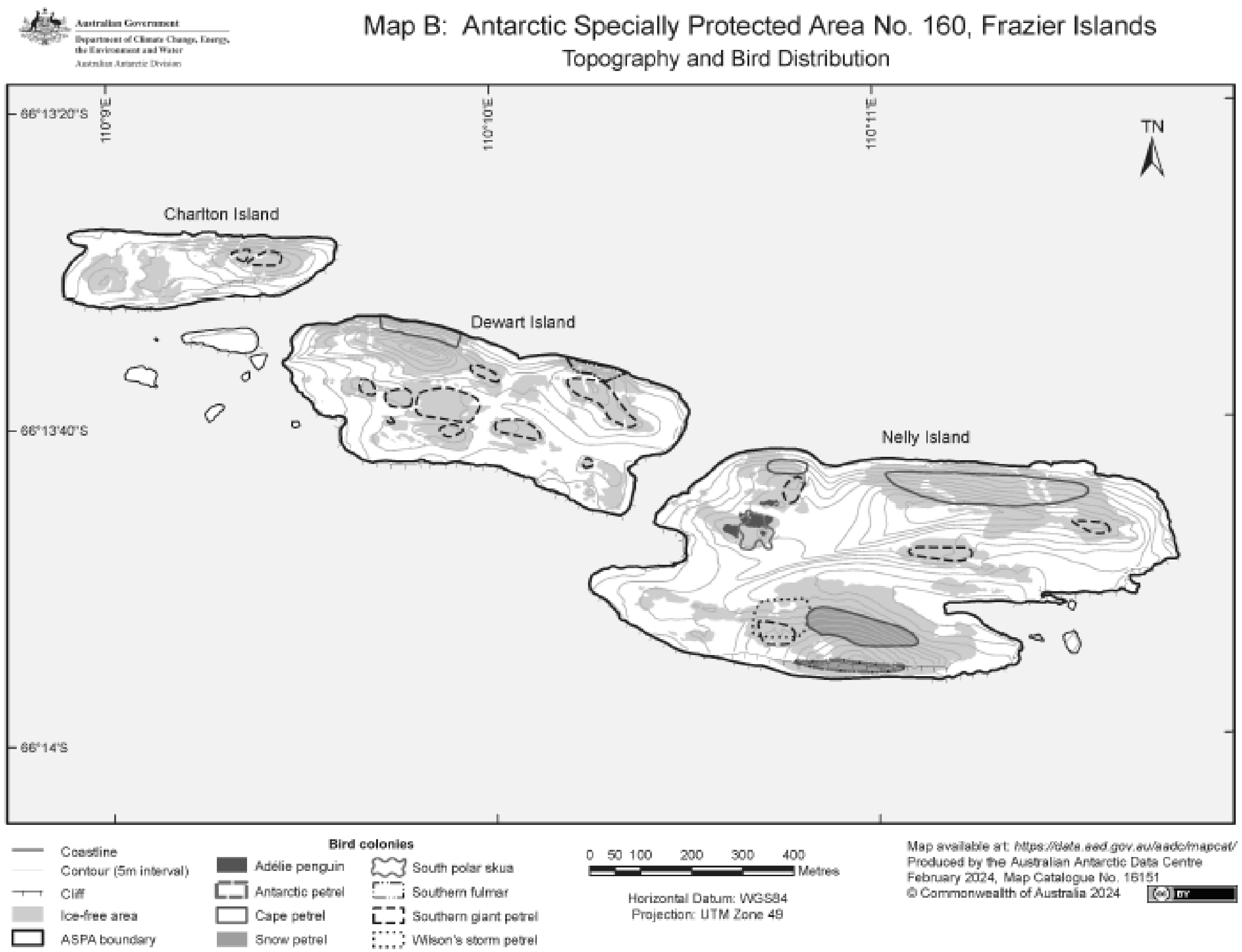
0 2 4 6 Kilometres

Horizontal Datum: WGS84
Projection: UTM Zone 49

Map available at: *https://data.aad.gov.au/aadc/mapcat/*
Produced by the Australian Antarctic Data Centre
February 2024, Map Catalogue No. 16150

Map B: Antarctic Specially Protected Area No. 160, Frazier Islands

Topography and Bird Distribution



Measure 11 (2024)

Antarctic Specially Protected Area No 161 (Terra Nova Bay, Ross Sea): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Measure 2 (2003), which designated Terra Nova Bay, Ross Sea as ASPA 161 and adopted a Management Plan for the Area;
- Measures 14 (2008), 15 (2013) and 7 (2019), which adopted revised Management Plans for ASPA 161;

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 161;

Desiring to replace the existing Management Plan for ASPA 161 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 161 (Terra Nova Bay, Ross Sea), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 161 annexed to Measure 7 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area No 161

TERRA NOVA BAY, ROSS SEA

Introduction

The ASPA of Terra Nova Bay is a coastal marine area encompassing 29.4 km² between Adélie Cove and Tethys Bay, Terra Nova Bay, immediately to the south of the Italian Mario Zucchelli Station (MZS). Terra Nova Bay was originally designated as Antarctic Specially Protected Area through Measure 2 (2003) after a proposal of Italy. CCAMLR considered and approved its designation during CCAMLR XXVI, Hobart 2007. The Management Plan has been revised in 2008, through Measure 14 (2008), in 2013 through Measure 15 (2013) and in 2019 through Measure 7 (2019).

The primary reason for the designation of Terra Nova Bay as an Antarctic Specially Protected Area (ASPA) is its particular interest for ongoing and future research. Long term studies conducted in the last 30 years by Italian and international scientists have revealed a complex array of species assemblages, characterized by unique symbiotic interactions. In this Area, several VME species are also present, above all the Antarctic scallop Adamussium colbecki and pterobranchs, and new species continue to be described.

The high ecological and scientific values derived from the diverse range of species and assemblages, together with the vulnerability of the Area to disturbance by scientific oversampling, alien introductions, and direct human impacts arising from increasing activities at the nearby permanent scientific stations are such that the Area requires long-term special protection.

ASPA 161 is listed within the Environmental Domain S and T (Morgan F. et al. 2014. Environmental Domains of Antarctica Version 2.0, Final Report) and protects adjacent Important Bird Area 177 Adélie Cove. As a marine area, it is not part of Antarctic Conservation Biogeographic Regions (Resolution 6, 2012).

1. Description of values to be protected

This coastal marine area is an important area for well-established and long-term scientific investigations that allowed, up to now, collection of an extensive amount of scientific data. During the last 5 years, substantial scientific research carried out in the ASPA led to significant advances in the knowledge of this area, as demonstrated by the great number of publications produced (see References and relevant supporting bibliography).), many of which contributed to refine the lists of species present in the area and their nomenclature, especially thanks to the use of molecular techniques (barcoding and metabarcoding). The site typically remains ice-free in summer, which is rare for coastal areas in the Ross Sea region, making it an ideal and accessible site for research into the near-shore benthic communities of the region. Extensive marine ecological research has been carried out at Terra Nova Bay since 1986/87, contributing substantially to our understanding of the marine communities in this area, and of the effect of katabatic winds on the physical, chemical and biological processes occurring in the water column (Povero et al., 2001).

High diversity at both species and community levels makes this Area of high ecological and scientific value. Studies have revealed a complex array of species assemblages, often co-existing in mosaics (Sarà et al., 1992; 2002; Gambi et al., 1997; Cantone et al., 2000; Ghiglione et al., 2013) and characterized by unique symbiotic interactions (Schiaparelli et al., 2011; 2015; Regoli et al., 2004). There exist assemblages with high species richness and complex functioning, such as the sponge and anthozoan communities, alongside loosely structured, low diversity assemblages. In this area several VME species also occur, above all the Antarctic scallop Adamussium colbecki (Schiaparelli and Linse, 2006) and pterobranchs (Schiaparelli et al., 2004), and new species continue to be described (see section 6). A population of Adélie penguins (Pygoscelis adeliae) is present nearby the Area.

The collected scientific data over the years, allowed the site to serve as reference for the determination of impacts arising from human activities (Berkman and Nigro, 1992; Focardi et al., 1993; Minganti et al., 1995; Bruni et al., 1997; Nonnis Marzano et al., 2000, Lo Giudice et al., 2013), the understanding of inter-annual variability in species dynamics (Cecchetto et al., 2021) and the assessment of predictive models of species occurrences (Peel et al., 2019; Grillo et al., 2022)

2. Aims and objectives

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research on the ecosystem, in particular on the marine species assemblages and long-term monitoring, while ensuring protection from oversampling or other possible human impacts;
- allow other scientific research and support activities provided they are for compelling reasons which cannot be served elsewhere and that will not compromise the values for which the Area is protected;
- prevent or minimise the possibility of introduction of non-native species (e.g. alien plants, animals and microbes) into the Area;
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities are to be undertaken to protect the values of the Area:

- A map showing the location of the Area (stating the special restrictions that apply) shall be displayed, and a copy of this Management Plan shall be kept available, at all the scientific stations located within 50 km of the Area. Information illustrating the location and boundaries with clear statements of entry restrictions is displayed on posters at MZS;
- Buoys, or other markers or structures established for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer necessary;
- Any abandoned equipment or material shall be removed to the maximum extent possible, provided that doing so does not adversely impact on the environment and the values of the Area;
- Visits shall be made as necessary to assess whether the Area continues to serve the purposes for which it was designated and whether management and maintenance measures are adequate;
- National Antarctic Programs are encouraged to consult together to prevent oversampling within the Area.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: Terra Nova Bay, Antarctic Specially Protected Area No 161, bathymetric map. Map specifications: Projection: UTM Zone 58S; Spheroid: WGS84. Bathymetric contour interval 50 m. Land contours and coast derived from 1:50,000 Northern Foothills Satellite Image Map (Frezzotti et. al. 2001). Bathymetry within ASPA derived from high resolution sidescan sonar data surveyed by Kvitek, 2002. Bathymetry outside of ASPA supplied by Italian Hydrographic Office 2000. Marine data collected under Terra Nova Bay marine protected area Project (PNRA 1999-2001). Inset 1: The location of Terra Nova Bay in Antarctica. Inset 2: Terra Nova Bay location map, showing the region covered by Map 1, stations, and sites of nearby protected areas.

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

- *General description, borders and coordinates*

The Area is situated in Terra Nova Bay, between the Campbell Glacier Tongue and Drygalski Ice Tongue, Victoria Land (Map 1). It is confined to a narrow strip of coastal waters to the south of MZS (Italy), extending approximately 9.4 km in length and generally within 1.5 – 7 km of the shore, comprising an area of 29.4 km². No marine resource harvesting has been, is currently, or is planned to be conducted within the Area, nor in the immediate surrounding vicinity.

The western boundary of the Area is defined as the mean high water mark along the coastline extending between 74°42'57"S in the north (2.3 km south of MZS) and 74°48'00"S in the south (the southern shore of Adélie Cove), and includes the intertidal zone (Map 1). The northern boundary of the Area is defined as the 74°42'57"S line of latitude, extending from the coast 1.55 km eastward to the 164°10'00"E line of longitude. The boundary position may be recognised near the shore by the presence of a large and distinctive offshore rock in the northernmost cove on the coast south of MZS, which is an unique feature on this stretch of coast. The southern boundary is defined as the 74°48'00"S line of latitude, extending from the coast 3.63 km eastward to the 164°10'00"E line of longitude. The boundary position may be recognized visually as being at the southern shore of the mouth of Adélie Cove, immediately south of a distinctive rocky outcrop at the base of the coastal cliffs. The eastern boundary of the Area is defined as the 164°10'00"E line of longitude extending between 74°42'57"S in the north and 74°48'00"S in the south.

- *Geology*

The coastline of Terra Nova Bay is characterised predominantly by rocky cliffs, with large boulders forming occasional ‘beaches’ (Simeoni et al., 1989). In the sheltered areas, the soft bottom begins at a depth of 20–30 m. The tidal range is 1.5–2 m and pack ice approximately 2–2.5 m thick covers the sea surface for 9–10 months of the year (Stocchino and Lusetti, 1988; 1990). Data available for the summer period suggest that ocean currents in the Area are likely to be slow and to flow generally in a north-south direction. Along the coastline of the Area there are two main coves; the larger Adélie Cove in the south and a smaller cove around 3 km to its north. The sea floor substrate of the smaller consists of pebbles of various sizes, while Adélie Cove is characterised by fine-grained, muddy sediments. The seafloor within the Area is primarily granitic rock, with softer substrates composed of coarse sands or gravels.

- *Marine benthic communities (0-500 m)*

Several new taxa have been described from Terra Nova Bay in the framework of PNRA expeditions. A list of species is reported here below, where type species of new genera are marked with an asterisk (*) and type localities falling within the ASPA boundaries are reported with two asterisks (**). Most taxa having type localities in Terra Nova Bay or Tethys Bay have also been confirmed to occur within the ASPA boundaries.

Species	**Phylum**	**Type locality**	**Reference**
Craspedostauros ineffabilis Trentin, Moschin, Lopes, Custódio & Moro 2022	Heterokontophyta	Terra Nova Bay	Trentin et al., 2022
Craspedostauros zucchellii Trentin, Moschin, Lopes, Custódio & Moro 2022	Heterokontophyta	Terra Nova Bay	Trentin et al., 2022
Tethysphytum antarcticum Sciuto, Moschin & Moro, 2021 (*)	Rhodophyta	Tethys Bay	Sciuto et al., 2021
Thalassolithon adeliense Trentin, Moschin & Moro 2023 (*)	Rhodophyta	**Adelie Cove (**)**	Trentin et al., 2023
Vellaria zucchellii Sabbatini, Pawlowski, Gooday & Bowser, 2004	Foraminifera	Tethys Bay	Sabbatini et al. (1999)
Megapogon schiaparellii Alvizu, Xavier & Rapp, 2019	Porifera	Tethys Bay	Alvizu et al., 2019
Microxina sarai Calcinai & Pansini, 2000	Porifera	**Adelie Cove (**)**	Calcinai & Pansini, 2000
Iophon terranovae Calcinai & Pansini, 2000	Porifera	**Faraglione (**)**	Calcinai & Pansini, 2000
Ectyodoryx minuta Calcinai & Pansini, 2000	Porifera	Terra Nova Bay	Calcinai & Pansini, 2000
Microxina lanceolata Calcinai & Pansini, 2000	Porifera	Terra Nova Bay	Calcinai & Pansini, 2000
Crella (Crella) aurantiaca Bertolino, Calcinai & Pansini, 2009	Porifera	**Adelie Cove (**)**	Bertolino et al., 2009
Mycale (Aegogropila) denticulata Bertolino, Calcinai & Pansini, 2009	Porifera	Terra Nova Bay	Bertolino et al., 2009
Amphicteis teresae Schiaparelli & Jirkov, 2016	Annelida	Terra Nova Bay	Schiaparelli & Jirkov, 2016
Amage giacomobovei Schiaparelli & Jirkov, 2021	Annelida	Terra Nova Bay	Schiaparelli & Jirkov, 2021
Lepidepecreella debroyeri Schiaparelli, Chiara, Kilgallen, Scinto & Lörz, 2015	Arthropoda	Terra Nova Bay	Schiaparelli et al., 2015
Alcyonidium kuklinskii Schwaha, Cometti, Saadi, Cecchetto & Schiaparelli, 2023	Bryozoa	Tethys Bay	Schwaha et al., 2023

In the supralittoral zone, only cyanobacteria and diatoms colonise the hard substrates, while the intertidal zone (1.5–2.0 m wide) has, in the most sheltered areas, a high coverage of the green alga Urospora penicilliformis and Prasiola crispa (Cormaci et al., 1992b). Below the tidal zone, down to 2–3 m depth, the community is very poor, due to the persistent presence and scouring action of pack ice and is mainly composed of epilithic diatoms and the amphipod Paramoera walkeri. Immediately deeper, rocks can be fully colonised by the red alga Iridaea cordata (Cormaci et al., 1996), frequently found with Plocamium cartilagineum, to a depth of 12 m (Gambi et al., 1994; 2000a). At this level, large sessile animals such as Alcyonium antarcticum and Urticinopsis antarctica can be occasionally observed, while frequent are the asteroid Odontaster validus and the echinoid Sterechinus neumayeri. Phyllophora antarctica is another red alga forming expanded mats from 12 to 25 m depth, often heavily colonised by sessile organisms, mainly hydroids (Cerrano et al., 2000c, Puce et al., 2002), serpulids and bryozoans (Celleporella antarctica and Harpecia spinosissima). The upper algal belts represent shelter and a food source for diversified and abundant communities of mobile fauna. Numerous invertebrates, such as the polychaete Harmothoe brevipalpa, the gastropod mollusc Laevilittorina antarctica, the crustacean amphipod Paramoera walkeri and the tanaid Nototanais dimorphus feed on these algal species and can be very abundant. On rocky bottoms in deeper layers, the thalloid macroalgal community is absent and only a calcareous crustose coralline alga previously determined as Clathromorphum lemoineanumund and later erroneously assigned to Phymatolithon foecundum by Alongi et al. (2002). Recent molecular studies have questioned the correctness of previous determination and issued new taxa, such as the new genus Tethysphytum and the species Tethysphytum antarcticum (Hapalidiales, Rhodophyta) (Sciuto et al., 2021). From the same group of algae, also the new genus Thalassolithon and the new species Thalassolithon adeliense (Trentin et al., 2023) have been described from Adélie Cove.

The soft bottoms from 20–40 m depth are coarse sands and gravels, where the community is characterised by the bivalve mollusc Laternula elliptica and the polychaete Aglaophamus ornatus (Nephtiidae). The bivalve Yoldia eightsi is abundant in fine-sand sediments especially in Adélie Cove. From this depth range several new other taxa have been recently described, such as the new genus Tethysphytum and the species Tethysphytum antarcticum of non-geniculate coralline algae (Hapalidiales, Rhodophyta) (Sciuto et al., 2021) and, the same group, the new genus Thalassolithon and the new species Thalassolithon adeliense (Trentin et al., 2023), the new,such as the Antarctic diatoms Craspedostauros ineffabilis and Craspedostauros zucchellii (Trentin et al., 2022), the new bryozoan Alcyonidium kuklinskii (Schwaha et al., 2023) and the calcareous sponge Megapogon schiaparellii (Alvizu et al., 2019).

Between 30–70 m, the substrate becomes finer and is completely colonised by the bivalve Adamussium colbecki, the shells of which are colonised by a micro-community comprising mainly forams, bryozoans (Aimulosia antarctica, Arachnopusia decipiens, Ellisina antarctica, Micropora brevissima) and the spirorbid Paralaeospira levinsenii (Albertelli et al., 1998; Ansell et al., 1998; Chiantore et al., 1998; 2000; 2001; 2002; Vacchi et al., 2000a; Cerrano et al., 2001a; 2001b). In this region, large predators such as the gastropod Neobuccinum eatoni and the nemertean Parborlasia corrugatus are frequent. The echinoid Sterechinus neumayeri and the starfish Odontaster validus are still very frequent at all depths on both hard and mobile substrates (Chiantore et al., 2002; Cerrano et al., 2000b). Several unique biotic associations have been described at these depths, e.g. between sponges and other invertebrates (Schiaparelli et al., 2000; 2003; 2007; 2010; 2011; 2015). Sponge also represent a key taxon, which has been widely investigated in terms of symbionts (Regoli et al., 2004) and associated microbes (Lo Giudice et al., 2019). In recent years also species new to science have been described, including the parasitic amphipod Lepidepecreella debroyeri (Schiaparelli et al., 2015). Other data have been produced about VME species, such as Cephalodiscus densus (Schiaparelli et al., 2004) and Adamussium colbecki (Schiaparelli and Linse, 2006). About the latter species, new analyses of data collected in 2006-2007, thanks to the presence of a mooring within the ASPA boundaries (Mooring "L" under the Italian mooring code system), showed that this species recruits during summer months in coincidence with an increase of the seawater temperature and a seasonal shift in the water currents and intensity (Schiaparelli and Aliani, 2019).

Below 70–75 m down to 120–130 m depth, heterogeneous substrates allow hard- and soft-bottom communities to coexist. On the sparse rocky outcrops the encrusting algae disappear and the benthic communities are dominated by the sessile zoobenthos. This diversified filter feeding assemblage is mainly characterised by sponges and anthozoans, while in soft sediments detritus-feeder polychaetes and bivalves dominate. Among sponges, which can reach very high biomass, Axociella nidificata, Calyx arcuarius, Gellius rudis, Phorbas glaberrima, Tedania charcoti, are very abundant (Sarà et al., 1992; 2002; Gaino et al., 1994; Cattaneo-Vietti et al., 1996; 2000c; Bavestrello et al., 2000; Cerrano et al., 2000a). Numerous invertebrates constitute an important component of this assemblage which develops down to 120-140 m depth. These include crustacean peracarids, pycnogonids, mollusc opisthobranchs (Austrodoris kerguelenensis, Tritoniella belli) (Cattaneo-Vietti, 1991; Gavagnin et al., 1995) and bivalves, ophiuroids and holothuroids, bryozoans, and a variety of endobionts. The conspicuous sponge spicule mats found at these depths underline the important role of sponges in this area, besides the one played by diatoms, in determining the sediment texture and silica content. A peculiar community, dominated by polychaetes and by the bivalve Limatula hodgsoni, can be associated with these mats.

Below 130 m the hard substrates become very sparse and are mainly colonised by the polychaete Serpula narconensis (Schiaparelli et al., 2000) and several bryozoans (Arachnopusia decipiens, Ellisina antarctica, Flustra angusta, F. vulgaris and Isoschizoporella similis). The dominant muddy bottoms are instead characterised by tubicolous polychaetes (Gambi et al., 2000b), mainly Spiophanes. Much deeper, at about 150-200 m depth, brachiopods and various species of bivalves characterise the environment on small gravels as well as on the soft bottom (Cattaneo-Vietti et al., 2000b). The great heterogeneity of these substrates contributes to the creation of communities with considerable species richness, diversity and biomass. New polychaete species have also been described in 2021 at ~ 500 m of depth, i.e. the ampharetidAmphicteis teresae (Schiaparelli and Jirkov, 2016) and Amage giacomobovei (Schiaparelli & Jirkov, 2021).

- *Bird, fish and mammals*

An Adélie penguin (Pygoscelis adeliae) colony is situated nearby the Area at Adélie Cove, with a 2013 population of 13,408 breeding pairs (Humphries et al., 2017) (Map 1). About 30 Skua (Stercorarius maccormicki) pairs breed close to the penguins.

The faunal assemblage of the Area includes notothenioid fishes, represented especially by species of the Trematomus group, including T. bernacchi, T. pennelli, T. hansoni and T. loennbergii. These exert an important role in benthic food webs as consumers of many invertebrate species, mainly crustaceans and polychaetes (Vacchi et al., 1991; 1992; 1994a; 1994b; 1995; 1997; 2000b; La Mesa et al., 1996; 1997; 2000; Guglielmo et al., 1998). The platelet ice occurring at Terra Nova Bay in early spring has been shown to house an important nursery for the Antarctic silverfish, Pleuragramma antarcticum, a key organism in the ecology of Antarctic food webs (La Mesa et al., 2004; Vacchi et al., 2004). The distribution of Pleuragramma eggs has been studied in detail only at three Terra Nova Bay sampling locations (i.e. Gerlache Inlet, Silverfish Bay and Cape Washington) (Guidetti et al., 2015) where it was showing a certain degree of patchiness in eggs and larvae distribution (significantly changing at a spatial scale of kilometres and showing a not homogeneous distribution under the solid ice). No specific studies to quantify Pleuragramma eggs have been performed within the ASPA 161 boundaries, but it is know that abundant platelet ice is also occurring here in this area where additional nurseries of this fish species could reasonably be found. The platelet ice environment has also strong prooxidant characteristics at the beginning of austral spring, and the marked responsiveness of antioxidant defences represents a fundamental strategy for P. antarcticum (Regoli et al., 2005b).

An aerial survey on cetacean species, conducted in the coastal area surrounding the Italian Station Mario Zucchelli, showed the presence of Killer Whale Orcinus orca (L.), types B and C and Minke Whale (Balaenoptera bonaerensis Burmeister). (Lauriano et al., 2007a; 2007b.). Leopard seals (Hydrurga leptonix) were sighted several times at the end of the slope that penguins climb to reach the colony in the area represented in Map 1.

- *Environmental characterization*

Studies on industrial pollutants in biomarkers allowed monitoring of the impact of human activities on the Antarctic biota in Terra Nova Bay area (Focardi et al., 1995; Regoli et al., 1998; Jimenez et al., 1999; Regoli et al., 2005a; Benedetti et al., 2005, 2007; Canapa et al., 2007; Di Bello et al., 2007, Corsolini, 2009).

In Terra Nova Bay, organisms are exposed to a naturally elevated bioavailability of cadmium causing tissue concentrations generally 10-50 folds higher than those typical of temperate species (Mauri et al., 1990; Nigro et al., 1992, 1997; Canapa et al., 2007, Caruso et al., 2018). Elevated level of cadmium at Terra Nova Bay modulates bioaccumulation and metabolism of polycyclic aromatic hydrocarbons and of organochlorine xenobiotics in local marine organisms (Regoli et al., 2005a; Benedetti et al., 2007; Canapa et al., 2007). Recent analyses (Signa et al. 2019) reported increased concentrations of Pb and Hg (Pb: Grotti et al., 2008; Ianni et al., 2010; Hg: Bargagli et al., 1998; Negri et al., 2006), and phytoplankton reached trace elements levels from 2-fold (Hg) to 4-fold (Cd) and even 10-fold (Pb) higher than those previously recorded (Bargagli et al., 1996, 1998; Dalla Riva et al., 2004). In contrast, Hg concentration measured in feathers of Adélie penguins (Pygoscelies adelie) and Skua (Catharacta maccormlcki) in 2013 (Signa et al. 2019) did not differ from those measured in 1989-1991 (Bargagli et al. 1998).

A systematic publication of faunal check-lists for the Terra Nova Bay area has been started by the Italian National Antarctic Museum (MNA, https://steu.shinyapps.io/MNA-generale/) in 2013, with the final target to provide to GBIF distributional information for all taxa occurring in the area. Data are available for: Mollusca (Ghiglione et al., 2013), Tanaidacea (Piazza et al., 2014), Ophiuroidea (Cecchetto et al., 2017), Porifera (Ghiglione et al., 2018), Asteroidea (Moreau et al., 2018; Guzzi et al., 2022), Bryozoa (Cecchetto et al., 2019), Rotifera (Garlaschè et al., 2020), planktonic Copepoda (Bonello et al., 2020), planktonic, benthic and sympagic copepods (Grillo et al., 2024), Gnathostomulida (Sterrer et al., 2022), polynoid polychaetes (Cowart et asl., 2022), fishes (La Mesa et al., 2022), echinoids and crinoids (Guzzi et al., 2023).

Long-term monitoring activities using non-destructive sampling techniques such as ROV, benthic cameras and ROV surveys have also been carried out in the Terra Nova Bay in recent years, further defining the set of organisms occurring in the area (Canese et al., 2015; Piazza et al., 2018; 2019; 2020; Castellan et al., 2021; La Mesa et al., 2022; Marini et al., 2022a; 2022b).

Ongoing studies on food web structure will enable quantification of trophic interactions between species and potential community vulnerability to biodiversity loss and changes in sea-ice dynamics (Calizza et al., 2018, Signa et al., 2019; Rossi et al., 2019).

- *Human Activities*

The Area is close to the Italian Station Mario Zucchelli (74°41’39”S,164°06’55”E) that can accommodate approximately 90 people, has facilities for helicopter operations and a jetty for the docking of small boats. Fuel used at the station is Jet-A1. The station is equipped with a waste water treatment plant. Treated water is discharged into the sea adjacent to the station 2.3 km from the northern boundary of the Area. A support ship regularly visits Mario Zucchelli Station during the summer, and there are occasional visits by tourist ships. These usually stop offshore several kilometers to the north of the Area.

Other nearby stations are Gondwana (74°38’0.7”S, 164°13’19” E; Germany), a summer station with capacity for approximately 25 personnel, Jang Bogo station (74°37’15”S ,164°11’57”E; Republic of Korea) year round station with a complement of 60 personnel during summer and 17 during winter, the new Qinling station (74°56’0.4”S, 163°42’55”E; China) at Inexpressible Island, a year-round station with a complement of up to 30 in winter and 80 summer personnel.

A gravel runway has been built at Boulder Clay site, Terra Nova Bay (74°44’45”S, 164°01’17”E, 205 m a.s.l.). The end of the runway is about 1.8 km from the penguin colony of Adélie Cove. An Environmental Impact Monitoring Plan has been developed to evaluate changes in the ecosystem during construction and operation of the runway (Draft CEE – MZS gravel runway ATCM39).

6(ii) Access to the Area

Access into the Area is generally by ship. Access into the Area may be made by air or over sea ice when conditions allow. Access routes within the Area have not been defined.

6(iii) Location of structures within and adjacent to the Area

There are no permanent structures within the Area. The nearest structure is the atmospheric monitoring facility (locally referred to as ‘Campo Icaro’) 650 m north of the northern boundary of the Area, while Mario Zucchelli Station (74°41'42"S, 164°07'23"E) is situated on a small peninsula on the coast adjacent to Tethys Bay, a further 1.65 km to the north. A gravel runway is located at Boulder Clay site, Terra Nova Bay (74°44’45”S, 164°01’17”E, 205 m a.s.l.). The end of the runway is about 1.8 km from the penguin colony of Adélie Cove. The Italian Marine Observatory in the Ross Sea (MORSea) maintains a mooring within the Area (74°45’25”S, 163°42’55”E).

6(iv) Location of other protected areas in the vicinity

ASPA No 178 Inexpressible Island and Seaview Bay is situated about 17 km to the south; ASPA No 175 the high altitude geothermal sites on Mount Melbourne, is a terrestrial site situated 45 km to the NE.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a permit issued by the appropriate national authority. Conditions for issuing a permit are that:

- it is issued for scientific purposes, or for educational purposes which cannot be served elsewhere;

- it is issued for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- the actions permitted will not jeopardise the values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the permit, or a copy, shall be carried by the holder within the Area;
- permits shall be issued for a stated period.

7(ii) Access to and movement within the Area

Access into the Area shall be by sea, land, over sea ice or by air. There are no specific restrictions on routes of access to and movement within the Area, although movements should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise disturbance. Anchoring is prohibited within the Area. There are no overflight restrictions within the Area and aircraft may land by permit when sea ice conditions allow, taking into consideration the penguin colony situated at Adélie Cove and following the Guidelines for Operations of Aircraft near Concentration of Birds in Antarctica (Resolution 2, 2004), to limit disturbance.

Overflight and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

7(iii) Activities that may be conducted within the Area

Activities that may be conducted in the Area should not jeopardise the values of the Area and include:

- Scientific research that cannot be served elsewhere.
- Sampling, which should be the minimum required to reach the scientific goals. Selective and less-invasive sampling methods should always be considered to reduce disturbance of the rich bottom communities.
- Essential management activities, including monitoring and inspection.
- Operational activities in support of scientific research or management of the Area.
- Activities for educational and outreach purposes.

7(iv) Installation, modification or removal of structures

Structures or scientific equipment shall not be installed within the Area except as specified in a permit. All markers, structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area. Removal of specific equipment for which the permit has expired is mandatory.

7(v) Location of field camps

None within the Area.

7(vi) Restrictions on materials and organisms which can be brought into the Area

- No living animals, plant material, pathogens or microorganisms shall be deliberately introduced into the Area.
- Poultry products, including food products containing uncooked dried eggs, shall not be introduced into the Area.
- No herbicides or pesticides shall be introduced into the Area.
- Chemicals, including radio-nuclides or stable isotopes, which may be introduced for the scientific or management purposes specified in the permit, shall be used in the minimum quantities necessary to achieve the purpose of the activity for which the permit was granted.
- All materials introduced in the Area shall be stored and handled so that risk of their accidental release into the environment is minimized and removed at the end of the period allowed in the permit.
- Visitors shall take special precautions against marine pollution and ensure that sampling equipment or markers brought into the Area are clean. Vessels that are found to show fuel leakage, or a significant risk of such leakage, are prohibited from entering the Area.

7(vii) Taking or harmful interference with native flora or fauna

Taking or harmful interference with native flora or fauna is prohibited, except by permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Careful environmental evaluation is needed concerning trawling, dragging, grabbing, dredging, or deployment of nets because of the sensitivity of the rich bottom communities to disturbance. More selective and less-invasive sampling methods should always be considered.

Where taking of or harmful interference with animals is involved, the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica (ATCM XXXIV-CEP XIV, 2011) should be used as a minimum standard.

7(viii) Collection or removal of materials not brought into the Area by the permit holder

Any anthropogenic material found should be notified to the appropriate national authority.

Material may be collected or removed from the Area only in accordance with a permit. In this case removal of material should not create an impact greater than leaving the material in situ.

7(ix) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- carry out monitoring and site inspection activities, which may involve the collection of limited samples for analysis or review, or for protective measures;
- install markers on specific sites of long-term monitoring.

7(xi) Requirements for reports

The holder of each permit issued should report to the appropriate national competent authority about the activity undertaken in the Area.

Such reports should include, as appropriate, the information identified in Appendix 2- ASPA visit report form of the Guide to the Preparation of Management Plans for ASPAs (Resolution 2, 2011). Parties should, wherever possible, exchange with the Party that proposed the Management Plan, information on reports received to assist managing the Area.

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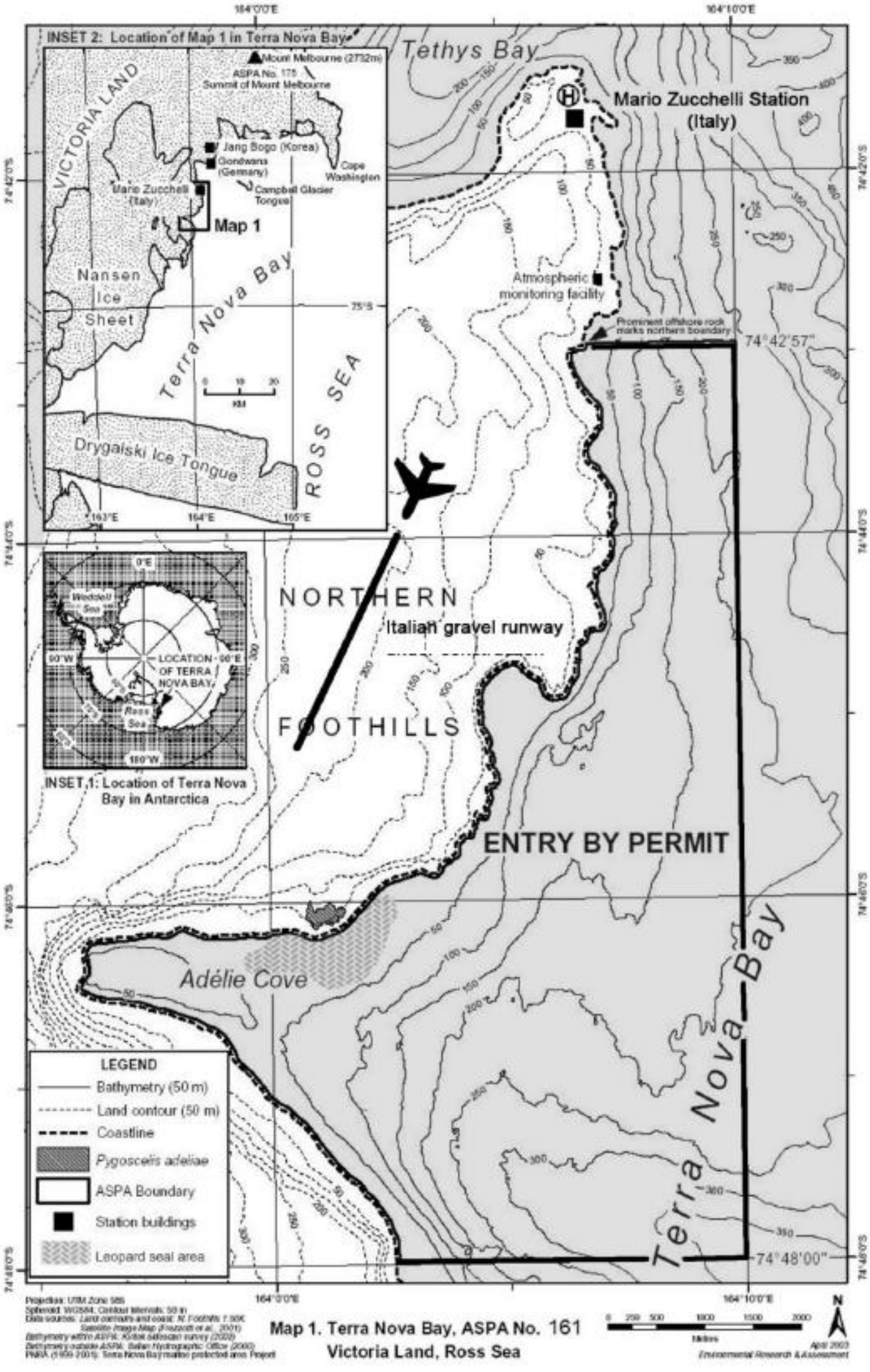

Map 1 Terra Nova Bay ASPA N° 161, Victoria Land, Ross Sea.

Measure 12 (2024)

Antarctic Specially Protected Area No 171 (Narębski Point, Barton Peninsula, King George Island): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Measure 13 (2009), which designated Narębski Point, Barton Peninsula, King George Island as ASPA 171 and adopted a Management Plan for the Area;
- Measures 11 (2014) and 8 (2019), which adopted revised Management Plans for ASPA 171;

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 171;

Desiring to replace the existing Management Plan for ASPA 171 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the revised Management Plan for Antarctic Specially Protected Area No 171 (Narębski Point, Barton Peninsula, King George Island), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 171 annexed to Measure 8 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area No 171

NARĘBSKI POINT, BARTON PENINSULA, KING GEORGE ISLAND

Introduction

Narębski Point is located on the southeast coast of Barton Peninsula, King George Island. The Area is delimited as latitude 62°13′40″- 62°14′23″S and longitude 58°45′25″- 58°47′00″W and easily distinguished by mountain peaks on the north and the east boundaries and coastline on the southwest boundary.

The unique topography of the Area gives outstanding aesthetic beauty with panoramic views, and the Area provides exceptional opportunities for scientific studies of terrestrial biological communities with high diversity and complexity of ecosystem. In particular, the coverage of mosses and lichens is very extensive.

The Area also includes water-shed systems, such as lakes and creeks, where dense microbial and algal mats with complex species assemblages are frequently found. These freshwater resources are essential to the diverse life forms in this Area. The high biodiversity of terrestrial vegetation with the complexity of habitats enhances the potential values of the Area to be protected.

Through the Korea Antarctic Research Program, scientists have visited the Area regularly since the 1980s in order to study its fauna, flora, and geology. In recent years, however, Narębski Point has been frequented by visitors from the nearby stations with purposes other than scientific research, particularly during the reproductive season, and vulnerability to human interference has been increasing. Some studies note that King George Island has the potential for tourism development (ASOC, 2007 & 2008; Peter et al., 2005) and visitors to the King Sejong Station have increased from less than 20 people a year in the late 1980s to over 110 in recent years.

The primary reason for the designation of the Area as an Antarctic Specially Protected Area is to protect its ecological, scientific, and aesthetic values from human interference. Long-term protection and monitoring of the diverse range of species and assemblages at Narębski Point will contribute to developing appropriate regional and global conservation strategies, and provide comparative information with other locations.

The ASPA was designated in 2009 (Measure 13: ASPA No 171 – Narębski Point, Barton Peninsula, King George Island) and the Management Plan was revised in 2014 (Measure 11) and 2019 (Measure H).

The Area is described as Domain A (Antarctic Peninsula northern geologic) based on the Environmental Domains Analysis for the Antarctic continent (Resolution 3, 2008), with ASPA No 111, 128, and 151. Moreover, the ASPA sits within the Antarctic Conservation Biogeographic Region (ACBR) 3 – North-west Antarctic Peninsula Regions (Resolution 3, 2017).

1. Description of Values to be Protected

The Narębski Point area is designated as an Antarctic Specially Protected Area to protect its outstanding environmental values and to facilitate ongoing and planned scientific research.

The Area provides exceptional opportunities for scientific studies of terrestrial biological communities. Scientific research, including the monitoring of penguin colonies, has been carried out by several countries since the early 1980s. The outcomes of the research revealed the potential value of the Area as a reference site, particularly in relation to climate change and the impacts of human activities.

The most conspicuous vegetal communities are the associations of lichens and the moss turf dominated by Usnea spp, Himantormia lugbris, and Chorisodontium aciphyllum. The present flora includes one Antarctic flowering plant species (only two flowering plant species were found as yet in Antarctica), 57 lichens, 29 mosses, six liverworts, and at least one algal species.

Another noticeable feature in the Area is that over 2,100 pairs of Chinstrap penguins (Pygoscelis antarcticus) and over 2,400 pairs of Gentoo penguins (Pygoscelis papua) inhabit the Area (MOE, 2023). There are also 16 other bird species. Among them, eight breeding birds include the Brown Skua (Stercorarius antarcticus lonnbergi), South Polar Skua (Stercorarius maccormicki), Kelp Gull (Larus dominicanus), Antarctic Tern (Sterna vittata), Wilson's Storm Petrel (Oceanites oceanicus), Black-bellied Storm Petrel (Fregetta tropica), Snowy Sheathbill (Chionis albus), and the Southern Giant Petrel (Macronectes giganteus).

The unique topography of the Area, together with the abundance and diversity of fauna and flora, gives the Area an exceptional aesthetic value. Among others, the mountain peaks and the southernmost peaks provide breathtaking panoramic views. For the above reasons, the Area should be protected and subject to minimal disturbance by human activities with the exception of occasional monitoring studies including vegetation, bird populations, and geological and geomorphologic studies.

The total area of the Area is 984,951 m^2.

2. Aims and Objectives

Management of Narębski Point aims to:

- Avoid degradation of or substantial risk to the values of the Area by preventing unnecessary human disturbance to the Area.
- Allow scientific research on the ecosystem, as well as the continuity of ongoing long-term biological studies established in the Area, while ensuring protection from oversampling or other possible scientific impacts.
- Allow other scientific research, scientific support activities, and visits for educational and outreach purposes (such as documentary reporting (visual, audio, or written) of educational resources or services) provided that such activities are for compelling reasons that cannot be served elsewhere and that will not jeopardize the natural ecological system in that Area.
- Allow visits for management purposes in support of the aims of the Management Plan.
- Prevent, to the maximum extent practicable, the introduction of non-native species and pathogens that may endanger or alter the ecosystem of the Area.
- Protect the Area's aesthetic and scientific values.

3. Management Activities

The following management activities are to be undertaken to protect the values of the Area:

- Personnel accessing the site shall be specifically instructed, by their national program (or competent authority) as to the content of the Management Plan;

- A signboard illustrating the location and boundaries, with clear statements of entry restrictions, shall be placed at appropriate locations at the boundaries of the Area (see Map 2).
- Copies of this Management Plan shall be made available to all vessels and aircraft visiting the Area and/or operating in the vicinity of the adjacent stations, and all pilots and ship captains operating in the region shall be informed of the location, boundaries, and restrictions applying to entry and overflight within the Area.
- All signs as well as scientific equipment and markers erected in the Area will be secured and maintained in proper conditions.
- The biological condition of the Area will be adequately monitored, including a census of penguins and other bird populations.
- Any abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact the environment and the values of the Area.
- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure that maintenance and management measures are adequate.
- National Antarctic Programs operating in the region are encouraged to consult with each other and exchange information to ensure that activities in the Area are undertaken in a manner consistent with the aims and objectives of this Management Plan.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Maps 1 to 6 are attached at the end of this Management Plan as Annex II.

Map 1: Location of Narębski Point in relation to King George Island
and the existing protected areas (ASMA, ASPAs, and HSMs).

Map 2: Boundary of the ASPA No 171.

Map 3: Distribution of bird colonies and seal haul-out sites within the ASPA No 171.

Map 4: Distribution of the plant communities in the ASPA No 171.

Map 5: Geomorphologic details of the ASPA No 171.

Map 6: Access routes to the ASPA No 171.

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers, and natural features

Narębski Point is located on the southeast coast of Barton Peninsula, King George Island, and the Area is delimited as latitude 62°13′40″- 62°14′23″S and longitude 58°45′25″- 58°47′00″W. Boundaries are delimited by mountain peaks on the north and the east and coastline on the southwest. The southwest boundary can be easily recognized due to its distinguished geomorphology. The Area includes only the terrestrial area, excluding the intertidal zone.

The Area is rich in flora and fauna, of which the abundance of some species is exceptional. The cover of mosses and lichens is very extensive. There are large numbers of Chinstrap and Gentoo penguins and the breeding areas of eight other birds including the nests of the Southern Giant Petrel. The high diversity in relief and coastal forms, due to the presence of different geologies and a prominent system of fractures, in addition to an extensive and varied vegetation cover, provides unusual scenic diversity in the Antarctic environment.

- *Climate*

Meteorological data for the Area are confined entirely to observations for the last 20 years at the King Sejong Station (2003-2022), about 2 km northwest of Narębski Point. The climate is humid and relatively mild because of a strong maritime effect. The Area has an annual average temperature of -1.69°C (maximum 13.9°C, minimum -24.2°C), relative humidity of 86.6%, average total precipitation of 522.4 mm, and cloud cover of 6.8 Octas. The mean wind velocity is 7.9 m/s (51.9 m/s at the greatest), predominantly from the northwest and east throughout the year. The occurrence of blizzards from 2003 to 2022 was 23.1/year on average.

- *Geology*

The lowermost lithostratigraphic unit in Barton Peninsula is the Sejong formation (Yoo et al., 2001), formally regarded as a lower volcanic member. The Sejong Formation is distributed in the southern and southeastern cliffs of Barton Peninsula (Lee et al., 2002). It is largely composed of volcaniclastic constituents gently dipping to the south and southwest. Mafic to intermediated volcanic lavas overlying the Sejong Formation are widespread in Barton Peninsula, including the Area. They are mostly plagioclase-phyric or plagioclase- and clinopyroxene-phyric basaltic andesite to andesite with rare massive andesite. Some thick-bedded lapilli tuffs are intercalated with the lava flows. Mafic dikes, Narębski Point being one of them, cut the Sejong formation along the southern coast of the peninsula. Soils of the peninsula are subdivided into four suites based on bedrock type, namely those on granodiorite, basaltic andesite, lapilli tuff, and the Sejong formation (Lee et al., 2004). Soils are generally poor in organic materials and nutrients, except for those near seabird colonies.

- *Penguins*

Breeding colonies of the Chinstrap penguin (Pygoscelis antarcticus) and Gentoo penguin (Pygoscelis papua) are distributed on rocky inclines and hill crests in the Area.

The Chinstrap penguin was the most abundant breeding species in the Area, but the number of breeding Chinstrap penguins seems to have declined since its maximum counted number of 3,332 nests in the 2012/13 season (MOE, 2013). A total of 2,271 nests were counted for the Chinstrap penguin in the 2023/24 season (Figure 1). Chinstrap penguins start laying eggs in early November and incubate for 32-43 days. The peak seasons for egg laying and hatching are estimated to be mid-November and mid-December, respectively (Kim, 2002).

The Gentoo penguin has become the most abundant breeding species in the Area since the 2019/20 season, surpassing the number of active nests of the Chinstrap penguin. The number of breeding nests for Gentoo penguins has steadily increased from 500 nests since the 1984/85 season, reaching a total of 2,669 nests in 2023/24 (Figure 1). Gentoo penguins begin laying eggs in mid-October, with the peak season occurring in late October. They incubate for 33-40 days and hatch in early December (Kim, 2002).

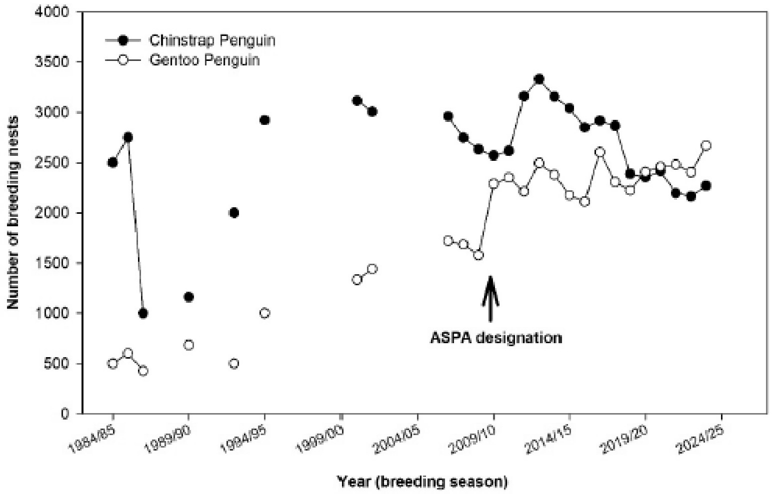

Figure 1. Changes in the breeding populations of Chinstrap penguin and Gentoo penguin at Narębski Point in the Area (Peter *et al.*, 1986; Rauschert *et al.*, 1987; Mönke & Bick, 1988; Yoon, 1990; MOST, 1993; MAF, 1997; Kim, 2002; MOE, 2007; MOE, 2011-2023)

- *Other birds*

Along with two penguin species, there are eight other nesting bird species in the Area: Brown Skua (Stercorarius antarcticus lonnbergi), South Polar Skua (Stercorarius maccormicki), Kelp Gull (Larus dominicanus), Antarctic Tern (Sterna vittata), Southern Giant Petrel (Macronectes giganteus), Wilson’s Storm Petrel (Oceanites oceanicus), Black-bellied Storm Petrel (Fregetta tropica), and Snowy Sheathbill (Chionis albus). A summary of the estimated number of nests by species is presented in Table 1. In addition, eight non-breeding bird species have been recorded in the Area, including the Adélie penguin (Pygoscelis adelie), Macaroni penguin (Eudyptes chrysolophus), Antarctic Shag (Leucocarbo bransfieldensis), Arctic Tern (Sterna paradisaea), Cape Petrel (Daption capense), Antarctic Petrel (Thalassoica antarctica), Snow Petrel (Pagodroma nivea), and Southern Fulmar (Fulmarus glacialoides).

Brown Skua and South Polar Skua prey on penguin eggs and chicks, and some pairs of skuas occupy penguin sub-colonies as feeding territory during the breeding season (Trivelpiece et al., 1980; Hagelin and Miller, 1997; Pezzo et al., 2001; Hahn and Peter, 2003). South Polar Skuas nesting in the Area do not rely on penguin eggs and chicks for their own chicks. On the contrary, Brown Skua pairs breeding near the penguin sub-colonies were observed to occupy their own feeding territory for feeding penguin eggs and chicks (Kim et al., 2022).

The number of breeding pairs of Snowy Sheathbills near the penguin rookery in the Area increased to six in the 2023/24 season. Snowy Sheathbills are omnivores that scavenge for food around the breeding colonies of seabirds. They feed on penguin feces, eggs, and dead chicks, and also steal krill from penguins at the site.

Intensive monitoring of the migration of Wilson's Storm Petrels was conducted using light-based geolocators between 2021/22 and 2023/24, revealing strong geographic connectivity between ASPA 171 and the Gulf of Maine in the Northern Atlantic.

Table 1. Estimated number of nests by species (2006/07, 2013/14, 2018/2019, and 2023/24)

Species		Number of nests			
		2006/07	2013/14	2018/19	2023/24
Chinstrap Penguin	*Pygoscelis antarcticus*	2,961	3,157	2,388	2,271
Gentoo Penguin	*Pygoscelis papua*	1,719	2,378	2,224	2,669
Brown Skua	*Stercorarius antarcticus lonnbergi*	4	7	5	7
South Polar Skua	*Stercorarius maccormicki*	27	-	7	10
Kelp Gull	*Larus dominicanus*	6	-	-	2
Antarctic Tern	*Sterna vittata*	41	-	4	2
Southern Giant Petrel	*Macronectes giganteus*	9	5	15	35
Wilson's Storm Petrel	*Oceanites oceanicus*	19	>10	>7	>132
Black-bellied Storm Petrel	*Fregetta tropica*	-	-	>1	>10
Snowy Sheathbill	*Chionis albus*	2	1	5	6

- *Vegetation*

Most of the ice-free areas of Barton Peninsula are covered by relatively rich vegetation, dominated by cryptogamic species. The cover of mosses and lichens is very extensive within the Area. The most conspicuous vegetal communities are the associations of dominant lichens Usnea-Himantormia and the moss turf dominated by Sanionia-Chorisodontium. The algal community is dominated by the green freshwater alga Prasiola crispa, which is established around penguin colonies. The present flora includes one Antarctic flowering plant species, 57 lichens, 29 mosses, six liverworts, and one algal species. In the case of algae, only the species forming macroscopically detectable stands was recorded. No information on cyanobacteria and mycobiota occurring in this Area is available, as studies have not been undertaken. The detailed vegetation list is shown in Annex I.

- *Human activities / impacts*

Two permanent scientific stations are located at nearby Narębski Point. The King Sejong Station (62°13'S, 58°47'W; Republic of Korea), established in 1988, and the Carlini Station (62°14'S, 58°40'W; Argentina), established in 1953, operate year-round activities.

6(ii) Access to the area

Access to the Area is possible on foot along the coast or by small boat without anchoring. The access routes and the landing site are shown in Map 6. Vehicle traffic of any type is not permitted inside the Area. Access restrictions apply within the Area, the specific conditions for which are set out in Section 7(ii) below.

6(iii) Location of structures within and adjacent to the Area

One refuge facility is located at the southeastern coast of the Area. The King Sejong Station (Republic of Korea, 62°13'S, 58°47'W; Map 2), which is located 2 km to the northwest of Narębski Point, is the closest major facility and the Carlini Station (Argentina) is located 5 km to the southeast of Narębski Point.

6(iv) Location of other protected areas in the vicinity

- ASMA No 1, Admiralty Bay, King George Island, South Shetland Islands lies about 8 km northeast.
- ASPA No 125, Fildes Peninsula, King George Island, South Shetland Islands lies about 11 km west.
- ASPA No 128, Western Shore of Admiralty Bay, King George Island, South Shetland Islands lies about 17 km east.
- ASPA No 132, Potter Peninsula, King George Island, South Shetland Islands lies about 5 km east.
- ASPA No 133, Harmony Point, Nelson Island, South Shetland Islands lies about 25 km southwest.
- ASPA No 150, Ardley Island, King George Island, South Shetland Islands lies about 9 km to the west.
- ASPA No 151, Lions Rump, King George Island, South Shetland Islands lies about 35 km northeast.
- HSM No 36, Replica of a metal plaque erected by Eduard Dallmann at Potter Cove, King George Island, lies about 5 km east.
- HSM No 50, Plaque to commemorate the research vessel Professor Siedlecki which landed in February 1976, Fildes Peninsula, King George Island lies about 10 km west.
- HSM No 51, Grave of W. Puchalski, an artist and a producer of documentary films, who died on 19 January 1979, lies about 18 km northeast.
- HSM No 52, Monolith erected to commemorate the establishment on 20 February 1985 of Great Wall Station (China), Fildes Peninsula, King George Island lies about 10 km west.

- HSM No 82, Plaque at the foot of the monument commemorating the Signatories to the Antarctic Treaty and successive IPYs, lies about 12 km west.
- HSM No 86, No 1 Building at Great Wall Station, lies about 10 km west.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a permit issued by appropriate national authorities as designated under Article 7 of Annex V of the Protocol on Environmental Protection to the Antarctic Treaty.

Conditions for issuing a permit to enter the Area are that:

- It is issued only for scientific study of the ecosystem, or for compelling scientific or educational (such as documentary reporting or the production of educational resources or services) reasons that cannot be served elsewhere, or for reasons essential to the management of the Area.
- The actions permitted will not jeopardize the natural ecological system of the Area.
- The actions permitted are in accordance with this Management Plan.
- Any management activities are in support of the objectives of the Management Plan.
- The permit, or an authorized copy, must be carried within the Area.
- Permits shall be valid for a stated period and identify the competent authority.

7(ii) Access to, and movements within or over, the Area

- Access to the Area is possible on foot along the coast or by small boat without anchoring. The access routes and the landing site are shown in Map 6.
- Pedestrian movements should be kept with caution so as to minimize disturbance to flora and fauna, and should walk on snow or rocky terrain if practical, but taking care not to damage lichens.
- Vehicle traffic of any type is not permitted inside the Area.
- The operation of aircraft over the Area will be carried out, as a minimum requirement, in compliance with Resolution 2 (2004), “Guidelines for the Operation of Aircraft near Concentrations of Birds”. As a general rule, no aircraft should fly over the ASPA at less than 610 meters (2000 ft), except in cases of emergency or aircraft security. Overflights, however, should be avoided.
- Overflight of bird colonies within the Area by Remotely Piloted Aircraft Systems (RPAS) shall not be permitted unless for scientific or operational

purposes in compliance with Resolution 4 (2018), and in accordance with a permit issued by an appropriate national authority.

7(iii) Activities which may be conducted within the Area

Activities which may be conducted within the Area shall not jeopardize the ecological, scientific, and aesthetic values of the Area. Activities which may be conducted within the Area include:

- Compelling scientific research which cannot be undertaken elsewhere.
- Essential management activities, including monitoring.
- Constraints may be placed on the use of motor-driven tools and any activity likely to generate noise and thereby cause disturbances to nesting birds during the breeding period (from October 1 to March 31).
- Activities for educational or outreach purposes (such as documentary reporting (e.g. visual, audio, or written) or the production of educational resources or services) that cannot be served elsewhere.
- Sampling, which should be the minimum required for approved research programmes.

7(iv) Installation, modification, or removal of structures

- No structures will be built and no equipment installed within the Area, with the exception of scientific or management activities, as specified in the permit.
- Any scientific equipment installed in the Area should be approved by a permit and clearly identify the permitting country, name of the principal investigator, and the year of installation and date of expected removal. All the equipment should pose a minimum risk of pollution to the Area or a minimum risk of causing disturbances to the flora or fauna.
- Signs of investigation should not remain after the permit expires. If a specific project cannot be finished within the allowed time period, an extension should be sought that authorizes the continued presence of any object in the Area.

7(v) Location of field camps

- The use of the refuge facility located on the shore near the eastern boundary of the Area is strongly encouraged in emergency (see Map 2).
- For scientific purposes, temporary camping is permitted within the Area in accordance with a permit. There are no specific restrictions on the precise locality for temporary campsites within the Area, although it is recommended that the initial sites selected should be away from breeding bird nests.

7(vi) Restriction on material and organisms which may b dc e brought into the Area

In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, restrictions on materials and organisms that may be brought into the Area are:

- No living animals or plant material shall be deliberately introduced into the Area.
- No uncooked poultry products or fresh fruit and vegetables are to be taken into the Area.
- To minimize the risk of microbial or vegetation introductions from soils at other Antarctic sites, including the station, or from regions outside Antarctica, footwear and any equipment (particularly sampling equipment and markers) to be used in the Area shall be thoroughly cleaned before entering the Area.
- No herbicides or pesticides shall be introduced into the Area. Any other chemical product, that shall be introduced with the corresponding permit, shall be removed from the Area upon conclusion of the activity for which the permit was granted. The use and type of chemical products should be documented, as clearly as possible, for the knowledge of other researchers.
- Fuel, food, and other material are not to be stored in the Area, unless required for essential purposes connected with the activity for which the permit has been granted, provided it is securely stored so that wildlife cannot have access to it.
- To ensure that the ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates, or plants from other Antarctic sites, including stations, or from regions outside Antarctica. In the event of a warning regarding HPAI (Highly Pathogenic Avian Influenza), consulting the guidance provided by COMNAP on HPAI is recommended.
- Further guidance can be found in the CEP Non-native species manual (Resolution 4, 2016; CEP, 2019) and SCAR's Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica (Resolution 5, 2018).

7(vii) Taking of, or harmful interference with, native flora and fauna

- Any taking or harmful interference, except in accordance with a permit, is prohibited and should be consistent with the SCAR Code of Conduct for the use of Animals for Scientific Purposes in Antarctica (Resolution 4, 2019) as a minimum requirement.
- Information on taking or harmful interference will be exchanged through the System of Information Exchange of the Antarctic Treaty.

7(viii) The collection or removal of materials not brought into the Area by the permit holder

- Collection or removal of materials from the Area may be only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs.
- Anything of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorized, may be removed unless the impact of removal is likely to be greater than leaving the material in situ: if this is the case, the appropriate authority should be notified.

7(ix) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- carry out biological monitoring and Area inspection activities, which may involve the collection of a small number of samples for scientific analysis or review;
- install or maintain signboards, markers, structures or scientific equipment;
- carry out protective measures;
- any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.

7(xi) Requirements for reports

- The principal permit holder for each issued permit shall submit a report of activities undertaken in the Area.
- Such reports should include, as appropriate, the information identified in the visit report form contained in the Revised Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2, 2011).
- This report shall be submitted to the authority named in the permit as soon as practicable, but not later than 6 months after the visit has taken place.
- Records of such reports should be stored indefinitely and made accessible to any interested Party, SCAR, CCAMLR, and COMNAP if requested, so as to provide necessary information of human activities in the Area to ensure adequate management of the Area.
- The appropriate authority should be notified of any activities / measures undertaken, and / or of any materials released and not removed, that were not included in the authorized permit.

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ANNEX I. List of flora in the Site

Taxa

Lichens

Acrospora austroshetlandica (C.W. Dodge) Øvstedal
Bryoria forsteri Olech & Bystrek
Buellia russa (Hue)Darb.
Caloplaca lucens (Nyl.) Zahlbr.
Caloplaca sublobulata (Nyl.) Zahlbr.
Cetraria aculeata (Schreb.) Fr.
Cladonia borealis S. Stenroos
Cladonia chlorophaea (Flörke ex Sommerf.) Spreng.
Cladonia gracilis (L.) Willd.
Cladonia novochlorophaea (Sipman) Brodo & Ahti
Cladonia pleurota (Flörke) Schaer.
Cladonia pyxidata (L.) Hoffm.
Cladonia scabriuscula (Delise) Nyl.
Haematomma erythromma (Nyl.) Zahlbr
Himantormia lugubris (Hue.) I. M. Lamb
Huea coralligera (Hue) C. W. Dodge & G. E. Baker
Lecania brialmontii (Vain.) Zahlbr.
Lecania gerlachei (Vain.) Darb.
Lecanora aspidophora Vain.
Lecanora epibryon (Ach.) Ach
Lecanora melanophthalma (Ram.) Leuckert & Poelt
Lecanora polytropa (Hoffm.) Rabenh.
Lecidea cancriformis C.W. Dodge and G.E. Baker
Lecidella carpathica Körb.
Lepra excudens (Nyl.) Hafellner
Lepraria borealis Loht. & Tønsberg
Massalongia carnosa (Dicks.) Körb.
Megaspora verrucosa (Ach.) Hafellner & V. Wirth
Ochlorechia frigida (Sw.) Lynge
Parmelia saxitilis (L.) Ach
Physcia caesia (Hoffm.) Fürnr.
Physcia dubia (Hoffm.) Lettau
Physconia muscigena (Ach.) Poelt
Placodium regale Vain
Placopsis contourtuplicata I. M. Lamb
Polycauliona candelaria (L.) Frödén, Arup & Søchting
Porpidia austrosheltandica Hertel
Protopannaria austro-orcadensis (Øvstedal) P.M. Jørg
Pseudophebe pubescens (L.) M. Choisy
Psoroma cinnamomeum Malme
Psoroma hypnorum (Vahl) Gray
Psoroma tenue Henssen
Ramalina terebrata Hook f, & Taylor
Rhizocarpon geographicum (L.) DC.
Rinodina olivaceobrunnea C.W. Dodge & G. B. Baker
Sphaerophorus globosus (Huds.) Vain.
Stereocaulon alpinum Laurer
Tephromela atra (Huds.) Hafellmer ex Kalb
Tetramelas anisomerus (Vain.) Elix
Tetramelas darbishirei (I.M. Lamb) Elix

Tremolecia atrata (Ach.) Hertel
Turgidosculum complicatulum (Nyl.) J. Kohlm. & E. Kohlm
Umbilicaria antarctica Frey & I. M. Lamb
Umbilicaria decussata (Vill.) Zahlbr.
Usnea antarctica Du Rietz
Usnea aurantiaco-atra (Jacq.) Bory
Xanthoria elegans (Link) Th. Fr.

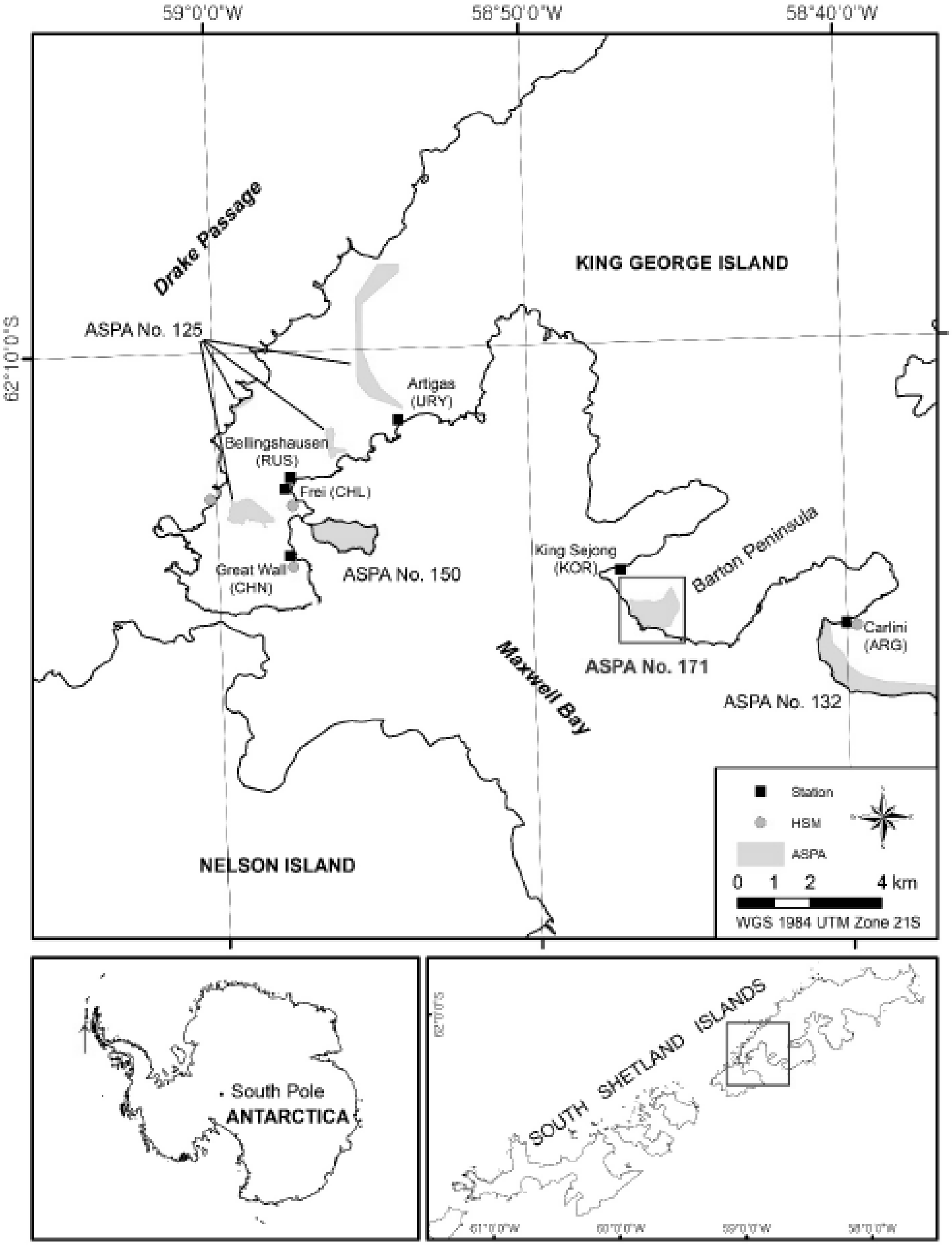
Mosses
Andreaea depressinervis Cardot
Andreaea gainii Cardot
Andreaea regularis Müll. Hal.
Bartramia patens Brid.
Bryum argenteum Hedw.
Bryum orbiculatifolium Cardot & Broth.
Bryum pseudotriquetrum (Hedw.) C.F. Gaertn. et al.
Ceratodon purpureus (Hedw.) Brid.
Chorisodontium aciphyllum (Hook. f. & Wils.)
Dicranoweisia brevipes (Müll. Hal.) Cardot
Dicranoweisia crispula (Hedw.) Lindb. ex Milde
Ditrichum hyalinum (Mitt.) Kuntze
Ditrichum lewis-smithii Ochyra
Encalypta rhaptocarpa Schwägr.
Hennediella antarctica (Ångstr.) Ochyra & Matteri
Notoligotrichum trichodon (Hook. f. Wils.) G. L. Sm.
Pohlia drummondii (Müll. Hal.) A. K. Andrews
Pohlia nutans (Hedw.) Lindb.
Pohlia wahlenbergii (Web. & Mohr) A. L. Andrews
Polytrichastrum alpinum (Hedw.) G. L. Sm.
Polytrichum strictum Brid.
Racomitrium sudeticum (Funck) Bruch & Schimp.
Sanionia georgico-uncinata (Müll. Hal.) Ochyra & Hedenäs
Sanionia uncinata (Hedw.) Loeske
Schistidium antarctici (Card.) L. I. Savicz & Smirnova
Syntrichia filaris (Müll. Hal.) Zand.
Syntrichia princeps (De Not.) Mitt.
Syntrichia saxicola (Card.) Zand.
Warnstorfia sarmentosa (Wahlenb.) Hedenäs

Liverworts
Barbilophozia hatcheri (A. Evans) Loeske
Cephalozia badia (Gottsche) Steph.
Cephaloziella varians (Gottsche) Steph.
Herzogobryum teres (Carrington & Pearson) Grolle
Lophozia excisa (Dicks.) Dumort.
Pachyglossa disstifidolia Herzog & Grolle

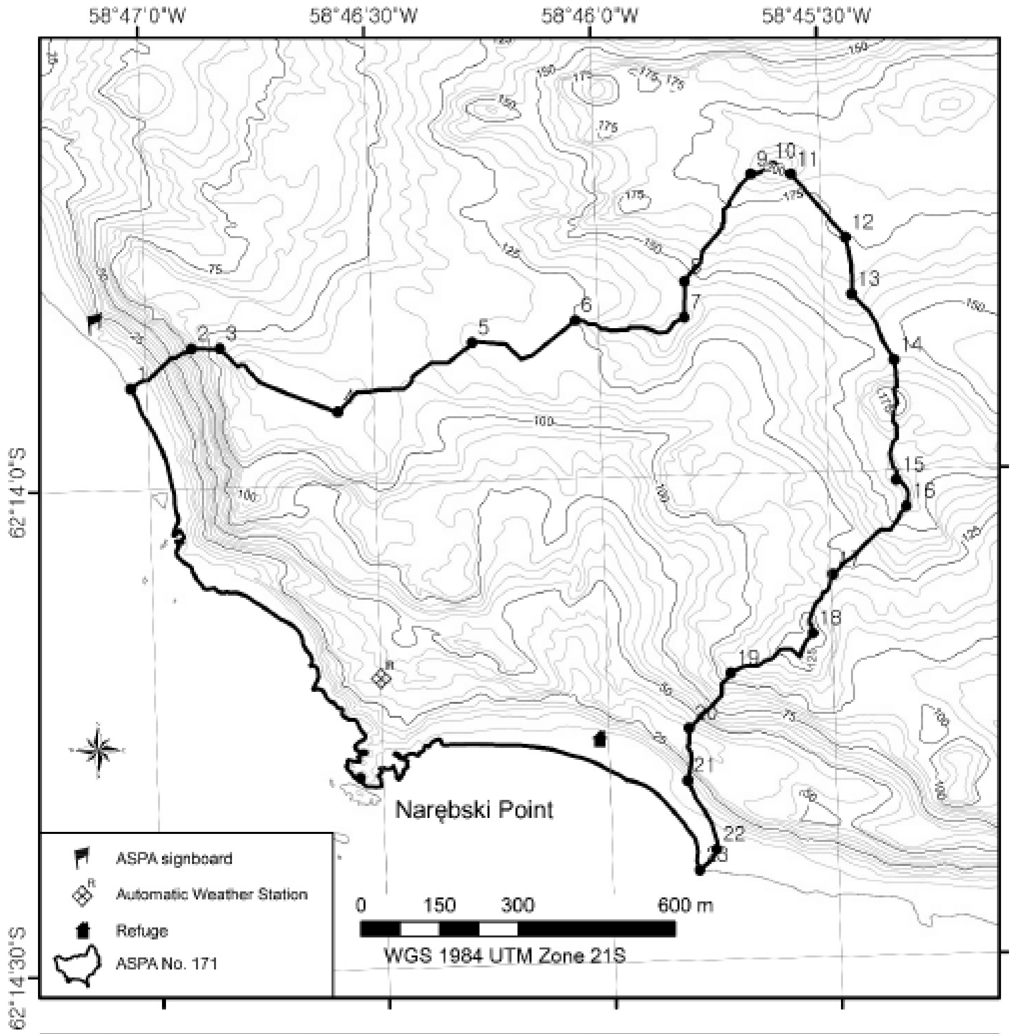
Algae
Prasiola crispa (Ligtf.) Menegh.

Flowering plant
Deschampsia antarctica Desv.

ANNEX II. Maps

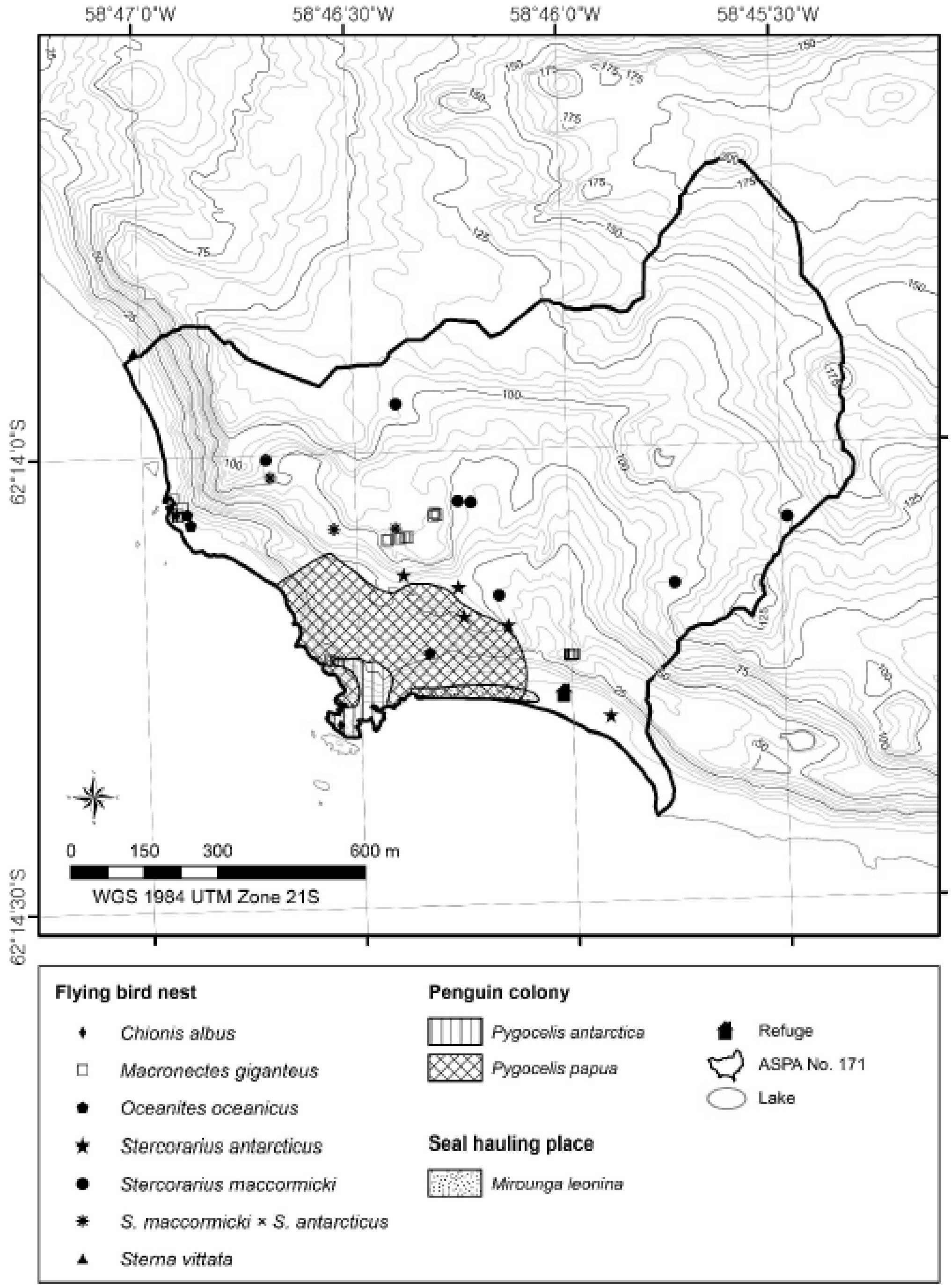


Map 1. Location of Narębski Point (ASPA No. 171) in relation to King George Island and the existing protected areas (ASMA, ASPAs, and HSMs)

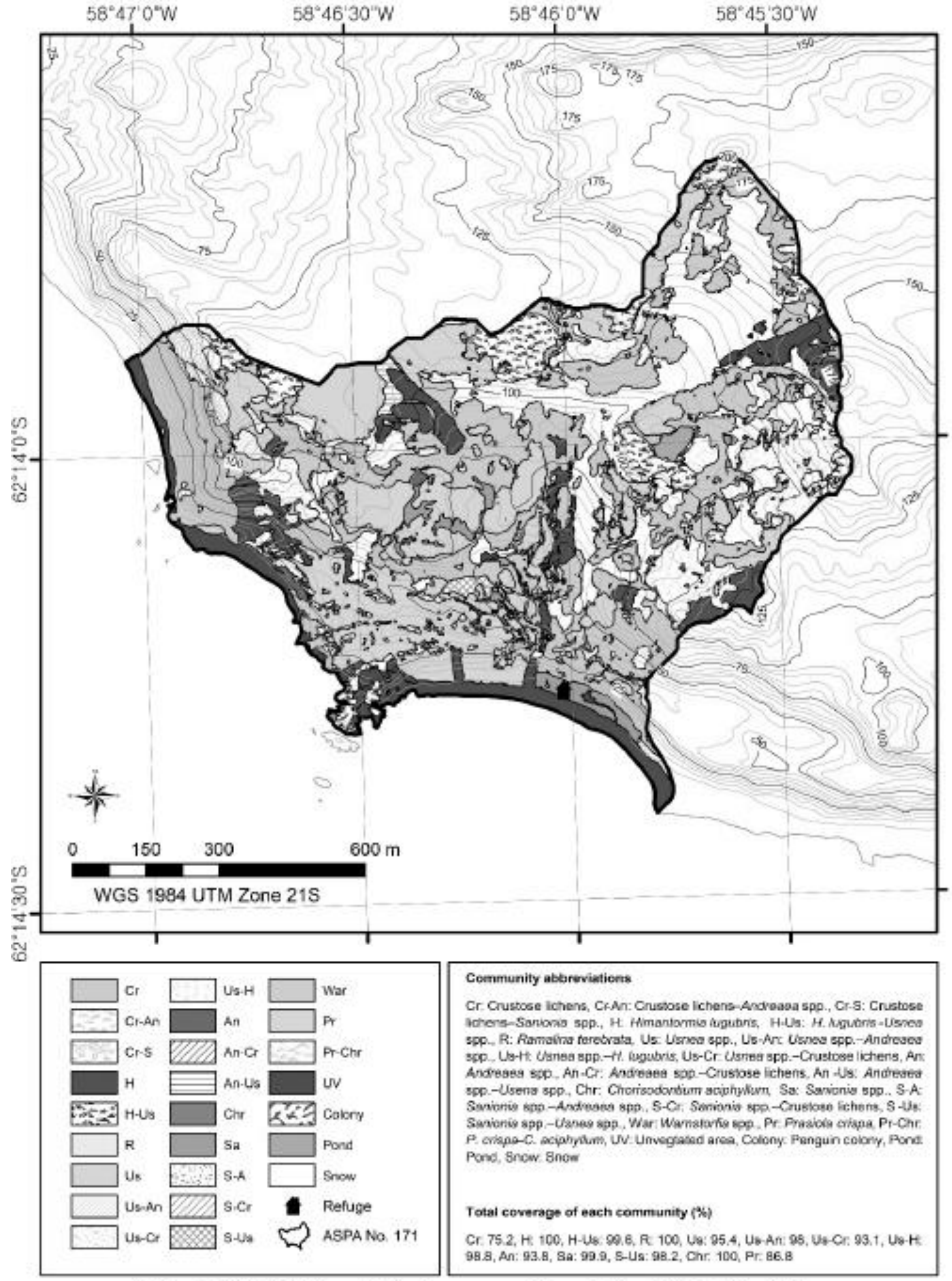


	Latitude	Longitude		Latitude	Longitude
1	62° 13' 53.757" S	58° 47' 02.093" W	13	62° 13' 49.089" S	58° 45' 26.162" W
2	62° 13' 51.395" S	58° 46' 53.906" W	14	62° 13' 53.212" S	58° 45' 20.781" W
3	62° 13' 51.419" S	58° 46' 50.136" W	15	62° 14' 00.629" S	58° 45' 20.934" W
4	62° 13' 55.537" S	58° 46' 34.700" W	16	62° 14' 02.277" S	58° 45' 19.645" W
5	62° 13' 51.459" S	58° 46' 16.650" W	17	62° 14' 06.378" S	58° 45' 29.655" W
6	62° 13' 50.273" S	58° 46' 02.924" W	18	62° 14' 09.993" S	58° 45' 32.489" W
7	62° 13' 50.256" S	58° 45' 48.464" W	19	62° 14' 12.312" S	58° 45' 43.585" W
8	62° 13' 48.041" S	58° 45' 48.312" W	20	62° 14' 15.627" S	58° 45' 49.304" W
9	62° 13' 41.529" S	58° 45' 39.156" W	21	62° 14' 18.883" S	58° 45' 49.666" W
10	62° 13' 41.050" S	58° 45' 36.106" W	22	62° 14' 23.167" S	58° 45' 46.055" W
11	62° 13' 41.592" S	58° 45' 33.772" W	23	62° 14' 24.421" S	58° 45' 48.379" W
12	62° 13' 45.599" S	58° 45' 26.777" W	NP	62° 14' 18.170" S	58° 46' 32.990" W

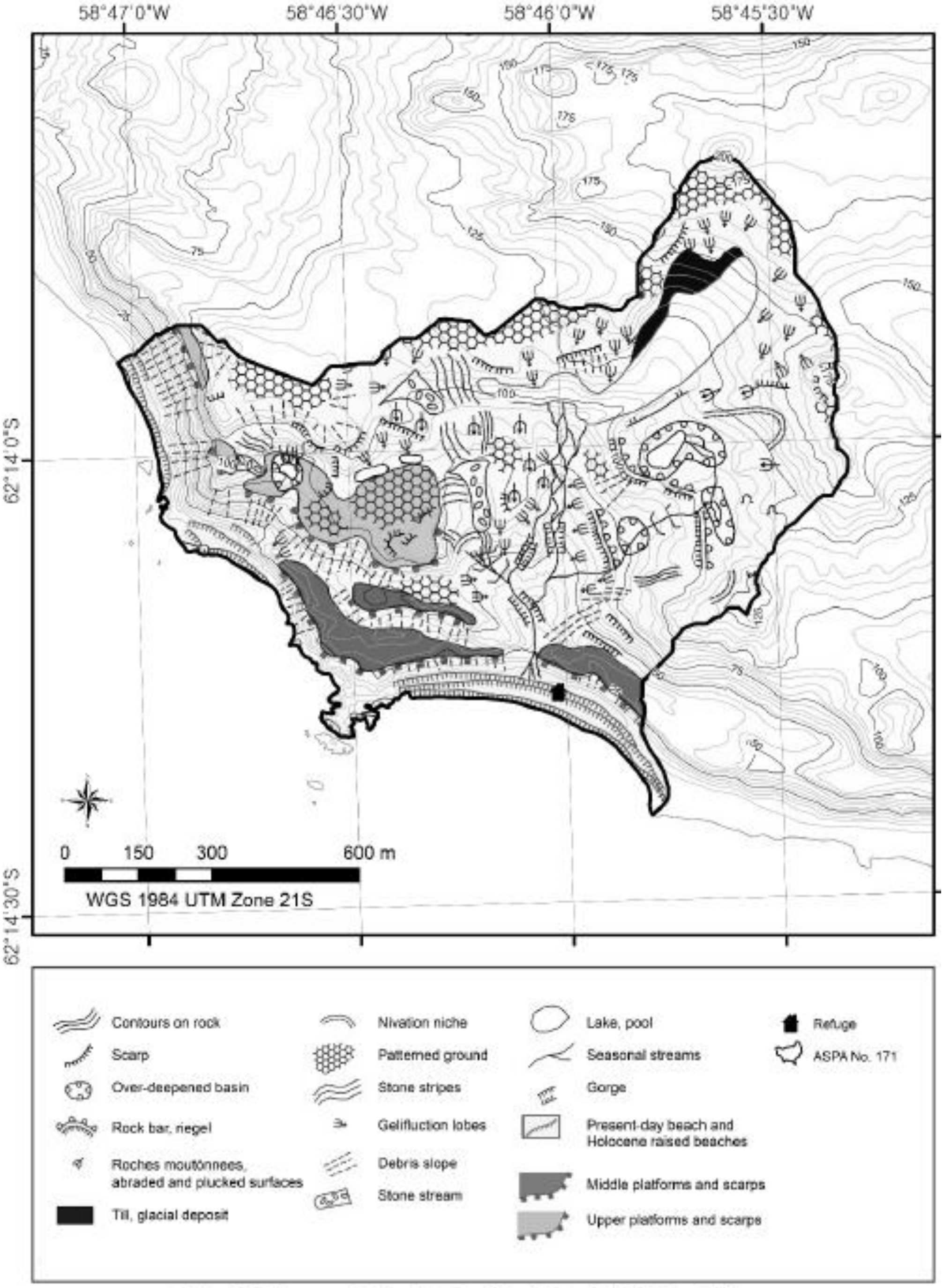
Map 2. Boundary of the ASPA No. 171



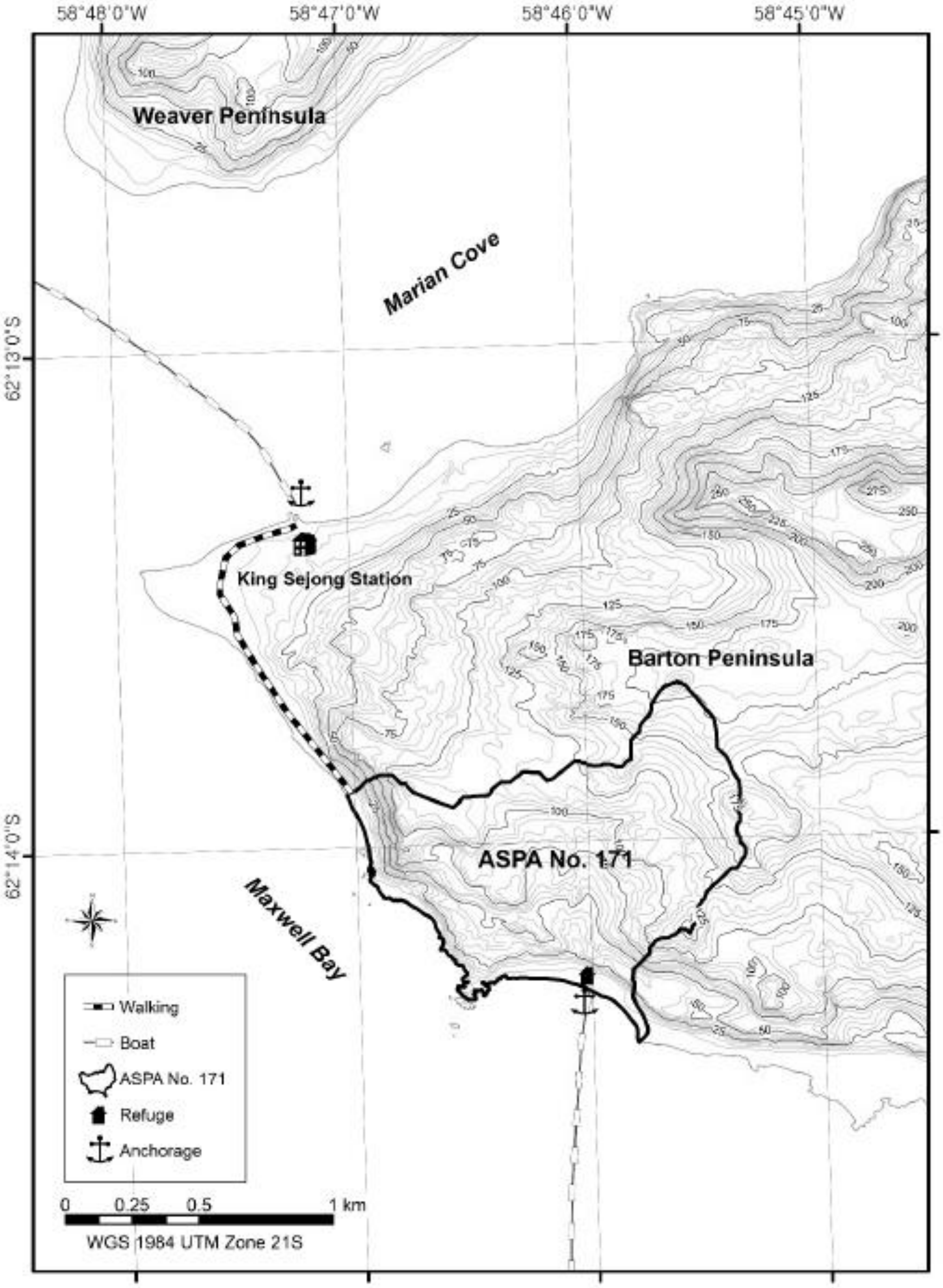
Map 3. Distribution of bird colonies and seal haul-out sites within the ASPA No. 171



Map 4. Distribution of plant communities in the ASPA No. 171



Map 5. Geomorphologic details of the ASPA No. 171



Map 6. Access routes to the ASPA No. 171

Measure 13 (2024)

Antarctic Specially Protected Area No 173 (Cape Washington and Silverfish Bay, Terra Nova Bay, Ross Sea): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Measure 17 (2013), which designated Cape Washington and Silverfish Bay, Terra Nova Bay, Ross Sea as ASPA 173 and adopted a Management Plan for the Area;
- Measure 9 (2019), which adopted a revised Management Plans for ASPA 173;

Noting the approval of the Commission for the Conservation of Antarctic Marine Living Resources ("CCAMLR"), at its thirty-first meeting, of the draft Management Plan for the ASPA at Cape Washington and Silverfish Bay, Terra Nova Bay, Ross Sea;

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 173;

Desiring to replace the existing Management Plan for ASPA 173 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 173 (Cape Washington and Silverfish Bay, Terra Nova Bay, Ross Sea), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 173 annexed to Measure 9 (2019) be revoked.

Management Plan for Antarctic Specially Protected Area (ASPA) No 173

CAPE WASHINGTON and SILVERFISH BAY, TERRA NOVA BAY, ROSS SEA

Introduction

Cape Washington and Silverfish Bay are located in northern Terra Nova Bay, Victoria Land, Ross Sea. Approximate area and coordinates: 286 km² (centered at 74° 37.1' S, 164° 57.6' E), of which 279.5 km² is marine (98 %) and 6.5 km² is terrestrial (2 %). The primary reasons for designation of the Area are the outstanding ecological and scientific values. One of the largest Emperor penguin (Aptenodytes forsteri) colonies in Antarctica breeds on sea ice adjacent to Cape Washington, with around 20,000 breeding pairs comprising approximately eight percent of the global Emperor population and ~21% of the population in the Ross Sea. Several factors, such as location, ice conditions, weather and accessibility provide relatively consistent and stable opportunities to observe Emperor chick fledging reliably and the presence of a variety of other species make it an ideal place to study ecosystem interactions. The extended record of observations of the Emperor colony at Cape Washington is of important scientific value. Approximately 20 km west of Cape Washington, the first documented ‘nursery’ and hatching area for Antarctic silverfish (Pleuragramma antarctica) is located at Silverfish Bay. Recent research has shown that the concentration of spawning on occasions extends all the way across the embayment to Cape Washington. The first ground-breaking studies on the life-history of this species have been made at the site, and its relative accessibility to nearby research stations make the Area important for biological research. The Area also has important geoscientific values, as it features extensive volcanic rock exposures originating from the nearby active volcano Mount Melbourne.

The Area was originally designated though Measure 17 (2013) after approval under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). The Area requires long-term special protection because of the outstanding ecological and scientific values and the potential vulnerability of the Area to disturbance from scientific, logistic and tourist activities in the region. A comprehensively updated Management Plan was adopted through Measure 9 (2019).

Antarctic Important Bird Area (IBA) No 176 Cape Washington is identified within the Area. The Area is situated in Environment U – North Victoria Land Geologic based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and in Region 8 – Northern Victoria Land based on the Antarctic Conservation Biogeographic Regions classification (Resolution 3 (2017)).

1. Description of values to be protected

The Area at northern Terra Nova Bay comprising Cape Washington and Silverfish Bay (Map 1) was proposed by Italy and the United States on the grounds that it contains one of the largest Emperor penguin (Aptenodytes forsteri) colonies known, and the colony and its associated ecosystem is the subject of on-going scientific studies that began in 1986. Recently, large quantities of eggs of the Antarctic silverfish (Pleuragramma antarctica) were discovered under sea ice in northern Terra Nova Bay, making it the first documented ‘nursery’ and hatching area for this species. This discovery has greatly expanded understanding of the life-history of this species, and the proximity of the site to nearby scientific stations makes it of outstanding scientific value for continuing study. The site of the original Antarctic silverfish egg discovery was named Silverfish Bay (Map 2), and more recent research has revealed the rich concentration of P. antarctica eggs found there extends in some years across the embayment towards Cape Washington. The total area is 286 km^2, of which the marine component is ~279.5 km² (98 %) and the terrestrial component is 6.5 km² (2 %).

The Cape Washington Emperor colony, usually centered around one kilometer northwest of the cape (at 74°38.8’ S, 165°22’ E), was the largest known in Antarctica in the 1993 and 1994 seasons, with counts of around 24,000 chicks being slightly greater than that of nearby Coulman Island at the time. In other years for which counts are available the Coulman Island colony was the slightly larger of the two. The colony appears to maintain a reasonably stable population, with ~17,000 chicks being counted in 2010. This relative stability makes the colony particularly suited to scientific study and monitoring, since long-term trends may be more readily studied and detected. Moreover, a relatively long time-series of scientific data exists for the Cape Washington Emperor colony. Because of the location, ice conditions, weather and accessibility, Cape Washington is one of only two Ross Sea colonies where October through December studies can be conducted and Emperor chick fledging can be observed reliably. All of these qualities make the Cape Washington Emperor colony of outstanding ecological and scientific value.

The Area at Cape Washington and Silverfish Bay is also of considerable scientific interest because of the variety of other species that frequent the Area, making it an ideal location to study ecosystem interactions. Cape Washington itself is a nesting area for south polar skuas (Stercorarius maccormicki) and snow petrels (Pagodroma nivea). Adélie penguins (Pygoscelis adeliae) are present in the Emperor colony and on the sea-ice edge daily from November to mid-January. Large groups of killer whales (Orcinus orca), both B1 and C type, and Antarctic minke whales (Balaenoptera bonaerensis) are regularly present and/or forage in the area, as well as Weddell (Leptonychotes weddellii) and leopard (Hydrurga leptonyx) seals. The embayment is an important haul-out and breeding area for Weddell seals, with several hundred typically congregating along sea ice leads and near Markham Island throughout the season. Crabeater seals (Lobodon carcinophagus) and Arnoux’s beaked whales (Berardius arnuxii) are occasionally seen at the sea ice edge in the region. Cape Washington is the only place known where the interaction between leopard seals and Emperor penguins can be so reliably observed.

The Area has exceptional value for observations of the interactions and predator / prey relationships between many different members of the marine ecosystem within a relatively compact area that is accessible to scientists supported by nearby research stations.

The boundaries of the Area are defined taking an integrated approach to inclusion of all components of the local ecosystem.

The Area has considerable geoscientific value because it features extensive volcanic rock exposures related to the nearby active volcano Mount Melbourne. The Area serves as a key marker region for evaluating the young, neotectonic evolution of the western Ross Sea. It borders the deepest waters of the Ross Sea and includes Markham Island, a volcanic outcrop that is located over a negative magnetic anomaly, the origin of which is not yet known.

Cape Washington is relatively accessible by sea-ice, sea and air from nearby research stations in Terra Nova Bay. Aircraft activity in the region is frequent throughout the summer season, with fixed-wing aircraft operating from the sea ice runway in Gerlache Inlet (Map 2), and helicopter movements within the region around Mount Melbourne on a regular basis.

The Area requires long-term special protection because of the outstanding ecological and scientific values and the potential vulnerability of the Area to disturbance from scientific, logistic and tourist activities in the region.

2. Aims and objectives

Management at Cape Washington and Silverfish Bay aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human presence, disturbance and sampling within the Area;
- allow scientific research on the ecosystem, in particular on the Emperor penguins and ecosystem interactions, while ensuring protection from oversampling or other possible scientific impacts;
- allow other scientific research, scientific support activities and visits for educational and outreach purposes (such as documentary reporting (visual, audio or written) or the production of educational resources or services) provided that such activities are for compelling reasons that cannot be served elsewhere and that will not compromise the values for which the Area is protected;
- prevent or minimize the possibility of the introduction of non-native species (e.g. plants, animals and microbes) into the Area;
- minimise the possibility of the introduction of pathogens that may cause disease in faunal populations within the Area; and
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- Signs showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, at all scientific stations located within 75 km of the Area.
- Copies of this Management Plan shall be made available to all vessels and aircraft visiting the Area and/or operating in the vicinity of the adjacent stations, and all pilots and ship captains operating in the region shall be informed of the location, boundaries and restrictions applying to entry and overflight within the Area.

- National programs shall ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and nautical / aeronautical charts.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer required.
- Any abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.
- The Area shall be visited as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- National Antarctic Programs operating in the region shall consult together for the purpose of ensuring that the above provisions are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA No 173: Cape Washington and Silverfish Bay – Regional map.
Projection: Lambert Conformal Conic; Standard parallels: 1st 74° 20' S; 2nd 75° 20' S; Central Meridian: 164° 00' E; Latitude of Origin: 74° 00' S; Spheroid and horizontal datum: WGS84; Contour interval 200 m; Bathymetry 200 m at coast, then 500 m interval. Inset: Location of Terra Nova Bay in the Ross Sea region.

Map 2: ASPA No 173: Cape Washington and Silverfish Bay – topographic map.
Projection: Lambert Conformal Conic; Standard parallels: 1st 74° 35' S; 2nd 74° 45' S; Central Meridian: 164° 42' E; Latitude of Origin: 74° 00' S; Spheroid and horizontal datum: WGS84; Contour interval 200 m; Bathymetry 100 m interval.

Map 3: ASPA No 173: Cape Washington and Silverfish Bay – Access Guidance. Map details as per Map 2.

Map 4: ASPA No 173: Cape Washington and Silverfish Bay – Restricted Zone. Map details as per Map 2 except Central Meridian: 165° 20' E. Satellite image Ikonos acquired 30 Dec 2011, © GeoEye (2011).

6. Description of the Area

6(i) Geographical coordinates, boundary markers and natural features

- *General description*

Cape Washington is situated in northern Terra Nova Bay, 40 km east of Mario Zucchelli Station (Italy) (Map 1). The Area is 286 km², of which the marine component is 279.5 km² (98 %) and the terrestrial component is 6.5 km² (2 %).

Sea ice persists in Silverfish Bay and across Closs Bay to Cape Washington from March until January, providing a stable and reliable platform on which the Emperors can breed and suitable conditions for the silverfish 'nursery'. The Cape Washington peninsula provides shelter to the Emperor colony, which is relatively protected from the strong katabatic winds that descend into other parts of Terra Nova Bay. The eastern coast of the Cape Washington peninsula comprises precipitous cliffs of several hundred meters in height, while the west side comprises more gentle mixed snow and ice-free slopes with some rocky outcrops extending down to sea level. Closs Bay extends uninterrupted across to the Campbell Glacier Tongue, punctuated by the solitary and small Markham Island close to Oscar Point (Map 2).

- *Boundaries and coordinates*

The eastern boundary of the Area at the NE corner extends from the coordinates 74° 37' S, 165° 27' E on the eastern coast of the Cape Washington peninsula due south for ~5.6 km to 74° 40' S, 165° 27' E (Map 2). The boundary thence extends due west across Closs Bay on latitude 74° 40' S for ~26.8 km to the Campbell Glacier Tongue. It then follows the eastern margin of the Campbell Glacier Tongue for ~11.2 km northwards to the coast at Shield Nunatak. The boundary thence follows the coastline eastwards, around the Vacchi Piedmont Glacier, to the western coast of the Cape Washington peninsula, ~23 km in a straight-line from Shield Nunatak. The boundary thence follows the coastline southward ~7.5 km towards the first prominent rock outcrop at latitude 74° 37.03' S on the western coast of the Cape Washington peninsula. The boundary extends eastwards from this coast along the line of latitude 74° 37' S ~ 2.8 km to the NE corner boundary point located on the eastern coast of the Cape Washington peninsula.

- *Climate*

Four meteorological stations are located in Terra Nova Bay, of which 'Eneide', located at Mario Zucchelli Station (74° 41.750' S, 164° 05.533' E) and ~ 25 km from the center of the Area, has the longest time series of data. The mean annual air temperature at Mario Zucchelli Station was -13.8º C during the period 1987 – 2018, with the coldest month being July with an average minimum temperature of -22.6º C and the warmest months are January and December with an average maximum temperature between -0.7 and -0.9º C. The mean annual wind speed at Mario Zucchelli Station was 6.20 m/s (22.3 km/h; 1987 –2018) with an average maximum of 13 m/s (47.0 km/h) in June and an average minimum of 4.4 m/s (15.8 km/h) in December and January.

The strongest mean annual wind speed in the Terra Nova Bay area has been recorded near Inexpressible Island, measured at 12.3 m/s (44.3 km/h) between Feb 1988 – 1989 (Bromwich et al. 1993). This is significantly stronger than ordinary katabatic winds (< 10 m/s), as local topographic features channel the air into the 'confluence zones' of the Reeves and the Priestley glaciers (Bromwich et al. 1993). These offshore katabatic winds play a significant role in the formation of the Terra Nova Bay polynya.

- *Oceanography*

Terra Nova Bay is a deep basin that reaches a maximum depth of ~1100 m, which is the deepest water in the Ross Sea (Buffoni et al. 2002) (Map 1). Ocean circulation in the bay is characterized in summer by a prevailing northward movement in the upper layer, parallel to the coast, and a clockwise rotation with depth (Vacchi et al. 2012b). Warmer and more saline waters are observed near the coast, while cooler waters are found in the central part of the bay, and local eddies and upwelling processes are strongly influenced by katabatic winds (Budillon & Spezie 2000; Buffoni et al. 2002).

A perennial winter polynya forms in the bay through a combination of persistent katabatic winds driving newly formed ice offshore and the Drygalski Ice Tongue acting as a barrier to the northward drift of pack ice (Bromwich & Kurtz 1984; Van Woert 1999) (Map 1). The polynya generally forms with a maximum east-west extent that appears to be closely related to the length of the Drygalski Ice Tongue (Kurtz & Bromwich 1983). The polynya has been observed to cover a mean area of roughly 1300 km² (65 km N/S by 20 km E/W), although in some years it may not exist at all, while in others it can reach a maximum of ~ 5000 km² (65 km N/S by 75 km E/W) (Kurtz & Bromwich 1983).

This polynya plays an important role in the formation of High Salinity Shelf Waters (HSSW) in Terra Nova Bay (Buffoni et al 2002). The brine rejected during the ice formation process increases the salt content and density of the water, which consequently causes a thermohaline circulation and convective movements. The HSSW found in this area have the highest salinity content in Antarctica reaching up to 34.87 and a potential temperature near the sea surface freezing point of -1.9 ºC.

- *Marine biology*

The silverfish (Pleuragramma antarctica) is the dominant pelagic fish (of both the abundance and biomass of Ross Sea midwater fish fauna) in waters of the continental shelf in the Ross Sea and is considered a keystone species providing one of the major links between lower and higher trophic levels (Bottaro et al. 2009; La Mesa et al. 2004; La Mesa et al. 2010; O’Driscoll et al. 2011; Vacchi et al. 2012). Silverfish represent the primary food item for most marine vertebrates, such as baleen whale, birds, and other fishes (La Mesa et al. 2004), and are the primary fish prey for both Emperor penguins and Weddell seals (Burns & Kooyman 2001).

Until a few decades ago little was known of the early life history of silverfish (Guglielmo et al. 1998; Vacchi et al. 2004). Marine surveys in Terra Nova Bay in the late 1980s yielded samples that suggested the northern part of the bay may represent a nursery ground for early stages of P. antarctica (Guglielmo et al. 1998). From late October to early December 2002 large quantities of embryonated eggs of P. antarctica were found floating among platelet ice under sea ice in northern Terra Nova Bay (Vacchi et al. 2004). This was the first documented nursery and hatching area of the Antarctic silverfish. In 2014, Italy and Korea conducted collaborative research on the ecology of Antarctic silverfish, which extended towards winter. Eggs were collected in the nursery as early as September, allowing observation and description of early embryonic development (Ghigliotti et al. 2015).

Research conducted over subsequent years showed higher egg concentrations were consistently found within the embayment east of the Campbell Glacier Tongue (which led to naming this area Silverfish Bay), with greatest abundances in areas where the sea was at least 300 m in depth. Since 2005, regular late spring – early summer monitoring of the Antarctic silverfish nursery has been undertaken, revealing annual fluctuations (significant at the site scale) in the distribution patterns of eggs, possibly related to differences in the processes of sea ice formation and local hydrodynamic conditions and winds (Guidetti et al. 2015). This and other research have indicated that habitats with particular combinations of geographic and oceanographic features and conditions (e.g. close ice shelf or glacier tongues, canyons, water mass stratification, polynyas, katabatic winds, and sea ice cover) are favorable for the early life history of the silverfish (Vacchi et al. 2012b, Ghigliotti et al., 2017). The spatial segregation of Antarctic silverfish eggs in the platelet ice makes this under-ice environment an essential habitat for this specific ecophase, and more research is needed on its biotic and abiotic characteristics (Koubbi et al. 2017). Specific molecular and functional adaptation mechanisms, possibly evolved in response to specific environmental conditions typical of the platelet ice, have been detected in the early life stages of Antarctic silverfish. For instance, a marked responsiveness of antioxidant defences has been described as a means to survive the extreme pro-oxidant conditions of platelet ice at the beginning of austral spring (Regoli et al. 2005). This feature also influences the susceptibility of this species toward pro-oxidant chemicals of anthropogenic origin (Regoli et al. 2005, Giuliani et al. 2017).

The Antarctic toothfish (Dissostichus mawsoni) is a unique piscine high trophic level predator. In a recent CCAMLR longline sub-adult survey in the Ross Sea, sampling stations were included in vicinity of the Area. The high catch rate at those stations, dominated by 8-10 year old fish, suggested the relevance of this area for slightly older sub-adult toothfish that would deserve regular monitoring (Hanchet et al., 2015). Opportunistic observations in Silverfish Bay, carried out through marine acoustics and visual methods, also supported the presence of Antarctic toothfish in the area, specifically large adult specimens under the sea-ice cover (O’Driscoll et al. 2018; Ghigliotti et al. 2018; Di Blasi et al. 2018).

A new project ‘PILOT’, carried out in the Area in November 2017 and 2018, focused on two target fish species, the Antarctic toothfish and the Antarctic silverfish. In 2018, visual observations were made at Silverfish Bay by miniaturized Baited Remote Underwater Video cameras (BRUV) deployed through holes in the sea-ice. The design and configuration of the mini-BRUV allowed acquisition of high-quality video imagery of 60 Antarctic toothfish in 13 deployments from the fast sea ice (Di Blasi et al., 2021). The behavior of fish at the bait, intra-species interactions, and potential biases in individual counting were investigated, setting baselines for future studies on the abundance and distribution of Antarctic toothfish in sea-ice covered areas.

The project ‘DISCOVERY’ built on these results in November 2021 and 2022, with the aim of testing and validating use of low-impact technologies for monitoring of Antarctic toothfish in coastal sea-ice covered shelf areas of the Ross Sea Region MPA. Field observations were made at Silverfish Bay to document Antarctic toothfish occurrence and distribution in this area and to gain insights into the habitat preferences of this species. Of particular note, the occurrence of nests of the icefish Chionodraco hamatus was recorded for the first time at ~500 m depth (Carlig et al. 2024). The presence of clusters of icefish nests suggests the existence of a C. hamatus nesting area in Silverfish Bay. If confirmed, this biological feature would further strengthen the ecological and scientific value of the Area.

- *Birds*

The Emperor penguin colony at Cape Washington is one of the two largest known; the other is the Coulman Island colony 200 km to the north. While in some years the Cape Washington population has exceeded that at Coulman Island, available data suggests that usually the latter is the slightly larger of the two (Barber-Meyer et al. 2008). The population generally ranges between approximately 13,000 and 25,000 breeding pairs (Table 1; Barber-Meyer et al. 2008). The most recent count available, made in November 2022 from high resolution aerial photography, indicated approximately 15,000 breeding pairs were present (Table 1; KOPRI pers. comm. 2024). Data from earlier years indicate that live chick numbers have consistently remained around these levels since studies were initiated in 1986 (Kooyman et al. 1990).

Table 1. Cape Washington emperor penguin population from 2000 and 2022.

Year	**Live chick count [1]**	**Estimated breeding pairs (approx.)**
2000	17397	20000
2001	18734	20000
2002	11093	13000
2003	13163	15000
2004	16700	20000
2005	23021	25000
2010	17000 2	20000
2018	16874 3	19000
2019	166773	19000
2020	N/A	N/A
2021	16793 3	19000
2022	15529 4	18000

1. Barber-Meyer et al. 2008.
2. Kooyman pers. comm. 2012, Kooyman & Ponganis 2017.
3. Counts in Nov / Dec from high resolution aerial photography – Korea, Republic of, 2022.
4. Nov 2022, high resolution aerial photography – Korean Polar Research Institute (KOPRI) pers. comm. 2024.

The Emperor penguin colony breeds on sea ice that extends from Cape Washington to the Campbell Glacier Tongue in the northern part of Terra Nova Bay. Sea ice formation begins in March and the bay is generally covered by sea ice until ice break-up around mid-January. The Terra Nova Bay polynya generally offers the colony access to open sea throughout the breeding cycle.

The sea ice in the vicinity of the Emperor breeding site may be covered with up to 25 cm of snow near the ice edge, with up to about 1 m of snow accumulating on the SW shoreline of the Cape Washington peninsula (Kooyman et al. 1990). This area is relatively sheltered from both SW and NW winds. The locality has been observed to enjoy relatively cloud-free conditions from October to January, resulting in elevated levels of direct solar irradiance. This causes the dirty guano-covered snow and ice to soften and melt, forming pools that are difficult or impossible for penguins, and humans, to walk through. As a result the birds need to shift their breeding sites regularly throughout the summer period. The incubating birds generally cluster adjacent to the SW coast of Cape Washington until September, before spreading away from the Cape in an expanding semi-circle.

The center of the incubation area in 1996 was approximately 74°38.8' S, 165°22.0' E. Observations in 1986-87 found the colony dispersed into several groups by the end of October, each containing 1000 to 2000 chicks with attendant adults (Kooyman et al. 1990). From the Cape northward along the western coast of the peninsula, there was found to be a gradient in chick development, with the largest chicks in groups closest to the ice-edge near the Cape. By the time of fledging some groups of chicks had moved 5 to 6 km away from the original breeding locality. In 1986-87 fledging occurred abruptly over a ten-day period at the end of December and the beginning of January.

There is evidence that the Cape Washington colony is comparatively stable in population and that it appears to enjoy relatively high levels of breeding success, averaging almost 95% of chicks successfully fledged over a six-year study period (Barber-Mayer et al. 2008). This compares with breeding successes of only around 60-70% at the Point Géologie, Taylor Glacier and Auster colonies in the East Antarctic. The Cape Washington colony is particularly valuable for scientific study because of its comparative low variability in breeding success, which may be in part a function of its large size, with smaller colonies exhibiting greater population fluctuations (Barber-Mayer et al. 2008). Moreover, the colony is relatively accessible to nearby scientific stations, making research more practical.

A south polar skua (Stercorarius maccormicki) colony comprising approximately 50 pairs is located on the ice-free slopes of Cape Washington, overlooking the Emperor colony. Snow petrels (Pagodroma nivea) have been recorded as breeding in niches in the Cape Washington cliffs (Greenfield & Smellie 1992), feeding along the ice edge, and have been noted as the most abundant flying bird in the vicinity over the summer months (Kooyman et al. 1990). Adélie penguins (Pygoscelis adeliae) are observed along the ice edge and within the Emperor colony during summer months, while Wilson’s storm petrels (Oceanites oceanicus) are frequently observed along the ice edge from mid- to late-November. Southern giant petrels (Macronectes giganteus) have been observed overflying and landing within the Area (Kooyman et al. 1990).

- *Mammals (whales, seals)*

Minke whales (Balaenoptera bonaerensis), Arnoux's beaked whale (Beradius arnuxii) and both B1 and C Killer whale forms are common in Terra Nova Bay (Kooyman et al. 1990; Lauriano et al. 2010). Arnoux's beaked whales and minke whales are seasonally present, taking advantage of the highly productive waters and associated prey that becomes available as the ice breaks up. Higher cetacean encounter rates were observed in the region between Edmonson Point and the Campbell Glacier Tongue than in the region south from Mario Zucchelli Station onwards (Lauriano et al. 2010). The B1 type killer whale feeds on mammals and commonly occurs along the ice shelf in the austral summer to take advantage of both the seals and Adélie penguin colonies in the area (Andrews et al., 2008; Lauriano et al., 2007). The C type killer whale (or Ross Sea Killer Whale - RSKW) feeds on fish, and is observed in the area between Campbell Ice Tongue and Cape Washington. A satellite telemetry study revealed deep dives (up to 300 m) and Area of Restricted Search (ARS) behaviours in Closs Bay compared to the transit behaviour outside of this area (Lauriano & Panigada, 2015a,b; Lauriano et al. 2020). These data emphasise the role of the Area as a feeding ground for this dwarf killer whale form. Moreover, resightings between 2004 and 2015 highlight a site fidelity and confirm the value of the Area. Stable isotope analysis indicates Antarctic toothfish (Dissostichus mawsoni) as the main component of the diet of the biopsied animals (Lauriano et al. 2020).

Three species of seal – Weddell (Leptonychotes weddellii), leopard (Hydrurga leptonyx) and crabeater (Lobodon carcinophagus) – are common in the Area. The embayment is an important haul-out and breeding area for Weddell seals, which typically congregate along sea ice leads and openings that dynamically form throughout the season. At least 200 Weddell seals were recorded in the bay west of Cape Washington in 1986-87, with 31 pups counted near Markham Island (Kooyman et al. 1990), and a similar number of adults was counted in the same region from satellite imagery acquired in November 2011 (La Rue pers. comm. 2012).

Leopard seals (Hydrurga leptonyx) were recorded within the Area from mid-November through December in 1986-87, and were observed to prey on Emperor penguins around the ice edge. Kooyman et al. (1990) estimated that the three individuals they monitored over this period would have taken approximately 150 – 200 adult birds, or about 0.5 % of breeding Emperor adults at the colony. Crabeater seals were recorded on occasion at the ice edge or on nearby ice flows in the same season (Kooyman et al. 1990).

- *Human activities / impacts*

Three permanent scientific stations are located at nearby Gerlache Inlet and one is under construction on Inexpressible Island. Mario Zucchelli (74° 41.650' S, 164° 06.917' E; Italy), established in 1987, operates summer only with a complement of about 90 personnel. Gondwana (74° 38.133' S, 164° 13.317' E; Germany), established in 1983, operates on occasional summers with capacity for approximately 25 personnel. Jang Bogo station (74° 37.250' S, 164° 11.950' E;

Republic of Korea) has been operational since February 2014 and carries a complement of ~20 winter personnel and up to 60 in summer. China opened Qinling Station on 07 February 2024 on nearby Inexpressible Island at 74° 56.15' S, 163° 42.5' E, which will operate year-round with a complement of up to ~30 winter and ~80 summer personnel (CAA 2018).

A gravel airstrip is located in the Northern Foothills, approximately six km south of Mario Zucchelli Station and ~40 km from the Area. The airstrip is capable of receiving large 4-engined wheeled aircraft, although all aircraft operating in the vicinity will be subject to the minimum flying heights specified in this Management Plan when overflying the Area.

The Cape Washington Emperor colony has been of interest for tourism for around 20 years, with an average of ~200 tourists visiting Cape Washington per annum over the last decade. The colony has also been of interest for recreational visits by station personnel from nearby Mario Zucchelli Station prior to the designation of the Area. An area frequented by Emperor penguins lies immediately south of the southern boundary of the Area at 74° 40' S (Maps 3 & 4). This region lies within the approximate 6 km buffer from the nominal centroid of the breeding colony within which the birds have been consistently observed when sea ice is present. This region outside of the protected area allows continued opportunities for tourism or recreational visits to view Emperor penguins in the Cape Washington vicinity, and other opportunities exist at colonies elsewhere in the Ross Sea and Antarctica more generally.

6(ii) Access to the Area

The Area may be accessed by traversing over land or sea ice, by sea or by air. Particular access routes have not been designated over land or sea ice or for vessels entering the Area by sea. Access to Cape Washington by helicopter should follow the designated access route over the northern part of the Cape Washington peninsula. Overflight, aircraft landing and ship access restrictions apply within the Area, the specific conditions for which are set out in Section 7(ii) below.

6(iii) Location of structures within and adjacent to the Area

There are no structures within the Area. Several geodetic reference markers have been established by the Italian Antarctic program at Markham Island and at Cape Washington on ice-free ground, and these are the only known permanent markers in the Area. Mario Zucchelli Station (74° 41.650' S, 164° 06.917' E; Italy) is situated ~13 km southwest of the western boundary of the Area on the southern shore of Gerlache Inlet (Map 2). Gondwana Station (74° 38.133' S, 164° 13.317' E; Germany) is located 8.7 km west of the western boundary of the Area, also in Gerlache Inlet and 7.2 km north of Mario Zucchelli Station. Jang Bogo Station (74° 37.25' S, 164° 11.95' E; South Korea) is located ~9 km west of the western boundary of the Area, ~1.8 km NW of Gondwana Station. Qinling Station (74° 56.15' S, 163° 42.5' E; China) is located on Inexpressible Island, ~40 km southwest of the southern boundary of the Area. A number of structures associated with national program operations are located nearby, such as a communications facility near the summit of Mount Melbourne, several radar and non-directional beacons to assist summer air operations, and Italy is constructing a new gravel airstrip in the Northern Foothills, although these are all outside of the Area.

6(iv) Location of other protected areas in the vicinity

The nearest protected areas to Cape Washington are the high altitude geothermal sites on Mount Melbourne (ASPA No 175) 23 km north of the northern boundary of the Area, Edmonson Point (ASPA No 165) 24 km north of the northern boundary of the Area, and Terra Nova Bay (ASPA No 161) and Inexpressible Island and Seaview Bay (ASPA No 178) are ~13 km and ~35 km southwest from the southwestern boundary of the Area respectively.

6(v) Special zones within the Area

This Management Plan establishes a Restricted Zone within the Area which applies during the period from 01 April through to 01 January inclusive.

- *Restricted Zone*

The Restricted Zone is designated east of the line of longitude 165° 10’ E and south of the line of latitude 74° 35.5’ S (Map 3), which encompasses the primary Emperor breeding area and is considered the most ecologically sensitive part of the Area. The Restricted Zone has an area of 62.5 km². Access to the Restricted Zone should be for compelling reasons that cannot be served elsewhere within the Area and detailed conditions for access are described in Section 7(ii) below.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a permit issued by an appropriate national authority. Conditions for issuing a permit to enter the Area are that:

- it is issued only for scientific study of the ecosystem, or for compelling scientific or educational (such as documentary reporting or the production of educational resources or services) reasons that cannot be served elsewhere, or for reasons essential to the management of the Area;
- the actions permitted are in accordance with this Management Plan;
- the activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the environmental, ecological and scientific values of the Area;
- access to the Restricted Zone is allowed only for compelling reasons that cannot be served elsewhere within the Area;
- the permit shall be issued for a finite period;
- the permit, or a copy, shall be carried when in the Area.

7(ii) Access to, and movement within or over, the Area

Access into the Area is permitted on foot or by vehicle, by ship or small boat, or by fixed-wing or rotor-wing aircraft.

- *Access on foot or by vehicle*

No special access routes are designated for access to the Area on foot or by vehicle over sea ice or by land. Vehicles may be used over sea ice and glaciers although are prohibited from ice-free ground within the Area. Pedestrian and vehicular traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize disturbance. Vehicle use should be avoided within 100 m of concentrations of Emperor penguins or Weddell seals, and permitted visitors should avoid entering penguin sub-groups or approaching seals except as required for essential scientific, educational or management purposes.

- *Access and overflight by piloted aircraft and Remotely Piloted Aircraft Systems (RPAS)*

Resolution 2 (2004), the Guidelines for the Operation of Aircraft near Concentrations of Birds in Antarctica, should be followed at all times. Restrictions on aircraft operations apply during the period from 01 April through to 01 January inclusive, when aircraft shall operate and land within the Area according to strict observance of the following conditions:

- Overflight below 2000 ft (610 m) and landings within the Area by piloted aircraft, including by helicopters, are prohibited except in accordance with a permit issued by an appropriate national authority.
- Piloted aircraft landings on sea ice within ½ nautical mile (~930 m) of the Emperor colony should be avoided to the maximum extent practicable except when authorized by permit, and all landings are prohibited within ¼ nautical mile (~500 m) of the Emperor colony. Pilots should note that the Emperor colony may move throughout the breeding season up to six kilometers from the nominal center coordinate of the colony at 74°38.8' S, 165°22' E (Map 3), and the colony may divide into a number of smaller units within the Area.
- Piloted aircraft landings on sea ice within ¼ nautical mile (~500 m) of concentrations of Weddell seals should be avoided to the maximum extent practicable, and landings within ~380 yards (350 m) of concentrations of Weddell seals are prohibited except when authorized by permit. Pilots should note that Weddell seals may be present throughout the Area, although tend to congregate along sea ice leads and around Markham Island (Map 3). In the context of management of the Area, a concentration is defined as five or more animals within 300 m of each other.
- Pilots shall ensure piloted aircraft maintain the minimum separation distance from any part of the Emperor colony and / or any concentration of seals when operating over sea ice at all times, excepting when this is impractical because

the animals have voluntarily moved closer to the aircraft after it has landed.

- Pilots making authorized landings beyond ½ nautical mile (~930 m) of the Emperor colony and / or concentrations of seals may select landing sites according to visit needs, local conditions and safety considerations. Pilots of piloted aircraft should make a reconnaissance of suitable landing sites from above 2000 feet (~610 m) before descending to land.
- Landings by helicopter may be made on land within the Restricted Zone at Cape Washington. The preferred helicopter approach route to the Cape is from the north over the Cape Washington peninsula, avoiding overflight of the Emperor colony, breeding skua territories situated immediately west of the access route, and seabird breeding sites along the cliffs of the Cape Washington peninsula (Map 3). Pilots flying to the Cape should follow the designated approach route to the maximum extent practicable and abort the journey should it be likely that conditions would force a route that might lead to overflight of the Emperor colony.
- Approaches by fixed wing aircraft to sea ice landing sites in Terra Nova Bay adjacent to Mario Zucchelli Station (Italy) (Map 2) should maintain designated approach paths and elevations as defined in the most recent edition of the Antarctic Flight Information Manual (COMNAP 2023). Should visibility or other conditions be prohibitive of maintaining these paths and / or elevations, pilots should ensure that alternative approaches adopted avoid exceeding the minimum overflight heights that apply within the Restricted Zone.
- Overflight below 2000 ft (610 m) and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

- *Access by ship or small boat*

Restrictions on ship and / or small boat operations apply during the period from 01 April through to 01 January inclusive, when ships and / or small boats shall operate within the Area according to strict observance of the following conditions:

- Ships and / or small boats are prohibited from the Area, including entering sea ice within the Area, unless authorized by permit for purposes allowed for by this Management Plan.
- Ships are prohibited within the Restricted Zone.
- There are no special restrictions on where access can be gained to the Area by small boat, although small boat landings should avoid areas where penguins are accessing the sea unless this is necessary for purposes for which the permit was granted.

7(iii) Activities that may be conducted within the Area

- Scientific research that will not jeopardize the values of the Area.
- Essential management activities, including monitoring and inspection.

- Activities for educational or outreach purposes (such as documentary reporting (e.g. visual, audio or written) or the production of educational resources or services) that cannot be served elsewhere.

7(iv) Installation, modification or removal of structures / equipment

- No structures are to be erected within the Area except as specified in a permit and, with the exception of permanent survey markers and signs, permanent structures or installations are prohibited.
- All structures, scientific equipment or markers installed in the Area shall be authorized by permit and clearly identified by country, name of the principal investigator, year of installation and date of expected removal. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area.
- Installation (including site selection), maintenance, modification or removal of structures or equipment shall be undertaken in a manner that minimizes disturbance to the values of the Area.
- Removal of specific structures / equipment for which the permit has expired shall be the responsibility of the authority which granted the original permit, and shall be a condition of the permit.

7(v) Location of field camps

Permanent field camps are prohibited within the Area. Temporary camp sites are permitted within the Area. There are no specific restrictions on the precise locality for temporary camp sites within the Area, although it is recommended that initial sites selected should be more than 1000 m from concentrations of breeding Emperor penguins. It is recognized that the birds move from their original breeding locations throughout the season. As the birds will subsequently set their own distance limits from any camp established, it is not considered necessary to keep moving the camp in response to the shifting positions of the Emperor colony. It is recommended that camp sites be located approximately 500 m offshore from the western coast of the Cape Washington peninsula because the near-shore area is subject to snow overburden and subsequent meltwater flooding. Camping within the terrestrial part of the Area is not restricted to a particular location, but where possible camp sites should be located on snow covered ground.

7(vi) Restrictions on materials and organisms that may be brought into the Area

In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, restrictions on materials and organisms that may be brought into the area are:

- Deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. Precautions shall be taken to prevent the accidental introduction of animals, plant material, micro-organisms and non-sterile soil from other biologically distinct regions (within or beyond the

Antarctic Treaty area).

- Visitors shall ensure that sampling equipment and markers brought into the Area are clean. To the maximum extent practicable, clothing, footwear and other equipment used or brought into the area (including backpacks, carry-bags and tents) shall be thoroughly cleaned before entering the Area. Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016), CEP 2019), and in the Environmental Code of Conduct for terrestrial scientific field research in Antarctica (Resolution 5 (2018)).
- Raw poultry is prohibited from the Area. All poultry brought into the Area shall be managed appropriately to minimize any risk of transmission of diseases and all poultry not consumed or used within the Area, including all parts, products and / or wastes of poultry, shall be removed from the Area or disposed of by incineration or equivalent means that eliminates risks to native flora and fauna.
- Herbicides and pesticides are prohibited from the Area.
- Fuel, food, chemicals, and other materials shall not be stored in the Area, unless specifically authorized by permit and shall be stored and handled in a way that minimises the risk of their accidental introduction into the environment.
- All materials introduced shall be for a stated period only and shall be removed by the end of that stated period.
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.

7(vii) Taking of, or harmful interference with, native flora or fauna

- Taking of, or harmful interference with, native flora and fauna is prohibited, except in accordance with a permit issued in accordance with Annex II of the Protocol on Environmental Protection to the Antarctic Treaty.
- Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(viii) Collection or removal of anything not brought into the Area by the permit holder

- Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs.
- Material of human origin likely to compromise the values of the Area, and which was not brought into the Area by the permit holder or otherwise authorized, may be removed from the Area, unless the impact of removal is likely to be greater than leaving the material in situ: if this is the case the appropriate authority must be notified and approval obtained.

7(ix) Disposal of waste

All wastes, except human wastes, shall be removed from the Area. Small quantities of human wastes, such as arising from groups of no more than 10 people within a given season, may be disposed of onto annual sea ice or directly into the sea within the Area, or otherwise shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
- install or maintain signposts, markers, structures or scientific equipment;
- carry out protective measures.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority after the visit has been completed in accordance with national procedures and permit conditions.
- Such reports should include, as appropriate, the information identified in the visit report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Parties should, wherever possible, deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organising the scientific use of the Area.
- The appropriate authority should be notified of any activities / measures that might have been exceptionally undertaken, or anything released and not removed, that were not included in the authorized permit.

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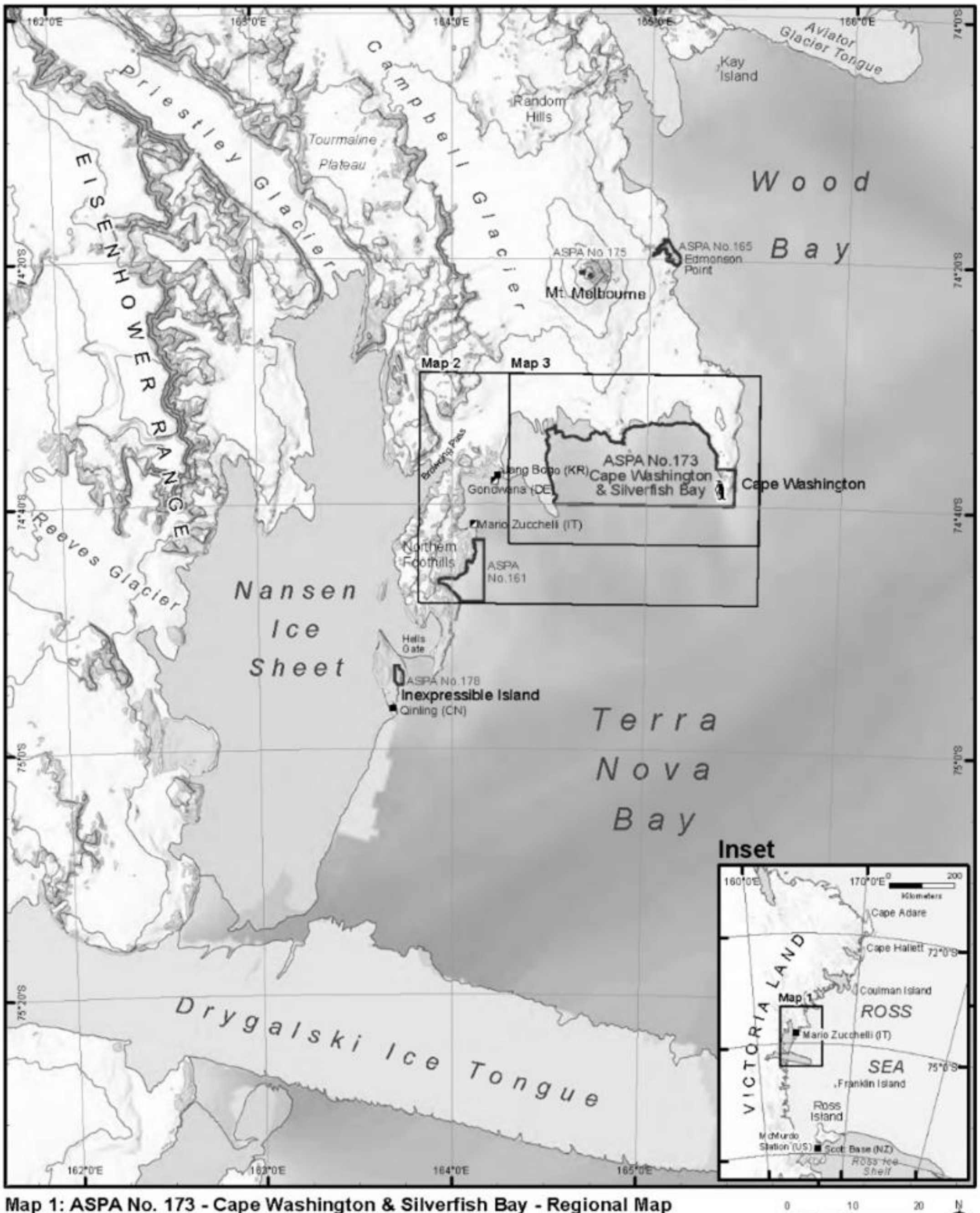


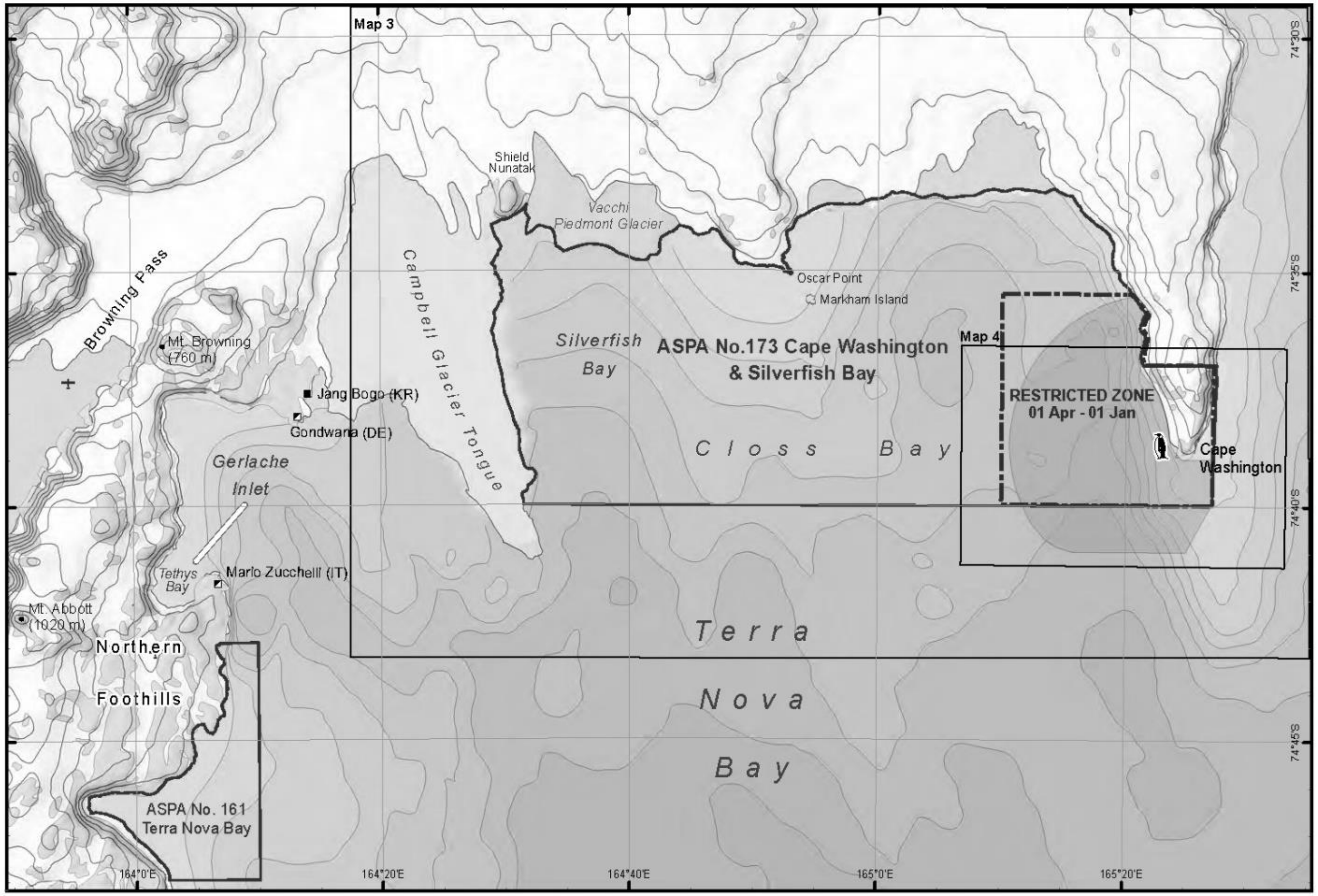
Map 1: ASPA No. 173 - Cape Washington & Silverfish Bay - Regional Map

26 Mar 2024
United States Antarctic Program / PNRA
Environmental Research & Assessment

Permanent ice
Ice shelf
Ice tongue
Ice free ground
Contour (500 m)
Station, Seasonal
Station, Year-Round
Antarctic Specially Protected Area
Emperor penguin colony

0 10 20 Kilometers

Projection: Lambert Conic Conformal,
Spheroid and Datum: WGS84.
Data sources:
Topography: ADD v.5; Bathymetry: GEBCO (1997);
Stations: COMNAP (2018) updated ERA (2019).



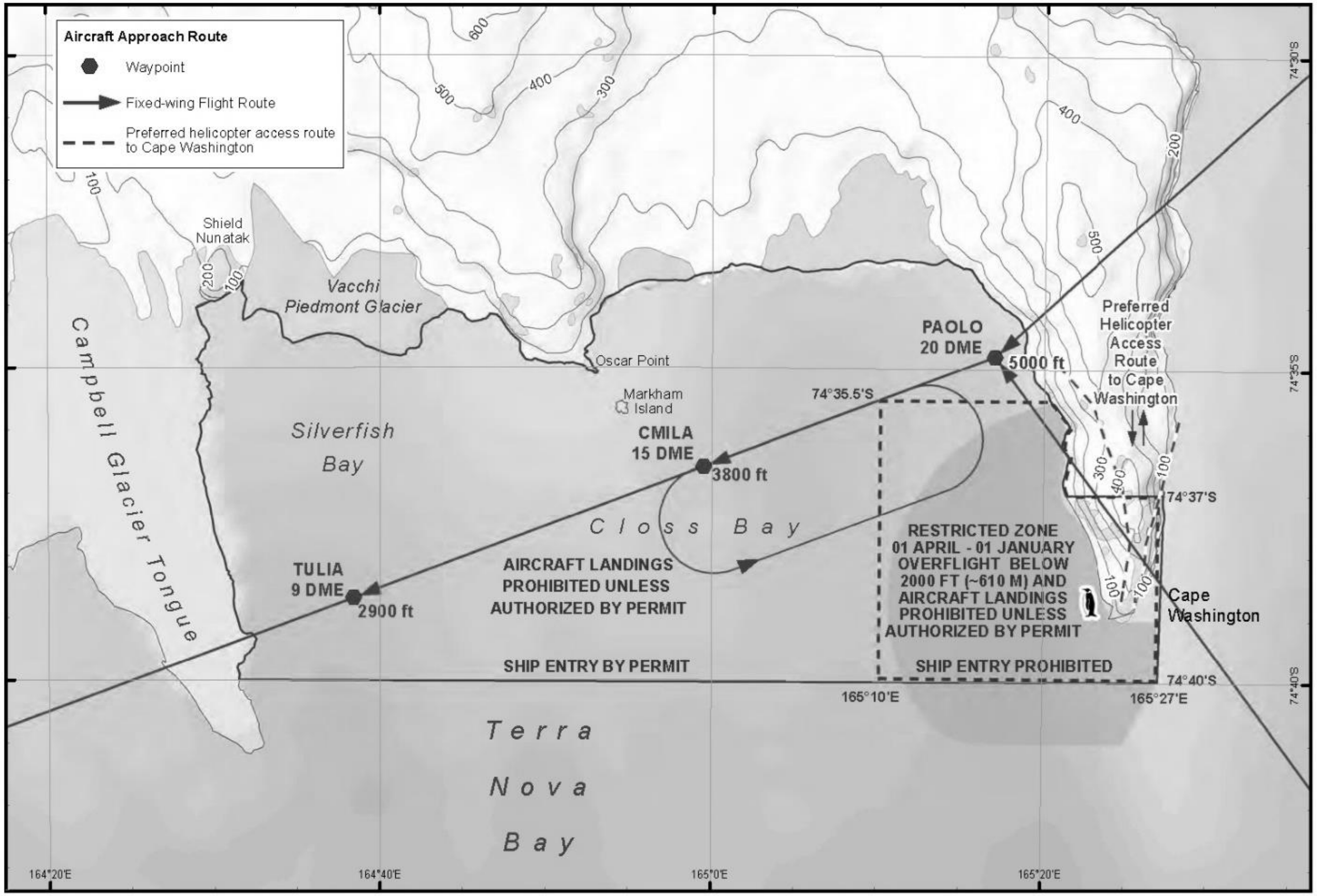
Map 2: ASPA No. 173 - Cape Washington & Silverfish Bay - topographic map

26 Mar 2024
United States Antarctic Program
Environmental Research & Assessment

Permanent ice
Ice shelf
Ice tongue
Ice free ground
Contour (100 m)
Peak
Antarctic Specially Protected Area
Restricted Zone
Airfield Camp, Seasonal
Refuge, Seasonal
Station, Seasonal
Station, Year-Round
Sea ice runway
Emperor breeding area (approx.)
Usual Emperor penguin colony centroid

0 5
Kilometers
N

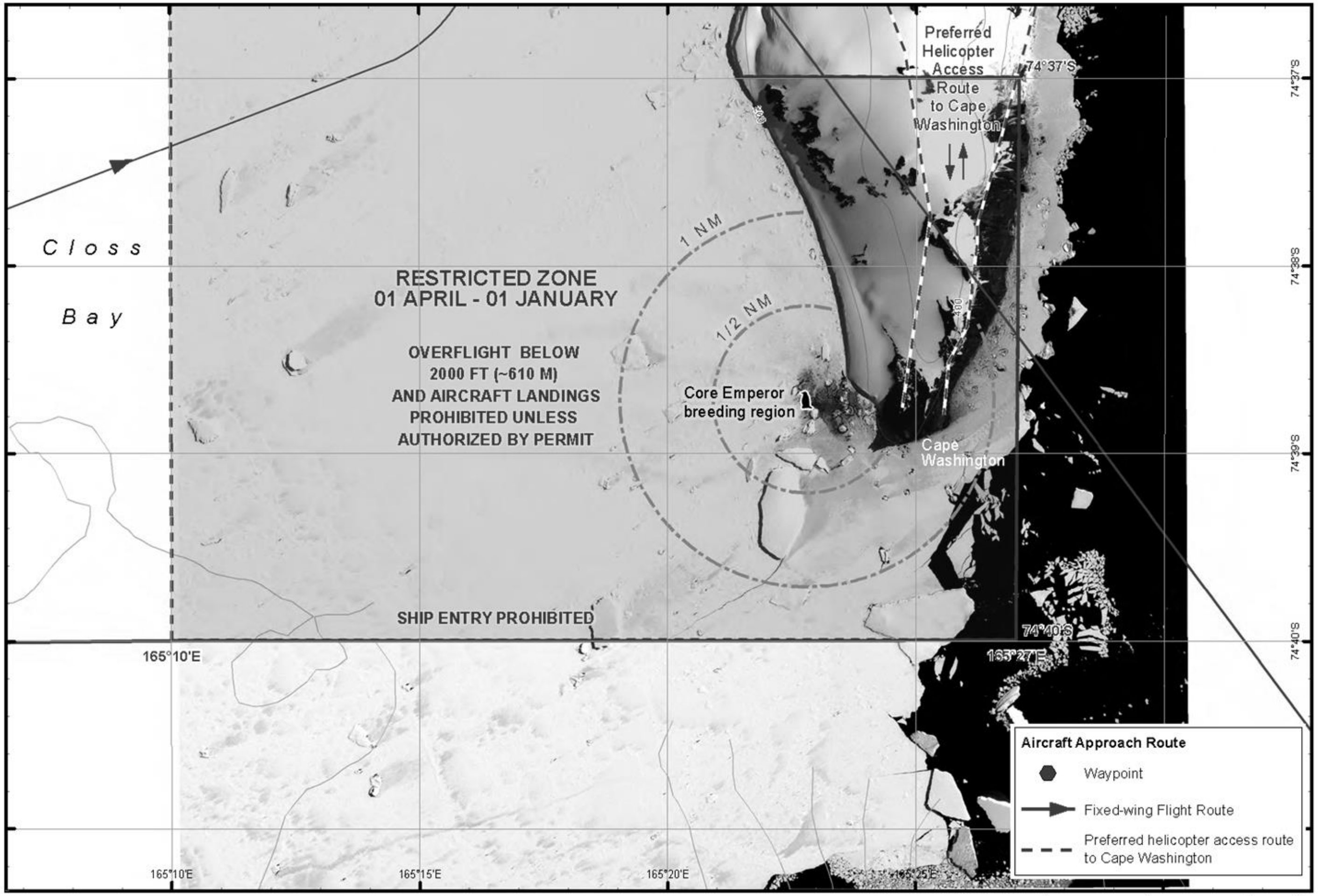
Projection: Lambert Conic Conformal,
Spheroid and Datum: WGS84.
Data sources: Topography / coastline: ADD v7.3 / v7.5 (2020-23);
Bathymetry: IBCSO v2.0 (2022); ASPA boundaries: ERA (2024);
Stations: COMNAP (2020), updated ERA 2024.



Map 3: ASPA No.173 - Cape Washington & Silverfish Bay - Access guidance

26 Mar 2024
United States Antarctic Program
Environmental Research & Assessment

Projection: Lambert Conic Conformal, Spheroid and Datum: WGS84.
Data sources: Topography: ADD v.7.5; Bathymetry: IBCSO (2022); ASPA Boundaries: ERA (2023); Aircraft Approach: PNRA (2006).



Map 4: ASPA No. 173 - Cape Washington & Silverfish Bay - Restricted Zone

26 Mar 2024
United States Antarctic Program
Environmental Research & Assessment

Peak
Contour (200 m)
Bathymetry (100 m)
Ice free area
Permanent ice
Ice shelf / Ice tongue
Antarctic Specially Protected Area (ASPA) boundary
Restricted Zone
Distance buffers from Emperor penguin colony centroid for reference
Usual Emperor penguin colony centroid
Emperor breeding area (approx.)

0 1 2
Kilometers

Projection: Lambert Conic Conformal.
Spheroid and Datum: WGS84.
Data sources: Topography: ADD v.5;
Bathymetry: PNRA (2000); Aircraft Approach: PNRA (2006);
Satellite imagery: Ikonos: 30 Dec 2011.
(Image © 2011 Digital Globe)

Measure 14 (2024)

Antarctic Specially Protected Area No 175 for(High Altitude Geothermal sites of the Ross Sea region): Revised Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XIV-5 (1987), which designated the Summit of Mount Melbourne, Victoria Land as Site of Special Scientific Interest ("SSSI") No 24, and annexed a Management Plan for the Site;
- Resolution 3 (1996) and Measure 2 (2000), which extended the expiry dates for SSSI 24;
- Recommendation XVI-8 (1991), which designated Cryptogam Ridge, located within SSSI 24, as Specially Protected Area ("SPA") No 22, and annexed a Management Plan for the Area;
- Recommendation XIII-8 (1985), which designated Tramway Ridge as SSSI 11, and Measures 2 (1995) and 3 (1997), which adopted revised Management Plans for the Site;
- Decision 1 (2002), which renamed and renumbered SSSI 24 and SPA 22 as merged ASPA 118 (Summit of Mount Melbourne, Victoria Land), and renamed and renumbered SSSI 11 as ASPA 130;
- Measures 2 (2003) and 5 (2008), which adopted revised Management Plans for ASPA 118;
- Measure 1 (2002), which adopted a revised Management Plan for ASPA 130;
- Measure 13 (2014), which merged ASPAs 118 and 130 as ASPA 175 (High Altitude Geothermal sites of the Ross Sea region), and adopted a Management Plan for the Area;

Recalling that Resolution 3 (1996) was designated as no longer current by Decision 1 (2011);

Recalling that Measure 2 (2000) did not become effective and was withdrawn by Measure 5 (2009);

Recalling that Recommendation XVI-8 (1991) and Measure 2 (1995) did not become effective and were designated as no longer current by Decision 1 (2011);

Recalling that Measure 3 (1997) did not become effective and was withdrawn by Measure 6 (2011);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a revised Management Plan for ASPA 175;

Desiring to replace the existing Management Plan for ASPA 175 with the revised Management Plan;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 175 (High Altitude Geothermal sites of the Ross Sea region), which is annexed to this Measure, be approved; and
2. the Management Plan for Antarctic Specially Protected Area No 175 annexed to Measure 13 (2014) be revoked.

Management Plan for Antarctic Specially Protected Area (ASPA) No 175

HIGH ALTITUDE GEOTHERMAL SITES OF THE ROSS SEA REGION

(including parts of the summits of Mount Erebus, Ross Island and Mount Melbourne and Mount Rittmann, northern Victoria Land)

Introduction

There exist a few isolated sites in Antarctica where the ground surface is warmed by geothermal activity above the ambient air temperature. Steam emissions from fumaroles (openings at the Earth's surface that emit steam and gases) condense forming a regular supply of water which, coupled with warm soil temperatures, provides an environment that selects for a unique and diverse assemblage of organisms. Geothermal sites are rare and small in extent covering no more than a few hectares on the Antarctic continent and circumpolar islands (or maritime sites). The biological communities that occur at continental geothermal sites are at high altitude and differ markedly to those communities that occur at maritime geothermal sites due to the differences in the abiotic environment.

There are three high altitude geothermal sites in the Ross Sea region, known to have unique biological communities. These are the summits of Mount Erebus, on Ross Island, and Mount Melbourne and Mount Rittmann, both in northern Victoria Land. The only other known high altitude site in Antarctica where evidence of fumarolic activity has been seen is at Mount Berlin in Marie Byrd Land, West Antarctica, although no biological research has been conducted at this site.

High altitude geothermal sites are vulnerable to the introduction of new species, particularly from human vectors, as they present an environment where organisms typical of more temperate regions can survive. These once isolated sites are now more frequently visited by humans for science and recreation, both of which require logistical support. Species from sites within Antarctica, and locally non-native to geothermal sites, or from regions away from Antarctica, may inadvertently be introduced to the Area through human activity.

High altitude geothermal sites are also vulnerable to physical damage to the substrate from trampling and over sampling because changes in the soil structure can affect the location and rate of steam emissions in which biological communities occur. The limited extent and fragility of these biological communities highlights the need for protection.

The primary reason for the designation of high altitude geothermal sites in the Ross Sea region as an Antarctic Specially Protected Area is to protect the outstanding ecological values, specifically the unique biological communities that occur in an environment where the selective factors are unique resulting in an assemblage of organisms not found anywhere else in the world. The biological communities are extremely vulnerable to the introduction of non-native species of plants, animals, microorganisms and non-sterile soils from biologically distinct regions within Antarctica and from regions outside Antarctica and to physical disturbance from trampling and oversampling through human activity. While high altitude geothermal sites are protected primarily for their outstanding ecological values (specifically the biological communities), they are also protected for their other scientific values such as microbiology, botany, terrestrial biology, geomorphology and geology.

The Area comprises three high altitude geothermal sites; Tramway Ridge on the summit of Mount Erebus (77°31'S; 167°06'E), three locations of geothermal activity on the summit of Mount Melbourne (74°21'S; 164°42'E), and the summit of Mount Rittmann (73°28'S; 165°37'E) (Map 1).

Tramway Ridge, Mount Erebus was originally designated in Recommendation XIII-8 (1985) as a Site of Special Scientific Interest (SSSI) No 11 after a proposal by New Zealand on the grounds that the Area supports an unusual ecosystem of exceptional scientific value to botanists and microbiologists. The Management Plan was revised and adopted in Measure 2 (1995) and Measure 3 (1997). The site was re- designated Antarctic Specially Protected Area (ASPA) No 130 in Decision 1 (2002). The Management Plan was revised and adopted in Measure 1 (2002).

The summit of Mount Melbourne was originally designated in Recommendation XVI-5 (1987) as SSSI No 24, after proposals by New Zealand and Italy, on the grounds that the Area contains geothermal soils that support a unique and diverse biological community. An area enclosed in SSSI No 24, Cryptogam Ridge, was designated as Special Protected Area (SPA) No 22 in Recommendation XVI-8 (1991). SSSI No 24 and SPA No 22 were re-designated as ASPA No 118a and 118b respectively in Decision 1 (2002). A merged Management Plan designating both Areas as ASPA 118 was adopted in Measure 2 (2003), with Prohibited and Restricted Zones providing for more stringent access conditions within the former SPA No 22. Revised Management Plans were adopted through Measure 5 (2008) and Measure 13 (2014). The ATCM reaffirmed the Management Plan continued to remain in force in 2019.

Mount Rittmann was discovered during the 4th Italian Expedition in the 1988/89 field season. During the 6th Italian Expedition in the 1991/92 field season, fumaroles and ground heated by geothermal activity were discovered in a small volcanic crater.

Both Mount Erebus and Mount Melbourne are visited annually by scientists from a wide range of disciplines and for management reasons (e.g. survey marks, radio repeaters and field huts). Mount Rittmann has had an increased number of visitors since its discovery.

Tramway Ridge, Mount Erebus is situated in Environment S – McMurdo – South Victoria Land Geologic based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and in Region 9 – South Victoria Land based on the Antarctic Conservation Biogeographic Regions (Resolution 6 (2012)).

Both Mount Melbourne and Mount Rittmann are situated in Environment U – North Victoria Land Geologic based on the Environmental Domains Analysis for Antarctica and in Region 8 – North Victoria Land based on the Antarctic Conservation Biogeographic Regions.

This is the only ASPA or ASMA in the Ross Sea region designated to protect geothermal environments. There is only one other ASPA within the protected area system that protects a geothermal environment, ASPA 140 Parts of Deception Island, South Shetland Islands. However, ASPA 140 protects biological communities of maritime Antarctica which significantly differ from high altitude biological communities.

The designation of these sites as a protected area complements the Antarctic protected areas system because the Area: (i) contains the known locations of Antarctic high altitude geothermally heated ground, which, due to the Area's physical and chemical characteristics, supports biological communities that are both regionally and globally unique, and (ii) is vulnerable to human interference, particularly the potential for the introduction of non-native species from biologically distinct regions within Antarctica and from regions outside Antarctica but also between geothermal locations at a specific site, and damage from trampling and over sampling. The Area is considered to be of sufficient size at each site to provide adequate protection of the values identified.

1. Description of values to be protected

The Ross Sea region has considerable areas of late Neogene and Quaternary volcanism. However, only three sites, Mounts Erebus, Melbourne and Rittmann, have been confirmed to show signs of present day geothermal activity. Fumaroles (opening in the ground emitting steam) and steaming warm ground are the surface manifestation of geothermal activity at these sites. Hollow ice towers or ice pinnacles (chimneys) can form around fumaroles up to many metres in diameter and height, formed by the condensation and freezing of water vapour. Ice and snow hummocks are also present over geothermally heated ground. Other areas of heated ground are commonly ice free during summer and maintain surface temperatures greater than ambient air temperatures.

Most areas of fumaroles and warm ground are on or adjacent to the summit calderas of each volcano, however areas of surface activity do extend down slope on the northwest side of Mount Melbourne. Although these areas in the Ross Sea region are isolated to the high altitude summits of volcanoes, the environment provides resident biological communities with a regular supply of free water (from condensed steam and melting of snow), temperatures suitable for growth and physical protection or shelter from extreme weather (under ice and snow hummocks). Because of the considerable isolation and unusual set of evolutionary selection pressures, some researchers believe that these habitats may host some of the earliest forms of life on the planet, many of which have still not been described.

The vegetation communities at high altitude continental geothermal sites differ markedly from other maritime geothermal sites in Antarctica and the sub-Antarctic. The communities in the Ross Sea region are dominated by algae with a low diversity of species present compared with maritime Antarctic sites. The latter are dominated by bryophytes and have high species diversity across several groups. In the Ross Sea region geothermally heated sites, diatoms are absent and only one possible lichen has been found, this being an unidentified black crust reported from Mount Melbourne. Twelve species of bryophytes, algae and protozoa that occur at one or more of these sites have no other known Antarctic record (Annex 1, Table 1). Although these areas are located within the same geographic region, the vegetation communities at each of the three sites differ from one another, with five of the twelve species of bryophytes, algae and protozoa, which have no other Antarctic record, reported from only a single geothermal site in the Ross Sea region (Annex 1, Table 1).

The microorganisms in these communities have been poorly characterised, or in some cases remain uncharacterised. However recent studies are beginning to reveal the unique and diverse microbial communities present. Studies on extremophiles (organisms that thrive in physically or geochemically extreme environments) are recognised as useful for understanding the evolution of life as the first inhabitants of Earth possibly evolved in extreme habitats. Not all microorganisms identified from these sites are thermophiles (organisms that have their optimum growth rates at high temperatures typically between 45° and 122°C).

Some grow optimally at mesophilic temperatures (moderate temperatures typically between 20°C and 45°C) some distance away from the fumaroles (Annex 1, Table 2). This highlights the vulnerability of these biological communities to physical disturbance of the substrate from trampling or sampling.

While the environmental conditions (i.e. regular supply of free water, temperatures suitable for growth and physical protection or shelter from extreme weather) at the three isolated high altitude geothermal sites in the Ross Sea region superficially appear similar, the biological communities differ between the sites. A possible explanation is that the physico-chemical differences of the soils (e.g. pH, nutrient availability, substrate grain size, moisture content) select for a unique assemblage of species at each site. An alternative hypothesis suggests these environments may have been occasionally colonised by viable propagules carried by wind from other sites in Antarctica or from circumpolar islands or other continents. Dispersal may be rare events resulting in the colonization of the soil by viable propagules of the few species that are deposited at each site. For example, several of the isolated strains of B. fumarioli from Mount Rittmann showed remarkable similarity with strains identified from the Candlemas Islands, South Sandwich archipelago even though the two sites are over 5,600 km apart. Colonization from a common source and more likely aerial dispersal of free spores or potential human contamination has been proposed. More simply, the differences could be due to stochastic factors.

An increase in human activity at the Area's three sites emphasises the need for adequate protective measures in order to reduce the possibility of the introduction of new organisms by a human vector.

The highly unusual biological communities at all three sites are of outstanding scientific value. These sites provide insights into biogeography and dispersal as well as physiology of Antarctic organisms operating under unusual conditions. The limited geographical extent of the Area's ecosystems, the vulnerability of the sites to the introduction of non-native species from biologically distinct regions within Antarctica and from regions outside Antarctica but also between geothermal locations at a specific site and ground disturbance is such that appropriate management of these sites is necessary to ensure their long term protection.

2. Aims and objectives

The management of high altitude geothermal sites of the Ross Sea region aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human presence, disturbance and sampling within the Area;
- prevent or minimise the possibility of the introduction of non-native species (e.g. plants, animals, microorganisms) and non-sterile soils into the Area from biologically distinct regions within Antarctica and from regions outside of Antarctica and between geothermal locations at a specific site;
- preserve a part of the natural ecosystem of each of the Area's three sites, which are declared Prohibited Zones, as reference areas for future scientific studies;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not compromise the values for which the Area is protected, specifically the biological communities and geology in the Area's three sites;
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management Activities

The following management activities shall be undertaken to protect the values of the Area:

- Information on the location of the Area's three sites, stating special restrictions that apply, shall be displayed prominently, and a copy of this Management Plan shall be made available, at National Antarctic Programme stations, and research, management or field huts close to the Area's three sites.
- All pilots operating in the region shall be informed of the location, boundaries

and restrictions applying to entry and landings at the three sites within the Area.

- National programmes shall ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and charts.
- Signs and/or boundary markers illustrating the locations of the Area's three sites, with clear statements of entry restrictions, shall be placed as appropriate at locations on the boundary of the individual sites (and Prohibited Zones) to help avoid inadvertent entry.
- Markers, signs or other structures erected within the Area for scientific, management or essential communication purposes shall be secured and maintained in good condition and removed when no longer required.
- The Area shall be visited as necessary, preferably no less than once every five years, to assess whether it continues to serve the purposes for which it was designated and to ensure that management and maintenance measures are adequate.
- National Antarctic Programmes operating in the Area shall consult together to ensure the above management activities are implemented. In particular, National Antarctic Programmes are encouraged to consult with one another to prevent excessive sampling of soil and biological material within the Area. Also, National Antarctic Programmes are encouraged to consider joint implementation of guidelines intended to minimize the introduction and dispersal of non-native species within the Area and between the Area's three sites.
- National Antarctic Programmes operating in the Area should coordinate planned activities with other research programmes with an interest in the Area to the maximum extent practicable.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: High altitude geothermal sites of the Ross Sea region location map. Horizontal Datum: WGS84, Antarctica Polar Stereographic Projection. Data Source: Base Vector Data, Antarctic Digital Database Version 6.

Map 2: ASPA 175 Tramway Ridge, Mount Erebus topographical map. Horizontal Datum: WGS72, Camp Area Projection. Vertical Datum: Mean Sea Level. Data Sources – Survey Data: Department of Survey and Land Information (DOSLI) Survey Plan 37/142 (Plan sourced from Land Information New Zealand (LINZ)); Contours and geothermally heated area: Data supplied by the University of Canterbury; Main map and inset overview diagram imagery: Digital Globe World View-2 Satellite (0.5 m resolution). Imagery date 23 January 2011. Imagery provided by the Polar Geospatial Centre, Department of Earth Sciences, University of Minnesota; Inset site photograph: Terrestrial photograph of Tramway Ridge geothermally heated ground looking north upslope. Image taken 26 November, 2010. Image provided by University of Waikato.

Map 3: ASPA 175 Cryptogam Ridge and Geothermal Slope, Mount Melbourne topographical map. Horizontal Datum: WGS84, UTM Zone 58S Projection. Vertical Datum: WGS84. Data Sources – Contours and protected areas derived from data collected during field survey undertaken 17 November, 2012 by LINZ; Main map and inset overview diagram imagery: DigitalGlobe GeoEye satellite imagery (0.5 m resolution). Imagery date 14 November, 2011. Imagery provided by the Polar Geospatial Centre, Department of Earth Sciences, University of Minnesota; Inset site photograph: Terrestrial photograph taken looking northeast with Cryptogam Ridge in the foreground. Image taken 17 November, 2012. Image provided by Antarctica New Zealand.

Map 4: ASPA 175 Northwest slope, Mount Melbourne topographical map. Horizontal Datum: WGS84, UTM Zone 58 Projection. Vertical Datum: WGS84. Data Sources - Main map and inset overview diagram imagery: Digital Globe World View-2 Satellite (0.5 m resolution). Imagery date 14 November, 2011. Imagery provided by the Polar Geospatial Centre, Department of Earth Sciences, University of Minnesota; Inset site photograph: Terrestrial photograph of northwest slope geothermally heated ground looking east. Image taken in 2002. Image provided by R. Bargagli and the PNRA (the Italian National Programme for Antarctic Research).

Map 5: ASPA 175 Mount Rittmann topographical map. Horizontal Datum: WGS72, UTM Zone 58S Projection. Vertical Datum: WGS84 Vertical Datum. Data Sources – Contours and protected areas derived from data collected during field survey undertaken 16 November, 2012 by LINZ; Main map: DigitalGlobe World View-1 satellite imagery (0.5 m resolution). Imagery date 3 March, 2009. Imagery provided by the Polar Geospatial Centre, Department of Earth Sciences, University of Minnesota; Inset site photograph: Terrestrial photograph taken looking north toward Mount Rittmann remnant caldera. Image taken 16 November, 2012. Image provided by Antarctica New Zealand.

6. Description of the Area

6(i) Geographical co-ordinates, boundary markers and natural features

This ASPA consists of three sites including Tramway Ridge on the summit of Mount Erebus, three locations on the summit of Mount Melbourne and the summit of Mount Rittmann.

- *Tramway Ridge, Mount Erebus*

Site Description: Mount Erebus, (77° 31’S, 167° 06’E) is the largest and most active volcano in Antarctica and it is located on Ross Island (Map A). It rises to an altitude of 3,794 m above sea level. It is a unique stratovolcano with a convecting anorthoclase phonolite lava lake in the main crater. The predominant rock type, and the only one which crops out near the summit, is anorthoclase phonolite.

The steep slopes of the main crater flatten out to an extensive plateau at an altitude of about 3,200 – 3,500 m above sea level except on the south east slopes where the outer slope continues to drop steeply.

Tramway Ridge is a ridge that rises to approximately 3,450 m above sea level on the northwest slope of the main crater (Map 2; Inset 1). The site is located along this ridge approximately 1.5 km from the main crater. It is the most extensive area of geothermally heated ground on the summit of Mount Erebus, though locations of geothermally heated ground are widespread at the summit.

The site is, in general, on a gentle slope of about 5°, with much of the ice-free ground in the form of terraces which have a typical vertical height of about 0.5 m and steeper sides of up to 30° in slope. The steep sides of the terraces are colonised by the majority of visible vegetation, and it is from these sides that visible steam emissions occur. Visible vegetation covers about 16% of the site. Low ice hummocks, up to approximately one metre in height and formed where steam has frozen, are distributed over the site. Ground temperatures of up to about 75°C have been recorded at 4 cm depth.

Boundaries: The boundary of the designated site is defined as a rectangle of 200 m by 200.8 m which encompasses most of the geothermally heated ground of lower Tramway Ridge. The western boundary of the site at the NW boundary corner extends from the coordinates 77°31' 01.853" S; 167°06' 21.251"E (Point A) south to the SW boundary corner at 77°31' 08.327" S; 167°06' 20.686"E (Point E). The boundary then extends east to the SE boundary corner at 77°31' 08.448" S; 167°06' 50.521"E (Point D). The boundary then extends north to the NE boundary corner at 77°31' 01.976" S; 167°06' 51.074"E (Point B) (Map 2).

The site is divided into two parts of almost equal size, the northern half being a Prohibited Zone (Map 2). The boundaries of the Prohibited Zone are described in Section 6(v).

The boundaries of the site (marked by boundary markers at each corner), the Prohibited Zone and prominent features are shown on Map 2. The boundary points of the Area and Prohibited Zone are marked by a boundary marker (Map 2; Point A-F) with a further boundary marker (Point H) located partway along the southern boundary of the Prohibited Zone. Two boundary markers (G and H) have been offset to better facilitate people working within the ASPA to identify the southern boundary of the Prohibited Zone and avoid entering the area (Map 2; ASPA Boundary Table of Coordinates). When bamboo flags are inserted in each boundary marker, the boundaries of the site and Prohibited Zone are visible when working in the ASPA.

- *Mount Melbourne*

Site Description: Mount Melbourne (74º 21’S 164º 42’E) is a stratovolcano located in northern Victoria Land, between Wood Bay and Terra Nova Bay, on the western side of the Ross Sea, and about 10 km east of Campbell Glacier (Map A). It rises to an altitude of 2,733 m above sea level.

Mount Melbourne is part of the McMurdo Volcanic Group, which is a line of dormant and extinct volcanoes running along the coast of Victoria Land. The Mount

Melbourne region is thought to be late Quaternary in age and the most recent eruption may have been as little as 150 years ago. The volcanic rocks have been described as trachyte to trachyandesite on the mountain itself, with basalt at its base.

Mount Melbourne is an almost perfect low-angle volcanic cone with locations of geothermally heated ground, fumaroles, and ice towers scattered around the summit crater and on some upper parts of the mountain. The summit caldera is about one km in diameter and forms the névé for a westward flowing glacier. Several smaller basaltic cones and mounds occur near the base and on the flanks of the mountain. Geothermally heated ground is generally marked by snow-free, steaming ground or fumaroles and ice towers or pinnacles up to one metre in height. Surface soil temperatures have been recorded up to 50°C at depths of a few centimetres.

Boundaries: The site consists of three separate locations, two on the main summit crater (Map 3) and a third on the northwest slope of the mountain (Map 4). On the south-eastern rim of the main summit crater of Mount Melbourne, there are two adjacent designated locations.

The first location, Cryptogam Ridge, is a distinct crescent shaped ridge and consists of areas of snow-covered unheated ground, snow-free geothermally-heated ground and ice-hummocks covering steam emissions that extends c. 40 m in all directions from the ridge line.

The western boundary of the site from the NW boundary corner extends from the coordinates 74°21' 20.389" S; 164°41' 31.652" E (Point 1A) south approximately 50 m to the SW boundary corner at 74°21' 22.096" S; 164°41' 32.551" E (Point 1N). The boundary then extends east following the crescent shape of Cryptogam Ridge to unmarked points at 74°21' 21.383" S; 164°41' 38.254" E (Point 1M); 74°21' 20.840" S; 164°41' 45.230" E (Point 1L); 74°21' 21.220" S; 164°41' 49.934" E (Point 1K); 74°21' 21.815" S; 164°41' 54.574" E (Point 1J); 74°21' 22.588" S; 164°41' 58.044" E (Point 1I) to the SE boundary corner at 74°21' 24.103" S; 164°42' 00.579" E (Point 1H). The boundary then extends north to the NE boundary corner at 74° 21' 23.355" S; 164°42' 07.010" E (Point 1G). The northern boundary extends west following the crescent shape of Cryptogam Ridge to unmarked points at 74°21' 21.523" S; 164°42' 03.989" E (Point 1F); 74°21' 20.117" S; 164°41' 57.869" E (Point 1E); 74°21' 19.307" S; 164°41' 51.137" E (Point 1D); 74°21' 19.153"S; 164°41' 45.329" E (Point 1C); 74°21' 19.650" S; 164°41' 37.695" E (Point 1B) to the NE boundary corner (Point 1A) (Map 3). Both the northern and southern boundaries are situated below the ice free ridge.

Cryptogam Ridge is divided into two parts with the western portion designated as a Prohibited Zone (Map 3). The boundaries of the Prohibited Zone are described in Section 6(v).

The second location (Geothermal Slope) on the south-eastern rim of the main summit crater of Mount Melbourne is adjacent to Cryptogam Ridge on a slope leading up the eastern rim of the summit crater (Map 3; Inset 2). Geothermal activity is evident on the hill slope as crevasses and ice towers extending up the steep caldera rim, approximately 50 m wide (Map 3). The northern boundary of the site from the NW boundary corner extends from the coordinates 74°21' 13.740" S; 164°42' 01.816" E (Point 2A) south approximately 50 m to the SW boundary corner at 74°21' 15.620" S; 164°42' 03.474" E (Point 2D). The boundary then extends east up the slope to the SE boundary corner at 74°21' 14.567" S; 164°42' 12.729" E (Point 2C), then north to the NE boundary corner at 74°21' 12.865" S; 164°42' 08.972" E (Point 2B) (Map 3).

The third location (Northwest Slope) is on the northwest slopes of the volcano (Map 4) approximately 1.5 km northwest of from Cryptogam Ridge. Geothermal activity is evident as a northwest to southeast trending line of ice towers and small patches of bare ground along the edge of a steep cliff. The boundaries for the location were not surveyed in the field but obtained via inference from satellite imagery. The northern boundary of the site from the NW boundary corner extends from the coordinates 74°21' 00" S; 164°39' 02" E (Point 3A) south downslope to the SW boundary corner at 74°21' 11" S; 164°39' 02" E (Point 3D). The boundary then extends east to the SE boundary corner at 74°21' 11" S; 164°42' 05" E (Point 3C), then north up slope to the NE boundary corner at 74°21' 00" S; 164°40' 05" E (Point 3B) (Map 4).

- *Mount Rittmann*

Site Description: Mount Rittmann (73° 28'S, 165° 37'E) is located in the Mountaineer Range on the south side of the Aviator Glacier, between the Pilot Glacier and the head of the Icebreaker Glacier in northern Victoria Land (Map 5). It rises to an altitude of 2,600 m above sea level and is approximately 103 km north of Mount Melbourne and approximately 50 km inland from the coast.

Fumaroles and geothermally heated ground occur within a single outcrop at the summit of Mount Rittmann in a minor caldera rim at approximately 2,000 m above sea level. The entire site is surrounded by glacial ice (Map 5; Inset). The site consists of a rough and unstable steep slope approximately 300 m wide and 80 m high (Map 5). The ground consists of pyroclastic rocks and volcanic debris in a sandy matrix.

Two adjacent ice-free areas are situated at the centre of the site. Ice free geothermally heated ground and fumaroles dominate the areas with ice hummocks and ice towers generally situated around the edges of the ice-free areas and along the rim of the caldera structure. Around the fumaroles the ground is covered by a whitish efflorescence and patches of moss are visible on the surface of these areas. Surface soil temperatures of between 50°C and 63°C have been recorded at 10 cm depth. The western side of the site is covered in ice, but geothermal activity is visible along the caldera rim as ice towers or steaming ground.

Boundaries: The site encompasses the entire exposed caldera of Mount Rittmann. The western most boundary corner is located at the western edge of the caldera rim at 73°28' 18.797"S; 165°36' 43.851"E (Point A). The boundary follows the caldera rim east to unmarked points at 73°28' 16.818" S; 165°36' 54.698" E (Point B); 73°28' 16.290" S; 165°37' 00.144" E (Point C); 73°28' 16.405" S; 165°37' 04.438" E (Point

D); 73°28' 17.655" S; 165°37' 12.235" E (Point E); 73°28' 18.024" S; 165°37' 14.468" E (Point F); 73°28' 19.823" S; 165°37' 16.943" E (Point G); 73°28' 20.628" S; 165°37' 20.089" E (Point H); 73°28' 21.530" S; 165°37' 21.567" E (Point I) to the easternmost boundary corner at 73°28' 22.015" S; 165°37' 23.817" E (Point J).

The boundary then extends south (downslope) to the SE boundary corner at 73°28' 23.436" S; 165°37' 20.540" E (Point K).The boundary then follows the bottom of the steep slope below the caldera rim and ice free areas to unmarked points at 73°28' 22.414" S; 165°37' 17.302" E (Point L); 73°28' 20.945" S; 165°37' 13.936" E (Point M); 73°28' 19.430" S; 165°37' 08.865" E (Point N); 73°28' 18.558" S; 165°37' 03.457" E (Point O); 73°28' 18.722" S; 165°37' 56.296" E (Point P); 73°28' 19.778" S; 165°36' 50.065" E (Point Q), then upslope to the westernmost boundary corner (Point A).

The eastern ice free area is designated as a Prohibited Zone (Map 5). The boundaries of the Prohibited Zone are described in Section 6(v).

6(ii) Access to the Area

Access conditions applicable to all sites are listed in Section 7(ii). Site specific conditions for accessing each site are listed below.

- *Tramway Ridge, Mount Erebus*

- Due to the high altitude of Tramway Ridge, helicopters should not be heavily loaded.
- There is a designated helicopter landing site approximately 250 m northwest of the site at 77°31.0' S; 167°05.8' E or the helicopter may land near the Lower Erebus Hut (US) (77°30.63' S; 167°08.84'E) or near the summit of Mount Erebus (77°31.54'S; 167°08.32'E) (Map 2; Inset 1).
- When travelling between the summit of Mount Erebus and Lower Erebus Hut, it is strongly encouraged to keep to the preferred snowmobile route, and wherever practical, stay at least 200 m away from the site boundary (Map 2; Inset 1).
- Access to the site should primarily be from Boundary Marker D (Map 2; Inset 2).

- *Mount Melbourne*

- There is a designated helicopter landing site approximately 40 m from Cryptogam Ridge at 74° 21' 24.6" S; 164°41' 56.0" E or at the alternative landing site at the summit of Mount Melbourne at 74°20' 57.7"S; 164°41' 28.9"E (Map 3 and Map 4; Inset 1).

- *Mount Rittmann*

- The site is a steep unstable slope surrounded by glacial ice. Helicopters shall only land, where it is safe to do so, on glacial ice. When landing a helicopter in front of the slope, to the maximum extent practical (and that is safe), helicopters should not land within 100 m of the sites boundary. When landing a helicopter above the slope, to the maximum extent practical (and that is safe), helicopters should not land within 25 m of the site boundary (caldera rim) (Map 5).

6(iii) Location of structures within and adjacent to the Area

- *Tramway Ridge, Mount Erebus*

- There are seven boundary markers indicating the boundary corner points and the southern boundary of the Prohibited Zone (Map 2; ASPA Boundary Table of Coordinates). A marker flag, attached to a pole, may be fixed to the boundary markers to define the Area and avoid inadvertent entry to the Area or the Prohibited Zone.
- There are three survey marks adjacent to the site (Map 2; Survey Mark Table of Coordinates).
- The Lower Erebus Hut is located ~1 km northeast of the site at 3,400 m (Map 2; Inset).

- *Mount Melbourne*

- There are two survey marks. MM01 is adjacent to Location 2 and is a metal mark set into a rock. MM02 is adjacent to Location 1 and consists of a metal tube set into a concrete base (Survey Mark Table of Coordinates; Map 3).
- National programmes operating in the area maintain a number of installations (weather stations, radio repeater and science experiments) on the highest summit of Mount Melbourne (Map 3; Inset 1).

- *Mount Rittmann*

- There are two survey marks along the northeast boundary edge above the caldera rim (Map 5; Survey Mark Table of Coordinates). Both survey marks are a metal mark set into a rock.

6(iv) Location of other protected areas in the vicinity

- *Tramway Ridge, Mount Erebus*

The nearest protected areas to Tramway Ridge, Mount Erebus are on Ross Island (Map A).

- ASPA 116: New College Valley, Caughley Beach, Cape Bird is 37 km to the north north-west.
- ASPA 156: Lewis Bay, Mount Erebus, Ross Island is 14 km to the northeast.
- ASPA 124: Cape Crozier, Ross Island is 54 km to the east.
- ASPA 122: Arrival Heights, Hut Point Peninsula, Ross Island and ASPA 158: Hut Point, Ross Island are 35 km and 38 km to the south, respectively.

- ASPA 155: Cape Evans, Ross Island is 21 km to the southwest.
- ASPA 121: Cape Royds, Ross Island and ASPA 157: Backdoor Bay, Cape Royds, Ross Island are 23 km to the west.

- *Mount Melbourne*

The nearest protected areas to Mount Melbourne are in Terra Nova Bay (Map A).

- ASPA 161: Terra Nova Bay, Ross Sea is 45 km to the southwest.
- ASPA 165: Edmonson Point, Wood Bay, Ross Sea is 13 km to the east.
- ASPA 173: Cape Washington and Silverfish Bay, northern Terra Nova Bay, Ross Sea is 30 km to the south.
- ASPA 178: Inexpressible Island and Seaview Bay, Ross Sea, is 67 km to the southwest.

- *Mount Rittmann*

Mount Rittmann is ~101 km north of Mount Melbourne. There are no protected areas within a 100 km radius of Mount Rittmann (Map A).

6(v) Special zones within the Area

Access to the Prohibited Zone at each of the Area's three sites is strictly prohibited until such time that it is agreed, during a Management Plan review, that access should be allowed.

- *Tramway Ridge, Mount Erebus*

The northern half of the site (Map 2) is designated a Prohibited Zone in order to preserve part of the site as a reference area for future scientific studies, while the southern half of the site (which is similar in biology, features and character) is available for scientific research.

The southern boundary of the Prohibited Zone is defined by a line from 77°31' 05.103"S; 167°06' 20.968"E (Point F) to 77°31' 05.224"S; 167°06' 50.792"E (Point C) that bisects the Area. The other three boundaries of the Prohibited Zone are defined by the boundaries of the Area with Point C (77°31' 05.224"S; 167°06' 50.792"E "E) to Point B (77°31' 01.967"S; 167°06' 51.074"E) making up the eastern boundary; Point B to Point A (77°31' 01.853"S; 167°06' 21.251"E) making up the northern boundary; and Point A to Point F making up the western boundary.

The southern boundary of the Prohibited Zone may be identified, approximately, on the ground as an extension westwards of the south ridge line of lower Tramway Ridge. When standing in the Area, the boundary markers (G, H and C) allow the bisecting line to be clearly visible.

- *Mount Melbourne*

The westernmost 100 m of Cryptogam Ridge (Location 1; Map A2) is designated a Prohibited Zone, in order to protect the most extensive stand of vegetation and preserve a part of the site as a reference area for future scientific studies, while the remainder of Cryptogam Ridge and Location 2 and 3 are available for scientific research.

The western boundary of the site from the NW boundary corner extends from the coordinates 74°21' 20.389" S; 164°41' 31.652" E (Point 1A) south approximately 50 m to the SW boundary corner at 74°21' 22.096" S; 164°41' 32.551" E (Point 1N). The boundary then extends east following the crescent shape of Cryptogam ridge to unmarked points at 74°21' 20.840" S; 164°41' 45.230" E (Point 1L), then north to the NE boundary corner at 74°21' 19.153" S; 164°41' 45.329" E (Point 1C) (Map 3).

The Prohibited Zone is identified by the distinct change in slope of the ridge as it starts to decrease in elevation.

- *Mount Rittmann*

Of the three geothermally heated areas identified at the site (Map 5), the eastern most area is designated a Prohibited Zone in order to preserve part of the site as a reference area for future scientific studies, while the remainder of the site (which is similar in biology, features and character) is available for scientific research.

The western boundary of the site from the NW boundary corner extends from the caldera rim at 73°28' 17.655" S; 165°37' 12.235" E (Point E) south down the steep slope approximately 80 m to the SW boundary corner at 73°28' 19.430" S; 165°37' 08.865" E (Point N). The boundary then extends east following the bottom of the slope to the SE corner at 73°28' 20.945" S; 165°37' 13.936" E (Point M). The boundary then extends upslope north to the NE boundary corner at 73°28' 19.823" S; 165°37' 16.943" E (Point G) (Map 5).

7. Terms and conditions for entry permits

All provisions for entry permits apply to the area's three sites.

7(i) General permit conditions

Entry into any of the Area's three sites is prohibited except in accordance with a Permit issued by an appropriate national authority. Conditions for issuing a Permit to enter the Area are that:

- it is issued for compelling scientific reasons which cannot be served elsewhere, or for reasons essential to the management of the Area;
- The number of visitors permitted to enter the Area should be minimised without compromising safety and the ability to undertake planned research or management;

- the actions permitted will not jeopardise the biological communities, ecological or scientific values of the Area;
- the actions permitted are in accordance with this Management Plan;
- access to the Prohibited Zones shall be prohibited;
- any management activities are in support of the objectives of the Management Plan;
- a Permit, or a copy, shall be carried within the Area, including a copy of all relevant maps from the Management Plan.

7(ii) Access to, and movement within or over, the Area

Access to the volcanic summits on which the sites within the Area are located is generally made by helicopter, and at Tramway Ridge, Mount Erebus, access may be by vehicle. Only persons specifically authorised by Permit are allowed to enter the sites within the Area. Access into the sites within the Area from adjacent landing or vehicle parking sites shall be on foot.

- *Access by aircraft*

- Landing of helicopters within the Area's three sites is strictly prohibited.
- Helicopters should land at designated landing sites outside of the Area's three sites (refer to Section 6(ii) or Maps A1, A2 and A3).
- Helicopters should only land away from the designated landing sites in the event of an emergency.
- Helicopter overflights or hovering over any ice-free area of the Area's three sites should be avoided, except for essential scientific or management purposes when helicopters shall in no instance fly lower than 50 m (~150 ft) above the ground surface.
- The use of helicopter smoke grenades within the Area's three sites is prohibited.
- Overflight and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

- *Access on foot*

- Permit holders should be aware that walking in the Area can compact soil, alter temperature gradients (which may change rates of steam release), and break thin ice crusts which may form over geothermally heated ground, with resulting damage to soil and biota below. The presence of snow or ice surfaces is not a guaranteed indication of a suitable pathway: therefore every reasonable effort should be made to minimise the effects of walking activity. Pedestrian movement should be kept to the absolute minimum necessary consistent with the objectives of any permitted activities.
- Permit holders should also avoid walking on areas of visible vegetation or

moist soil both on ice-free ground and among ice hummocks and, as far as practicable, areas of geothermally heated ground. The presence of snow or ice surfaces is not a guaranteed indication of a suitable pathway.
- Permit holders are strongly encouraged to collect GPS data for all movements within the Area and submit these data to the appropriate national authority with the visit report (see Section 7(x)).

\- *Access by vehicle*

- Vehicles are strictly prohibited from entering the three sites within the Area.
- Vehicles such as snowmobiles may be used to gain access to areas adjacent to and outside of the sites. At Tramway Ridge a snowmobile route has been designated for access between Lower Erebus Hut and the summit of Mount Erebus, and this passes within ~250 m of the site. Visitors should keep to the designated route to the maximum extent practicable.

7(iii) Activities that may be conducted within the Area

Activities that may be conducted within the Area include:

- compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the biological communities, ecological or scientific values of the Area;
- essential management activities, including monitoring and inspection.

7(iv) Installation, modification, or removal of structures

- New structures (i.e. signs or boundary markers) shall not be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for pre-established periods, as specified in a Permit.
- Permanent installations are prohibited, except for the purpose of permanently marking the outer boundaries of sub-sites within the Area, where all such markers shall be placed at practical locations in accordance with management needs and shall minimize intrusion into the Area and be authorized by permit.All markers, structures or scientific equipment installed in the Area must be clearly identified by country, name of the principal investigator or agency, year of installation and date of expected removal.
- All such items should be sterilised prior to installation to ensure, that to the maximum extent possible, they are free of organisms, propagules and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination to the Area.
- Installation (including site selection), maintenance, modification or removal of structures or equipment shall be undertaken in a manner that minimizes disturbance to the values of the Area.
- Installations and equipment should be made of durable materials capable of withstanding the conditions at geothermal sites and, to the maximum extent practicable, pose minimal risk of harmful emissions to the environment (e.g.

gel cells or other non-spill batteries).

- Removal of specific structures or equipment for which the Permit has expired shall be the responsibility of the authority which granted the original Permit and shall be a condition of the Permit.

7(v) Location of field camps

- Camping is prohibited within the Area.
- Camping required for work at Tramway Ridge, Mount Erebus, should be near the existing Lower Erebus Hut (US) (77°31' 32.6172"S; 167°08' 12.8688"E) (Map 2; Inset 1).
- Camping is discouraged anywhere within 100 m of the boundaries of the three locations on Mount Melbourne and Mount Rittmann.
- Camping should be on ice-covered ground only.

7(vi) Restrictions on materials and organisms that may be brought into the Area

To avoid compromising the ecological values, specifically the unique biological communities, for which the Area is protected, the following restrictions apply to all activities in the Area:

- Deliberate introduction of plants, animals, microorganisms and non-sterile soil into the Area is prohibited.
- Precautions shall be taken to prevent accidental introduction of non-native species (e.g. plants, animals, microorganisms) or non-sterile soil from other Antarctic sites, including other sites or locations within the Area, stations, or from regions outside Antarctica, to any of the Area's three sites or between the Area's three sites by following the measures outlined in Section 7(x).
- All sampling equipment or markers brought into the Area shall be cleaned or sterilized.
- To the maximum extent practicable, clothing, footwear and other equipment used or brought into the Area (including backpacks, carry-bags, walking poles, and tripods) shall be thoroughly cleaned before entering the Area. Select clothing and equipment in good condition and made of tightly woven or knitted fabrics that do not shed fibres. See Section 7(x) for requirements on sterile protective over-clothing.
- Visitors moving between the Area's three sites shall take extra care to ensure that all materials and equipment used at one site are cleaned or sterilized before moving to another site to avoid transferring species between these biologically distinct, but physically and climatically similar sites. In addition, because microbial diversity can differ over short distances, visitors moving between geothermal locations within a site shall take the same precautions.
- Herbicides, pesticides, explosives, smoking, vaping, fuel and food are prohibited within the Area.
- Equipment or other materials shall not be stored in the Area.
- Chemicals, including radio-nuclides or stable isotopes, which may be brought into the Area for scientific or management purposes specified in the

Permit, shall not be released into the environment and shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.

- Fossil-fuel-powered tools at geothermal sites should be avoided wherever practicable: if power tools are necessary to support science within the Area, electric machines powered by batteries should be used.
- Materials liable to shatter at low temperatures (e.g. polyethylene plastic products) should be avoided, as should those liable to melt at the high temperatures that can occur within the Area.
- All materials introduced shall be for a stated period only and shall be removed by the end of that stated period.
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016); CEP 2019), in the SCAR Code of Conduct for Activity within Terrestrial Geothermal Environments in Antarctica (Resolution 3 (2016); SCAR 2016), in the Environmental Code of Conduct for terrestrial scientific field research in Antarctica (Resolution 5 (2018)), and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes.

7(vii) Taking of, or harmful interference with, native flora and fauna

- Taking of, or harmful interference with, native flora and fauna and biological communities (specifically the microbiology) at these sites is prohibited, except in accordance with a permit issued under Article 3 of Annex II of the Protocol on Environmental Protection to the Antarctic Treaty.

7(viii) The collection or removal of materials not brought into the Area by the permit holder

- Material may be collected or removed from the Area only in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted if there is reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, sediment, microbiota, flora or fauna that their distribution or abundance within the Area would be significantly affected.
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed from the Area, unless the impact of removal is likely to be greater than leaving the material in situ; if this is the case the appropriate authority should be notified.

7(ix) Disposal of waste

- All wastes, including all human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- carry out monitoring and Area inspection activities, which may involve the collection of samples or data for analysis or review;
- erect or maintain signposts, structures or scientific equipment; or
- carry out management activities.

To help maintain the ecological and scientific values derived from the isolation and relatively low level of human impact of the Area, visitors shall not interfere (drill, sample, damage) with any ice structures unless specified in a Permit. Visitors shall also take special precautions against introductions, especially when visiting more than one of the Area's three sites in a season. Of particular concern are introductions sourced from:

- geothermal areas, both Antarctic and non-Antarctic;
- geothermal areas located at the same high altitude site which are not included within the Area;
- moving between any of the Area's three sites;
- soils from any other Antarctic site, including those near stations; and
- soils from regions outside Antarctica.

To this end, visitors shall take the following measures to minimise the risk of introductions:

- Any sampling equipment or markers brought into the Area shall be sterilised and maintained in a sterile condition before being used within the Area. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including backpacks or carrybags) shall be thoroughly cleaned or sterilised and maintained in this condition before entering the Area.
- Sterilisation should be by an acceptable method, such as by UV light, autoclave, or by washing surfaces in 70% ethanol solution in water.
- Sterile protective over-clothing shall be worn. The over-clothing shall be suitable for working at temperatures of -20°C or below and comprise, at a minimum, sterile overalls to cover arms, legs and body and sterile gloves suitable for placing over the top of cold-weather gloves. Disposable sterile/protective foot coverings are not suitable for the scoria surface and should not be used. Instead, all footwear should be thoroughly brushed to remove soil particles and wiped with 70% ethanol solution.
- Both the interior and exterior of helicopters should be cleaned, as far as practicable, before moving to and from the Area, or between the Area's three sites.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority after the visit has been completed in accordance with national procedures and permit conditions.
- Such reports should include, as appropriate, the information identified in the visit report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organizing the scientific use of the Area.
- The appropriate authority should be notified of any activities / measures that might have exceptionally been undertaken, or anything removed, or anything released and not removed, that were not included in the authorized permit.
- The report shall identify which sites within the Area were visited.

8. Supporting documentation

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ANNEX 1: Site specific description of biological communities at each geothermal site.

<u>Tramway Ridge, Mount Erebus</u>

Located 1.5 km northwest of the main Mount Erebus crater is an ice-free, gently sloping geothermal area known as Tramway Ridge (Map 2). Soil temperatures have been recorded up to 75°C at 4cm depth. The steam-warmed lithosols at the site provide an unusual habitat of limited extent. The geothermal heat, the acidic soils and the unusual regular supply of moisture by condensation of steam produce conditions that contrast markedly with most Antarctic soils.

The vegetation comprises a single bryophyte species and a diverse range of algae which differs from that found in other high altitude geothermal sites, as well as other Antarctic plant communities from low altitude areas (Table 1). A number of fungi have been identified but no detailed studies have taken place. The single moss species, Campylopus pyriformis, is unusual in that it has never been seen to produce leaves but persists in the protonematal stage (a thread like chain of cells). C. pyriformis is widely known from both northern and southern temperate regions of the world including Australia, New Zealand and South America. This species has not been recorded at any other continental location in Antarctica except at Mount Melbourne where it occurs as small cushions of mature leafy gametophytes up to about 4 cm^2 forming populations covering areas up to 200 cm^2 with up to 70% ground cover.

The vegetation occurs in zones related to surface temperature. The warmest ground, from about 35°C to 60°C, is colonised by dark blue-green and reddish-brown mats of cyanobacteria, whereas cooler surfaces of about 10°C to 30°C are dominated by green crusts of coccoid chlorophytes and moss protonema. Bare ground, lacking any macroscopic vegetation, has a temperature of between 0°C and 20°C. The presence of a thermophilic cyanobacterium is especially noteworthy as it is an unusual variety of the hot spring cyanobacterium Mastigocladus laminosus, which is common elsewhere in the world. There is little evidence of the presence of micro-invertebrates in the soils. An early investigation reported the presence of a rhizopod protozoan and bdelloid rotifer although subsequent more detailed studies did not report these.

Early studies investigating bacterial communities on Tramway Ridge, using classical cultivation techniques, successfully cultured a limited number of novel thermophilic bacteria from the genera Clostridia and Bacillus. The three bacterial species found at Mount Erebus (Bacillus schlegelii, Alicyclobacillus acidocaldarius (previously Bacillus acidocaldarius) and Thermoanaerobacter thermohydrosulfuricus (previously Clostridium thermohydrosulfuricum)) have not been identified in samples collected from Mount Melbourne and Mount Rittmann (Table 2). Several halophilic (organisms that live in high salt concentrations) strains were also isolated from soil samples from Tramway Ridge and based on phenotypic characteristics assigned to Micrococcus.

New techniques (genetic based culture independent methods) have been employed at this site to characterize the microbial diversity. Analyses show a clear delineation in bacterial and cyanobacterial community structure between communities closest to fumaroles and communities away from the fumaroles. The soil temperature, pH, percentage carbon and moisture at the hottest temperature sites next to fumaroles were significantly different from sites away from the fumaroles, selecting for organisms with unique physiological traits.

Phylogenetic analysis identified the presence and exceptionally deep branching of bacterial sequences which varied to known microbial strains suggesting the soils at Tramway Ridge provide an atypical and unique habitat for microbial life and contain several yet to be described bacterial groups. Diversity of Archaea diversity was found to be low with a high sequence homology with known distant deep subsurface Archaea strains, indicating the Tramway Ridge species are from ancient lineages.

Mount Melbourne

Geothermal activity on Mount Melbourne is concentrated in two main areas; at the rim of the main summit crater and on the northwest slope of the mountain. On the main summit crater, there are two locations within the Area. On the southern rim of the main summit crater of Mount Melbourne is a distinct deglaciated, crescent shaped ridge known at Cryptogam Ridge (Location 1; Map 3). Here warm ground extends along approximately 110 m of the ridge. The areas of geothermally heated ground are marked by snow free areas, ice and snow hummocks up to a metre in height. Adjacent to Cryptogam Ridge is a slope (referred to as the geothermal slope) leading up to the eastern rim of the summit crater (Location 2; Map 3). The ground is marked by crevasses and ice towers extending up the steep caldera rim. On the northwest slopes of the volcano there is a northwest to southeast trending line of ice towers and small patches of bare ground that make up the third location at this site (Map 4).

Soil temperatures at these locations typically reach between 30°C and 50°C at depths of a few centimetres. Survival of plant life is only possible through the occurrence of small water droplets, formed by the condensation of steam, which keep the soils moist and acts as a water source for the vegetation.

Mount Melbourne supports a unique biological assemblage with high biodiversity relative to the other two high altitude geothermal sites in the Ross Sea region (Table 1). Biota includes (i) algae (11 species) within crusts and mats that coat small substrata, (ii) bryophytes (two species of moss and one of liverwort), and (iii) a protozoan. Many of the species are not of a local provenance and are thought to have been dispersed to the site from outside Antarctica, probably by winds. A lichen association has been observed as a component of black crusts over small areas of warm soil. The warmest areas of ground on Cryptogam Ridge (Location 1) support yellowish-green patches of the moss Campylopus pyriformis, along with the liverwort Cephaloziella varians and brownish crusts of algae. The unusual occurrence of shallow peat is evidence of bryophyte growth over at least several decades. Sporophytes of C. pyriformis have not been observed at Mount Melbourne indicating it reproduces asexually by dispersal of vegetative propagules. Analysis of the population found genetic evidence that indicated a single colonisation event probably occurred followed by multiple mutations. A comparison with samples of C. pyriformis collected from Mount Erebus, 350 km south of Mount Melbourne, found the two populations to be closely related providing evidence for dispersal between areas of heated ground.

Only sporadic patches of moss have been observed on the geothermal slope (Location 2). The amoeboid protozoan Corythion dubium was observed as empty shells in both mineral substrates and amongst bryophytes. The species is not common in continental Antarctica, and only found at one other site in Victoria Land. A number of fungi have been identified but no detailed studies have taken place.

The description of biota on Mount Melbourne is generally focused on Cryptogam Ridge (Location 1). More recent investigations of the biota on the northwest slope (Location 3) found no significant difference among the algal flora which is generally less well developed than that of Cryptogam Ridge. However, a third bryophyte species Pohlia nutans was identified from this location, a species closely related to populations found at Mount Rittmann and absent from Cryptogam Ridge. Furthermore, different populations of bacteria were identified from the two separate areas of geothermal activity on Mount Melbourne, even though they are only separated by a few km.

Early microbial investigations carried out on samples collected from Crytpogram Ridge (Location 1) isolated new species of thermophilic bacteria such as Bacillus thermoantarcticus (now thermantarcticus), Bacillus (now Alicyclobacillus) acidocaldarius and Bacillus fumarioli. Later investigations were concerned with the soils on the northwest slope (Location 3) and identified the thermophilic strains Alicyclobacillus sp. and three mesophilic bacteria, Micrococcus sp., Paenibacillus validus and Paenibacillus apiaries. A further two novel species were identified more recently from the northwest slope, Alicyclobacillus pohliae sp. nov and Brevibacillus levickii, both of which have not been found on Cryptogam Ridge, but during the same investigation a new species of Aneurinibacillus genus was isolated from Cryptogam Ridge, and not the northwest slope. The name Aneurinibacillus terranovensis sp. nov. was proposed (Table 2).

Due to the restriction of certain species to certain locations on Mount Melbourne, investigations focussed on the metabolism of the different species and the soil characteristics and considered that the physico-chemical features of the geothermally heated ground may affect the colonisation history and dispersal of microorganisms and mosses at this site.

Mount Rittmann

Although several expeditions into northern Victoria Land recognised the general distribution of volcanic centres in the region, Mount Rittmann was discovered only in the late 1980s. Located to the east of the head of the Aviator Glacier, a minor crater structure of Mount Rittmann is visible as a crescent shaped outcrop of a rough and unstable near vertical steep slope (approximately 300 m wide and 80 m high) surrounded by glacial ice (Map 5). Soil temperatures range from 50°C to 63°C at 10 cm depth.

Like Tramway Ridge, Mount Erebus and the three locations on Mount Melbourne, the biota consists of bryophytes and a diverse range of algae and protozoa which differs from that found in other high altitude geothermal sites, as well as other Antarctic plant communities from low altitude areas (Table 1). A single bryophyte species, Pohlia nutans occurs as small loose colonies of short shoots only 1-2 mm in length with soil visible between the shoots. It is a cosmopolitan species known from Europe, Asia, Africa, Australasia and a number of locations around Antarctica including Mount Melbourne, although it is notably absent from Mount Erebus. Sporophytes have not been observed and it appears P. nutans reproduces asexually. Genetic analysis found the population at Mount Rittmann has low levels of genetic diversity and appears to be derived from a single immigration event followed by mutations, similar to the C. pyriformis on Mount Melbourne. A diverse range of algae has been cultured and identified, while direct microscopic examination of original samples only revealed occasional algae. While examining cultures for algae, two protozoa were found, one a small cyst forming naked rhizopod and the other a flagellate resembling Bodo sp., neither of which were found on Mount Melbourne or Mount Erebus.

Microbial investigations carried out on samples collected from Mount Rittmann isolated thermophilic acidophilic (organisms that survive in acidic conditions) strains belonging to the genus Alicyclobacillus and the thermophilic genus Anoxybacillus. The genetic relatedness of the isolated strains of Alicyclobacillus suggested that the strains could be related to the species A. acidocaldarius or it could be distinct enough to be a new sub-species and the name Alicyclobacillus acidocaldarius subsp. rittmannii was proposed. The characteristics of the isolated strain of Anoxybacillus were found to represent a novel species and the name Anoxybacillus amylolyticus sp. nov. was proposed. Two species of bacteria, including Aneurinibacillus terranovensis and Bacillus fumarioli, were isolated from samples taken from Cryptogam Ridge on Mount Melbourne and Mount Rittmann but were unable to be isolated from the northwest slope on Mount Melbourne even though the two sites on Mount Melbourne are approximately 1.5 km apart and Mount Melbourne and Mount Rittmann are approximately 103 km apart (Table 2).

Table 1: Flora and fauna of fumarolic ground in high altitude geothermal areas of the Ross Sea region.

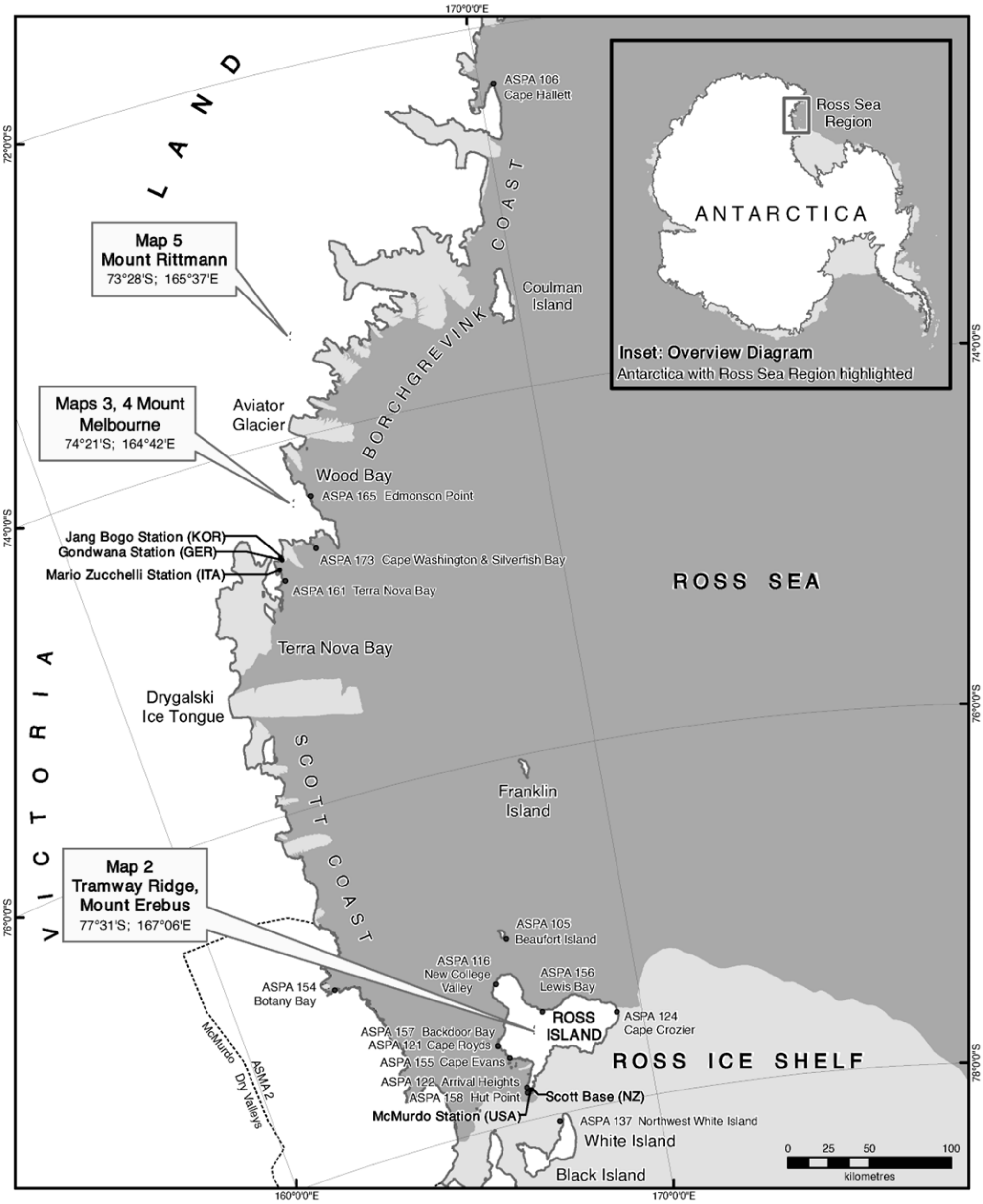
Taxon	Mount Erebus a	Mount Melbourne b	Mount Rittmann c
Bryophytes			
Campylopus pyriformis† (Moss)	+	+	
Pohlia nutans (Moss)		+	+
Cephaloziella exiliflora‡ (Liverwort)		+	
Algae - Cyanobacteria			
Aphanocapsa elachista†	+	+	
Gloeocapsa magma‡		+	
Phormidium fragile	+	+	
cf. Phormidium fragile			+
Tolypothrix bouteillei‡		+	
Mastigocladus laminosus†	+	+	+
Non-heterocystous M. laminosus	+		
Stigonema ocellatum†‡		+	
Nostoc sp.			+
Algae - Chlorophyta			
Bracteacoccus cf. minor	+		
Chlorella emersonii†	+	+	
Chlorella protothecoides†	+		
Chlorella cf. protothecoides			+
Chlorella reisiglii	+		
Chlorella cf. reisiglii			+
Chlorella cf. reniformis†		+	+
Chlorella saccharophila†‡	+		
Coccomyxa curvata‡	+		
Coccomyxa gloeobotrydiformis	+	+	
Coccomyxa cf. gloeobotrydiformis			+
Coenocystis oleifera	+	+	
Coenocystis cf. oleifera			+
Oocystis minuta	+		
cf. Oocystis minuta			+
Pseudococcomyxa simplex	+	+	
cf. Pseudococcomyxa simplex			+
Scotiellopsis terrestris†	+		
Scotiellopsis cf. terrestris			+
cf. Lyngbya sp. †‡			+
Scenedesmus sp. ‡	+		
Protozoa			
Corythion dubium‡		+	
Small cyst-forming naked rhizopod			+

Flagellate cf. Bodo sp.			+
Rhizopod protozoa	+		
Bdelloid rotifer	+		
Fungi			
Aspergillus sp.	+	+	
Chaetomium sp.		+	
Cryptococcus sp.		+	
Unidentified dematiacean sp.	+		
Malbranchea pulchella var. sulfurea		+	
Mucor sp.	+		
Myceliophthora thermophila		+	
Neurospora sp.	+		
Paecilomyces sp.		+	
Penicillium sp.	+		
Unidentified yeast	+		
Actinomycetes			
Streptomyces coelicolor†	+	+	
Thermoactinomyces vulgaris	+		
Thermomonospora sp.†	+	+	

a Broady, 1984; Ugolini and Starkey, 1966; Hudson and Daniel, 1988; Skotnicki et al., 2001; Janetschek, 1963
b Broady et al., 1987; Nicolaus et al., 1991; Lesser at al., 2002
c Skotnicki et al., 2002; Bargagli et al., 1996 (Species identification is tentative as isolates were not established for more detailed study).
†No other Antarctic record.
‡No other record from Victoria Land.

Table 2: Bacterial diversity of fumarolic ground in high altitude geothermal areas of the Ross Sea region.

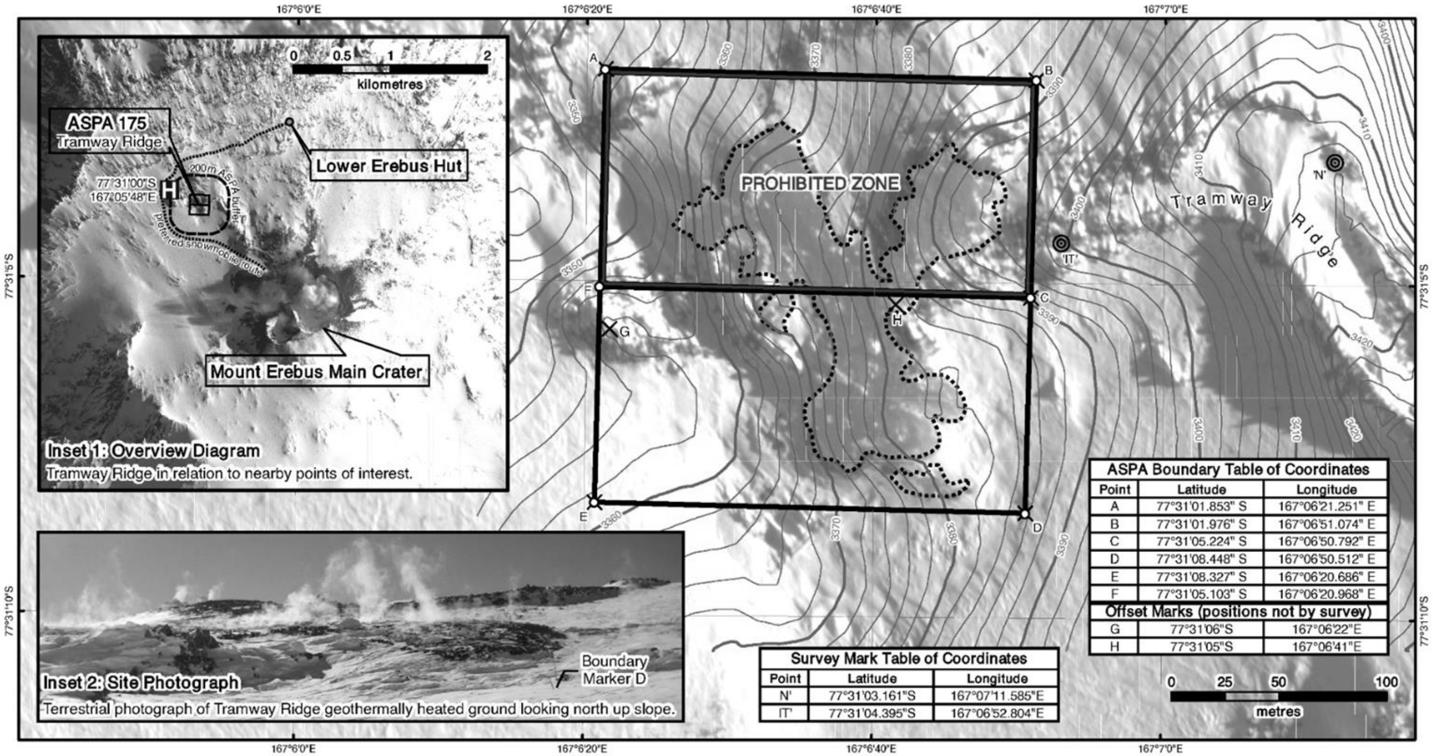
Genus species	Mount Erebus	Mount Melbourne	Mount Rittman	Reference
Thermophilic Bacteria				
Bacillus				
- Bacillus schlegelii	+			Hudson and Daniel, 1988
- Bacillus thermoantarcticus		+		Hudson et al., 1988
- Bacillus fumarioli		+	+	Nicolaus et al., 1996 Logan et al., 2000
Alicyclobacillus				
- Alicyclobacillus acidocaldarius (previously Bacillus acidocaldarius)	+			Hudson and Daniel, 1988
- Alicyclobacillus acidocaldarius subsp. Rittmannii			+	Nicolaus et al., 1998
- Alicyclobacillus sp.		+	+	Pepi et al., 2005 Bargagli et al., 2004 Nicolaus et al., 1998
- Alicyclobacillus pohliae		+		Imperio et al., 2008
Aneurinibacillus				
- Aneurinibacillus terranovensis		+	+	Allan et al., 2005
Anoxybacillus				
- Anoxybacillus amylolyticus			+	Poli et al., 2006
Brevibacillus				
- Brevibacillus levickii		+		Allan et al., 2005
Themoanaerobacter				
- Thermoanaerobacter thermohydrosulfuricus (previously Clostridium thermohydrosulfuricum)	+			Hudson and Daniel, 1988
Mesophilic Bacteria				
- Micrococcus sp.	+	+		Nicolaus et al., 2000; Nicolaus et al., 2001
- Paenibacillus validus		+		Pepi et al., 2005 Bargagli et al., 2004
- Paenibacillus apiarius		+		Pepi et al., 2005 Bargagli et al., 2004



Map 1 - High Altitude Geothermal Sites of the Ross Sea Region
Location Diagram

Map Information:
Version 2 - 4 Apr 2024.
Horizontal Datum: WGS84, Antarctica Polar Stereographic Projection.
True north is coincident with lines of longitude.

Data Sources:
Base Vector Data: Antarctic Digital Database Version 6.



ASPA Boundary Table of Coordinates		
Point	Latitude	Longitude
A	77°31'01.853" S	167°06'21.251" E
B	77°31'01.976" S	167°06'51.074" E
C	77°31'05.224" S	167°06'50.792" E
D	77°31'08.448" S	167°06'50.512" E
E	77°31'08.327" S	167°06'20.686" E
F	77°31'05.103" S	167°06'20.968" E
Offset Marks (positions not by survey)		
G	77°31'06"S	167°06'22"E
H	77°31'05"S	167°06'41"E

Survey Mark Table of Coordinates		
Point	Latitude	Longitude
N'	77°31'03.161"S	167°07'11.585"E
IT'	77°31'04.395"S	167°06'52.804"E

Map 2 - ASPA 175: High Altitude Geothermal Sites of the Ross Sea Region

Tramway Ridge, Mount Erebus Topographical Map

Map Information:

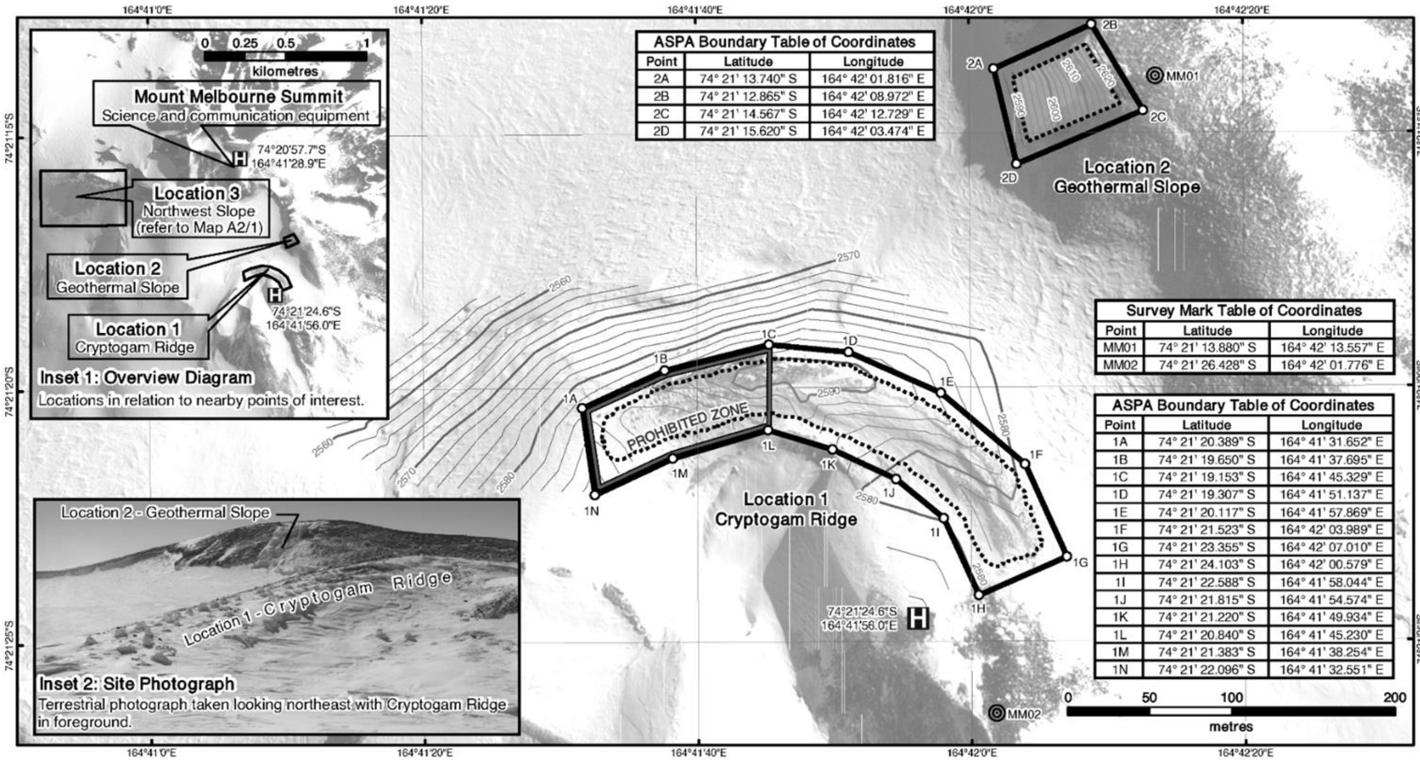
Version 2 - 4 Apr 2024.
Horizontal Datum: WGS72, Camp Area Projection.
Vertical Datum: Mean Sea Level.
Satellite Imagery: orthorectified without ground-truthing.

Data Sources:

Survey Data: DOSLI Survey Plan 37/142.
Contours & Geothermally Heated Area: University of Canterbury.
Main Map & Overview Diagram Imagery: Digital Globe WorldView-2 Satellite (0.5 m resolution).
Site Photograph: University of Waikato.

Survey Mark
ASPA Boundary Point
Boundary Marker (approx.)
ASPA Boundary
Prohibited Zone Boundary
Contour ~ 10-metre interval
Contour ~ 2-metre interval
Helicopter Landing Site
Geothermally Heated Ground (approx. & subject to change)

N



ASPA Boundary Table of Coordinates		
Point	Latitude	Longitude
2A	74° 21' 13.740" S	164° 42' 01.816" E
2B	74° 21' 12.865" S	164° 42' 08.972" E
2C	74° 21' 14.567" S	164° 42' 12.729" E
2D	74° 21' 15.620" S	164° 42' 03.474" E

Survey Mark Table of Coordinates		
Point	Latitude	Longitude
MM01	74° 21' 13.880" S	164° 42' 13.557" E
MM02	74° 21' 26.428" S	164° 42' 01.776" E

ASPA Boundary Table of Coordinates		
Point	Latitude	Longitude
1A	74° 21' 20.389" S	164° 41' 31.652" E
1B	74° 21' 19.650" S	164° 41' 37.695" E
1C	74° 21' 19.153" S	164° 41' 45.329" E
1D	74° 21' 19.307" S	164° 41' 51.137" E
1E	74° 21' 20.117" S	164° 41' 57.869" E
1F	74° 21' 21.523" S	164° 42' 03.989" E
1G	74° 21' 23.355" S	164° 42' 07.010" E
1H	74° 21' 24.103" S	164° 42' 00.579" E
1I	74° 21' 22.588" S	164° 41' 58.044" E
1J	74° 21' 21.815" S	164° 41' 54.574" E
1K	74° 21' 21.220" S	164° 41' 49.934" E
1L	74° 21' 20.840" S	164° 41' 45.230" E
1M	74° 21' 21.383" S	164° 41' 38.254" E
1N	74° 21' 22.096" S	164° 41' 32.551" E

Map 3 - ASPA 175: High Altitude Geothermal Sites of the Ross Sea Region

Cryptogam Ridge and Geothermal Slope, Mount Melbourne Topographical Map

N

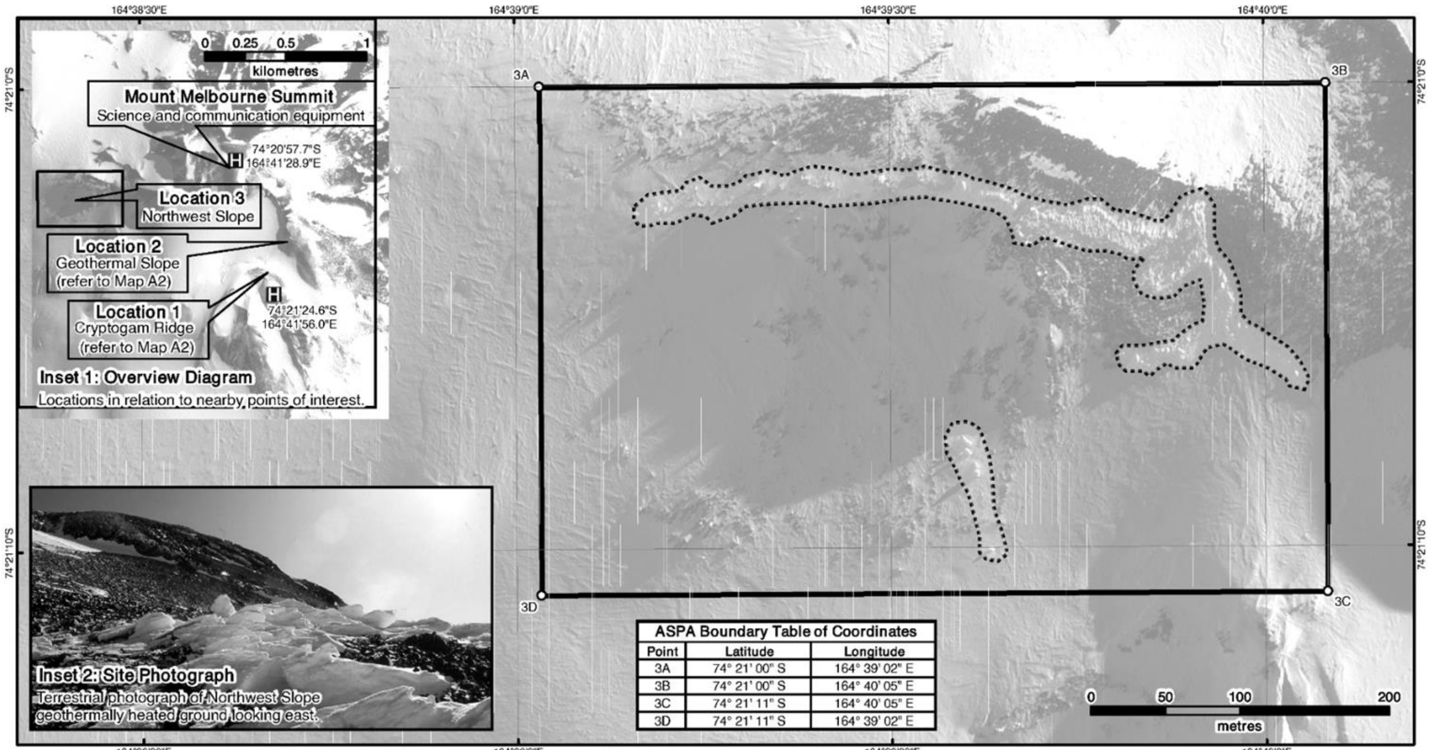
Map Information:

Version 1.6 - 9 May 2014 (final).
Horizontal Datum: WGS84, UTM Zone 58 Projection.
Vertical Datum: WGS84.
Satellite Imagery: orthorectified without ground-truthing.

Data Sources:

Survey Data: Obtained by field survey 17 November 2012.
Main Map & Overview Diagram Imagery: Digital Globe GeoEye Satellite (0.5 m resolution).
Site Photograph: Antarctica New Zealand.

Survey Mark
ASPA Boundary Point (unmarked)
ASPA Boundary
Prohibited Zone Boundary
2580 Contour ~ 10-metre interval
Contour ~ 2-metre interval
Helicopter Landing Site
Geothermally Heated Ground (approx. & subject to change)



ASPA Boundary Table of Coordinates		
Point	Latitude	Longitude
3A	74° 21' 00" S	164° 39' 02" E
3B	74° 21' 00" S	164° 40' 05" E
3C	74° 21' 11" S	164° 40' 05" E
3D	74° 21' 11" S	164° 39' 02" E

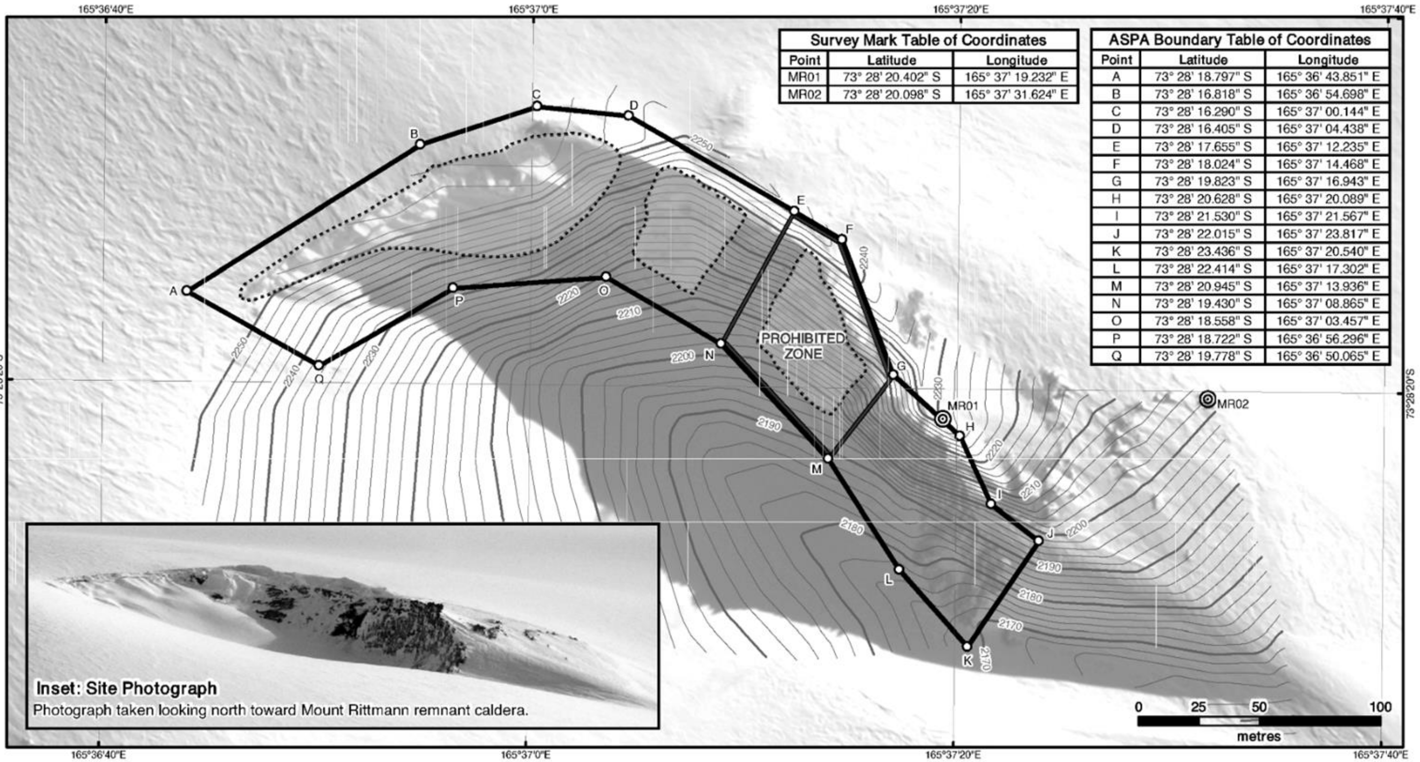
Map 4 - ASPA 175: High Altitude Geothermal Sites of the Ross Sea Region
Northwest Slope, Mount Melbourne Topographical Map

N

Map Information:
Version 1.4 - 9 May 2014 (final).
Horizontal Datum: WGS84, UTM Zone 58 Projection.
Vertical Datum: WGS84.
Satellite Imagery: orthorectified without ground-truthing.

Data Sources:
Survey Data: Data not by field survey. ASPA boundary obtained via inference from satellite imagery.
Main Map & Overview Diagram Imagery: Digital Globe GeoEye Satellite (0.5 m resolution).
Site Photograph: University of Siena.

ASPA Boundary Point (unmarked)
ASPA Boundary
Helicopter Landing Site
Geothermally Heated Ground (approx. & subject to change)



Survey Mark Table of Coordinates

Point	Latitude	Longitude
MR01	73° 28' 20.402" S	165° 37' 19.232" E
MR02	73° 28' 20.098" S	165° 37' 31.624" E

ASPA Boundary Table of Coordinates

Point	Latitude	Longitude
A	73° 28' 18.797" S	165° 36' 43.851" E
B	73° 28' 16.818" S	165° 36' 54.698" E
C	73° 28' 16.290" S	165° 37' 00.144" E
D	73° 28' 16.405" S	165° 37' 04.438" E
E	73° 28' 17.655" S	165° 37' 12.235" E
F	73° 28' 18.024" S	165° 37' 14.468" E
G	73° 28' 19.823" S	165° 37' 16.943" E
H	73° 28' 20.628" S	165° 37' 20.089" E
I	73° 28' 21.530" S	165° 37' 21.567" E
J	73° 28' 22.015" S	165° 37' 23.817" E
K	73° 28' 23.436" S	165° 37' 20.540" E
L	73° 28' 22.414" S	165° 37' 17.302" E
M	73° 28' 20.945" S	165° 37' 13.936" E
N	73° 28' 19.430" S	165° 37' 08.865" E
O	73° 28' 18.558" S	165° 37' 03.457" E
P	73° 28' 18.722" S	165° 36' 56.296" E
Q	73° 28' 19.778" S	165° 36' 50.065" E

Map 5 - ASPA 175: High Altitude Geothermal Sites of the Ross Sea Region

Mount Rittmann Topographical Map

Map Information:

Version 1.5 - 9 May 2014 (final).
Horizontal Datum: WGS84, UTM Zone 58 Projection.
Vertical Datum: WGS84.
Satellite Imagery: orthorectified with limited ground-truthing.

Data Sources:

Survey Data: Obtained by field survey 16 November 2012.
Main Map & Overview Diagram Imagery: Digital Globe WorldView-1 Satellite (0.5 m resolution).
Site Photograph: Antarctica New Zealand.

Survey Mark
ASPA Boundary Point (unmarked)
ASPA Boundary
Prohibited Zone Boundary
2170 Contour ~ 10-metre interval
Contour ~ 2-metre interval
Geothermally Heated Ground (approx. & subject to change)

N

Measure 15 (2024)

Antarctic Specially Protected Area No 180 (Danger Islands Archipelago, North-eastern Antarctic Peninsula): Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Noting that the Committee for Environmental Protection ("CEP") has endorsed a Management Plan for ASPA 180;

Recognising that this area supports outstanding environmental, scientific, historic, aesthetic or wilderness values, or ongoing or planned scientific research, and would benefit from special protection;

Desiring to designate Danger Islands Archipelago, North-eastern Antarctic Peninsula as ASPA 180 and to approve the Management Plan for this Area;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. Danger Islands Archipelago, North-eastern Antarctic Peninsula be designated as Antarctic Specially Protected Area No 180; and
2. the Management Plan, which is annexed to this Measure, be approved.

Management Plan for Antarctic Specially Protected Area (ASPA) No 180

DANGER ISLANDS ARCHIPELAGO, NORTH-EASTERN ANTARCTIC PENINSULA

Introduction

The Danger Islands are located east of the northern tip of the Antarctic Peninsula, about 10 – 25 km east of Joinville Island, in the region of 54°56'– 54°35'W, 63°22'-63°30'S ("the Area"). The Antarctic Specially Protected Area (ASPA) includes seven islands and has a terrestrial area of approximately 4.48 km².

The primary reason for designation of the Area is its outstanding number and diversity of seabirds, which are representative of the region. The Area hosts large colonies of seabirds, which are of exceptional ecological and scientific interest. This relates above all to Adélie penguins (Pygoscelis adeliae). The Area hosts the third and fourth largest Adélie penguin colonies in the world and more Adélie penguins than the rest of the Antarctic Peninsula region combined. In addition, there are breeding sites of nine further species of Antarctic seabirds on the Danger Islands, including a large colony of Antarctic shags (Phalacrocorax atriceps). Currently, main activities of ongoing scientific research focus on the seabird population of the area.

The Area is designated because it has been rarely visited and is in almost pristine condition, i.e., it is of great value as a reference site for comparative scientific studies and long-term monitoring. Furthermore, the Area has exceptional aesthetic and wilderness values.

There has been a low level of ship-based tourism in this Area with rare and irregular visits/landings. Visits are rare as there is little bathymetric data available for the waters around the islands and they are relatively remote from other landing sites in an area with generally unfavourable weather and landing conditions. The overall human footprint in the different sites of the Area is considered to be low to medium (Pertierra et al., 2017).

The Area is situated within 'Environment B – Antarctic Peninsula mid-northern latitudes geologic' and 'Environment E – Antarctic Peninsula, Alexander and other islands' based on the Environmental Domains Analysis for Antarctica (Morgan at al. 2007). It is included in Antarctic Conservation Biogeographic Region (ACBR) 3: 'North-west Antarctic Peninsula' (Terauds et al. 2012 and Terauds and Lee 2016). The Antarctic Important Bird Areas ANT062 (Danger Islands), ANT063 (Brash Island, Danger Islands) and ANT064 (Earle Island, Danger Islands) are identified within the Area (Harris et al., 2015). The waters surrounding the islands of the ASPA No 180 are identified as marine IBA 13 (Handley et al., 2021) and as part of an Area of Ecological Significance (Hindell et al., 2021).

Danger Islands complement the network of ASPAs by protecting a representative sample of the Antarctic ecosystem including some of the largest Adélie penguin colonies worldwide.

1. Description of values to be protected

The ASPA No 180 Danger Islands (North-eastern Antarctic Peninsula, 54°56‘-54°35‘W / 63°22‘- 63°30'S) includes seven islands and has an approximate area of 4.48 km². The primary reasons for designation of the Area are its large colonies of seabirds, which are of exceptional ecological and scientific interest, and its almost pristine condition. The spatial extent of the Area includes all known seabird breeding sites in the Danger Islands group. The feeding grounds of these colonies are not yet known.

The importance of ASPA No 180 for the network of protected areas in Antarctica arises primarily from the number of seabirds breeding in the Area. There are approx. 750,000 breeding pairs of Adélie penguins (Pygoscelis adeliae) on the Danger Islands (Borowicz et al., 2018). According to MAPPPD database v 4.2 (Humphries et al., 2017) this is more than the half of the population of the Antarctic Peninsula region in total. The colonies at Heroina and Beagle Island are the second and third largest Adélie penguin colonies in the Antarctic.

At Earle Island (site 6) a colony of 156 breeding pairs of Antarctic shag (Phalacrocorax atriceps) was recorded by Borowicz et al. (2018). This is equivalent to 1.2 % of the global population of this species (Schrimpf et al., 2018).

In addition, Danger Islands host breeding sites of Gentoo penguin (Pygoscelis papua), Chinstrap penguin (Pygoscelis antarcticus), cape petrel (Daption capense), snowy sheathbill (Chionis albus), kelp gull (Larus dominicanus), skua (Catharacta ssp.), Wilson's storm-petrel (Oceanites oceanicus) and snow petrel (Pagodroma nivea) (Borowicz et al., 2018).

A number of studies revealed an impact of climate change on all three pygoscelis penguin species that breed on Danger Island. The impacts are not the same for all penguin species. For example, Adélie penguins are in decline at the western Antarctic Peninsula region while having stable populations at the Weddell Sea region and the southwestern Antarctic Peninsula (Borowicz et al., 2018; Casanovas et al., 2015) and expanding in other Antarctic regions (Che-Castaldo et al., 2017; Southwell et al., 2015). Chinstrap penguins were found to decline generally with a significant exception at the South Sandwich Islands (Lynch et al., 2016; Strycker et al., 2020). In contrast, Antarctic Gentoo penguins show increasing populations and expand their ranges southward (Forcada and Trathan, 2009; Herman et al., 2020; Lynch et al., 2012). Further shifts in population of the pygoscelis penguins may occur.

There has been a low level of ship-based tourism in the Area with rare and irregular visits/landings. Scientific activity in the Area and its proximity is low and there is no infrastructure or scientific facility. Therefore, degree of human interference for the most of the Danger Islands can be considered low (Pertierra et al., 2017). Thus, wilderness can be regarded as an additional value of the Area. For those islands where occasional visits occur (Heroina Is., Beagle Is.) human interference can be considered as medium (Pertierra et al., 2017).

A particular aesthetic value is based on the partly spectacular rock formations of steep banded cliffs emerging from the sea at the coast of some of the islands (see Appendix 2, Figure 2).

Past and planned scientific research in the Area is related to penguin and seabird population assessment (Borowicz et al., 2018; Naveen et al., 2000; Woehler, 1993). An investigation of the extensive ornithogenic deposits (Kalvakaalva et al., 2020) revealed its potential for paleoecologic research.

2. Aims and objectives

Management of the Danger Islands aims to:

- Avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human presence, disturbance and sampling in the Area.
- Allow visits for management purposes in support of the aims of the Management Plan.
- Allow scientific research on the ecosystem and physical environment in the Area that will not compromise the values for which the Area is protected.
- Minimize the possibility of introduction of non-native plants, animals and microbes into the Area.
- Minimize the possibility of the introduction of pathogens that may cause disease in faunal populations within the Area.
- Protect the natural ecosystem of the Area as a reference Area for future comparative scientific studies and for monitoring faunistic and ecological change and population development.
- Preserve the wilderness and aesthetic values of the Area.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- Notices showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be made available, at Base Petrel (Argentina) on Dundee Island, at Base Esperanza (Argentina) and Ruperto Elichiribehety Station (Uruguay) in Hope Bay on the Antarctic Peninsula, at Base Marambio (Argentina) at Seymour Island, at Base General Bernardo O'Higgins Riquelme (Chile) and GARS Station (Germany) at Cape Legoupil on the Antarctic Peninsula and at Johann Gregor Mendel Station (Czech Republic) on James Ross Island.
- Copies of this Management Plan and informative material shall be made available to vessels and aircraft visiting the vicinity of the Area, and the appropriate national authority shall inform all personnel operating in the vicinity of, accessing or flying over the Area, of the location, boundaries and restrictions applying to entry and overflight within the Area.
- National programs shall take steps to ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and nautical / aeronautical charts.
- Markers, signs or other structures should not be installed within the Area except for essential scientific or management purposes. If installed, they shall be recorded, secured and maintained in good condition and removed when no longer required by the responsible National Antarctic program.
- In accordance with the requirements of Annex III of the Protocol, abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.
- The Area shall be visited as necessary, and no less than once every five years, to assess whether it continues to serve the purposes for which it was

designated and to ensure management and maintenance measures are adequate.

- Visits shall be permitted as necessary in order to facilitate the study and monitoring of anthropogenic changes that could affect the protected values in the Area. Impact study and monitoring should be conducted, by methods as less invasive as possible.
- The current and projected impact of climate change to the protected values of the Area should be assessed as well as its potential for mitigation and adaption.
- National Antarctic Programmes operating in the Area shall consult together with a view to ensuring the above management activities are implemented.
- The Management Plan shall be reviewed no less than once every five years and revised as required.

4. Period of designation

Designated for an indefinite period.

5. Maps

The maps in the appendix show the location of the area in the region, the position of the islands in relation to each other and the topographical information known to date about the individual islands.

Map 1: ASPA No 180 Danger Islands – Regional overview.

Map 2: ASPA No 180 Danger Islands – Overview.

Map 3: ASPA No 180 Danger Islands (Brash Island).

Map 4: ASPA No 180 Danger Islands (Heroina Island).

Map 5: ASPA No 180 Danger Islands (Comb Island).

Map 6: ASPA No 180 Danger Islands (Beagle Island).

Map 7: ASPA No 180 Danger Islands (Darwin Island).

Map 8: ASPA No 180 Danger Islands (Platter Island).

Map 9: ASPA No 180 Danger Islands (Earle Island).

6. Description of the Area

6(i) Geographical coordinates, boundary markers and natural features

- *Boundaries and coordinates*

The components of the ASPA are seven islands in the region of 54°56‘– 54°35‘W, 63°22‘- 63°30’S, without the marine part in between. (see maps).

- Beagle Island: (63°24'52"S, 54°40'2"W, 1.01 km²)

- Brash Island: (63°23'11"S, 54°54'47"W, 0.58 km²)
- Heroina Island: (63°23'39"S, 54°36'20"W, 0.83 km²)
- Darwin Island: (63°26'16"S, 54°43'38"W, 1.59 km²)
- Platter Island: (63°26'2"S, 54°40'26"W, 0.19 km²)
- Earle Island: (63°29'16"S, 54°47'14"W, 0.17 km²)
- Comb Island (63°24'37"S, 54°43'4"W, 0.11 km²)

The ASPA boundaries are the shorelines of these islands at low tide water levels. There are no further boundary markers.

- *Climate*

No in-situ climatic data are available, but the Danger Islands lie in the track of depressions approaching the Antarctic Peninsula from the west. Climate models (Karger et al., 2021) calculate an annual precipitation of 541 mm and a mean annual temperature of -4,95°C for the period of 2010 – 2018. The currents of the Weddell Sea often drive sea ice towards the islands, making the occurrence of pack ice common (Borowicz et al., 2018; Comiso and Gordon, 2013).

- *Geology, geomorphology, and soils*

The Area is one of the largest areas of basic plutonic rock exposed in the Antarctic Peninsula region. Its petrography ranges from gabbro to alkali-feldspar quartz syenite of Cretaceous origin (Hamer and Hyden, 1984). The topography of the islands ranges from low and flat (Platter Island) to sheer cliff faces (Darwin and Comb Island) steep scree slopes, flat areas, and cliffs.

Ingólfsson et al., (2003) suggests these islands may have been glaciated until around 6,000 b.c.

The oldest recovered ornithogenic soils at Platter Island date to about 600 years before present (Kalvakaalva et al., 2020) which fits to comparable results from other northern Antarctic Peninsula breeding sites (Emslie et al., 2018).

- *Terrestrial ecology*

The freshwater environment within the Area has yet to be described. Given the limited extent of available ice-free ground, streams and ponds are likely to be relatively few, small and seasonal. For example, several small temporary ponds are evident in satellite imagery which are likely to be enriched by nutrients from local breeding penguins.

- *Vegetation*

The vegetation of the Danger Islands has yet to be described. Preliminary observations using high resolution satellite remote sensing indicates widespread vegetation cover on Heroina and Beagle Island, particularly on Areas not covered by breeding penguins or snow.

The invertebrate fauna of the Danger Islands has yet to be described.

- *Breeding birds and mammals*

According to Borowicz et al. (2018) at least 10 species of birds breed in the Danger Islands: Adélie penguin (Pygoscelis adeliae), Chinstrap penguin (Pygoscelis antarctica), Gentoo penguin (Pygoscelis papua), Antarctic shags (Phalacrocorax atriceps), skua species (Catharacta spp.), cape petrel (Daption capense), snow petrel (Pagodroma nivea), Wilson's storm petrel (Oceanites oceanicus), kelp gull (Larus dominicanus) and snowy sheathbill (Chionis albus) (Appendix 3, Table 1). Southern giant petrels (Macronectes giganteus) are verified as not breeding at six of the seven islands in 2015 and the presence of Antarctic tern (Sterna vittata) was observed on two islands only. Available data on seabird population numbers are summarised in Appendix 3, Table 2. No (breeding) birds were detected on nearby Dixey Rock (see Map 2) in December 2015 (Borowicz et al., 2018), which is therefore not included in ASPA No 180.

Adélie penguins breed on all islands within ASPA No 180 with a total population of 751,527 (95th CI = [710,103–792,443]) breeding pairs in December 2015 (Borowicz et al., 2018). The biggest colonies are on Heroína Island (292,363 breeding pairs) and Beagle Island (284,535 breeding pairs). The study of (Borowicz et al., 2018) suggests that the Area occupied by Adélie penguin colonies has remained stable or has modestly increased over the last 60 years.

Breeding Gentoo penguins were found on four islands (>100 nests), particularly at Brash Island (2,270 breeding pairs). The Gentoo population at Heroína Island seems to be increased from 1996 till 2015 (Appendix One, Table 2).

Breeding Chinstrap penguins were found only on Heroína Island with 27 breeding pairs (Borowicz et al., 2018).

Earl Island is the only island where breeding Antarctic shags were found (156 breeding pairs) (Borowicz et al., 2018). This is equivalent to 1.2% of the global population of this species (Schrimpf et al., 2018).

There is no evidence of breeding seals at the Danger Islands, though the presence of individual Weddell seals (Leptonychotes weddellii) have been found at four islands (Appendix One, Table 1). Non-breeding Antarctic fur seals (Arctocephalus gazella) inhabit the region especially in the late summer and early autumn (Blix and Nordøy, 2007). However, detailed studies have not been conducted through haulout and pupping season.

- *Human activities and impact*

Due to the high concentration of seabirds, particularly penguins, the Danger Islands have been subject to occasional tourist visits during the last decades. Data (International Association of Antarctica Tour Operators, 2024) show that numbers of visiting tourists have been relatively constant at some hundred visitors from the

2003-2004 to the 2017-2018 season. Since then, the numbers increased with more than thousand visits per season from the 2018-2019 to 2022-2023 season (see Appendix 2, Figure 3,).

According to (International Association of Antarctica Tour Operators, 2024) the majority of tourist activities near the Danger Islands was small boat cruising, all others small boat landings. The impact of cruising small boats can be regarded small, since they are unlikely to go very close to breeding birds. The impact of small boat landing depends on location and date of the landing and the amount of landed persons.

Only once 'science support' has been reported, including Remotely Piloted Aircraft System (RPAS) activities. Additionally, one commercial RPAS flight has been reported on Heroina Island. Other potentially impactful activities like aircraft landings, camping/overnight stays, helicopter flights, filming or marathon events have not yet been reported for the Area.

There are no permanent human settlements on the Islands, the closest permanent scientific station is Petrel (ARG), about 70 km to the west (Ministry of Foreign Affairs Argentina, 2023).

Past scientific research in the area was primarily focused on the penguin population (Borowicz et al., 2018; Naveen et al., 2000; Woehler, 1993). Occasional geological and paleoecological research has also been carried out (Hamer and Hyden, 1984; Kalvakaalva et al., 2020). During the few scientific visits to date, access has been by landing with small boats.

6(ii) Access to the area

Access to the Area is generally provided by ship and small boat.

6(iii) Location of structures within and adjacent to the area

There are no known permanent human structures in the Area

6(iv) Location of other protected areas in the vicinity

Other protected Areas in the vicinity include:

- ASPA No 148 Mount Flora, Hope Bay, Antarctic Peninsula, 63°25' S, 57°01' W, ca. 100 km to the East.
- HSM 39 at Hope Bay, 63°24' S, 56°59' W, ca. 100 km to the East.
- HSM 40 at Hope Bay, 63°24' S, 56°59' W, ca. 100 km to the East.
- HSM 41 at Paulet Island, 63°34' S, 55°45' W, ca. 50 km to the Southeast.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

Access to the Area is prohibited except in accordance with a Permit issued by the national competent authority. Conditions for issuing a Permit to enter the Area are that:

- it is issued in particular for scientific research on the terrestrial ecosystem and fauna in the Area or for reasons essential to the management of the Area;
- the actions permitted are in accordance with this Management Plan;
- the activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the environmental and scientific values of the Area;
- it is issued for compelling educational or outreach reasons which cannot be served elsewhere, and which do not conflict with the objectives of this Management Plan; Activities for educational and / or outreach purposes do not include tourism which is prohibited within the ASPA Nr.?;
- the Permit shall be issued for a finite period;
- the Permit, or a copy, shall be carried when in the Area;
- during periods of an emerging wildlife disease (e.g. the current highly pathogenic avian influenza), access to the area is only permitted for personnel specially trained in dealing with the disease in question, regardless of previously issued permits.

7(ii) Access to, and movement within or over, the area

Access to the Area shall be by small boat, or on foot. Vehicles are prohibited within the Area.

- *Foot access and movement within the area*

All movement on land within the Area shall be on foot. All people in boats are prohibited from moving on foot beyond the immediate vicinity of their landing or access site unless specifically authorised by permit.

Visitors should move carefully to minimize disturbance to flora, fauna, soils, and water bodies. Pedestrians should walk on snow or rocky terrain if practical but taking care not to damage lichens. Pedestrians should walk around the penguin colonies and should not enter sub-groups of nesting penguins unless required for research or management purposes. Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects.

- *Small boat access*

On Heroina Island there are three known landing sites for small boats which are already proven in practice (see map 3). The primary landing site is located in a small harbour which is greatly affected by tides (see Appendix 2, Figure 1). The landing area is small and is only viable when the tide is in. The swell and waves into the site are the primary risks to landing here. Careful consideration of the swell and impacts of moving ice in the bay is recommended.

Alternatively, there is another, much more narrow landing site between rocks. It is located south of the entrance of the natural harbour on the western side of Heroina Island.

The third landing site is located on the eastern side of Heroina Island. It also narrower and rockier than the primary landing site (see map 3).

Visitors landing on other Islands of the Area are encouraged to include the information on further appropriate landing sites in the report to their national competent authority.

- *Aircraft access and overflight*

Restrictions on aircraft operations apply year-round, when pilots shall operate aircraft over the Area according to strict observance of the following conditions:

- Piloted aircraft landings, including by helicopters, are prohibited.
- Overflight of the Area by piloted aircraft below 2000 ft (~610 m) is prohibited, except in accordance with a permit issued by an appropriate national authority. Pilots operating within the Area should follow the Guidelines for the Operation of Aircraft near Concentrations of Birds (Resolution 2 (2004)).
- Overflight below 2000 ft (610 m) and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

7(iii) Activities that may be conducted within the area

Activities which may be conducted within the Area include:

- Scientific research or management activities that will not jeopardize the ecosystem or values of the Area.
- Activities for educational and / or outreach purposes (such as documentary reporting (e.g. visual, audio or written) or the production of educational resources or services) that cannot be served elsewhere. Activities for educational and / or outreach purposes do not include tourism.

- Essential management activities, including monitoring and inspection with the aim to assess the effectiveness of the Management Plan and management activities.
- Small boat cruising along the coastline shall avoid blocking exit/entry points of the penguins nesting or moulting on the Islands.

7(iv) Installation, modification, or removal of structures

- Permanent structures or installations are prohibited.
- All markers, structures or scientific equipment installed in the Area must be authorized by a permit and clearly identified by country, name of the principal investigator, year of installation and date of expected removal. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination or damage to the values of the Area.
- Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimizes disturbance to flora and fauna, preferably avoiding the main breeding season (01 October – 31 March).
- Removal of specific structures / equipment for which the permit has expired shall be the responsibility of the authority which granted the original permit, and shall be a condition of the permit.

7(v) Location of field camps

Temporary camping is allowed within the Area for scientific or management purposes only. Specific camp sites have yet to be identified or designated, although any camp sites should preferably be located on beach gravels, snow surfaces or rocky ground far enough away to avoidance wildlife concentrations. Camping on surfaces with significant vegetation cover is prohibited.

Visitors should however be aware of the potential of being stranded on the islands due to weather and landing conditions; therefore, camping on the islands should only be done if absolutely necessary.

7(vi) Restrictions on materials and organisms that may be brought to the area

In addition to the requirements of the Protocol, restrictions on materials and organisms that may be brought into the Area are:

- The deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. Precautions shall be taken to prevent the accidental introduction of animals, plant material, micro-organisms and non-sterile soil from other biologically distinct regions within or beyond the Antarctic Treaty Area.
- All sampling equipment or markers brought into the Area shall be cleaned and sterilized. To the maximum extent practicable, footwear and other

equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. Further guidance can be found in the CEP non-native species manual (Resolution 4 (2016)) and the SCAR Environmental code of conduct for terrestrial scientific field research in Antarctica (Resolution 5 (2018)).

- Poultry and all poultry products are prohibited from the Area.
- Herbicides or pesticides are prohibited from the Area.
- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted.
- Fuel, food, and other materials shall not be stored in the Area, unless required for essential purposes connected with the activity and specifically authorised by permit condition. In general, all materials introduced shall remain for a stated period only and shall be removed at or before the conclusion of that stated period.
- All materials shall be stored and handled in a way that minimises the risk of their accidental introduction into the environment.
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.

7(vii) Taking of, or harmful interference with, native flora or fauna

Taking of, or harmful interference with, native flora and fauna is prohibited, except in accordance with a permit issued in accordance with Annex II of the Protocol. Where taking or harmful interference of animals is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7 (viii) Collection or removal of materials not brought into the Area by the permit holder

- Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs. This includes biological samples and rock or soil specimens.
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorized, may be removed from any part of the Area, unless the impact of removal is likely to be greater than leaving the material in situ. If this is the case the appropriate authority should be notified and approval obtained.
- The appropriate national authority should be notified of any items removed from the Area that were not introduced by the permit holder.

7(ix) Disposal of waste

All wastes, including human wastes, shall be removed from the Area.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
- install or maintain signposts, markers, structures or scientific equipment;
- carry out protective measures;
- carry out research or management in a manner that avoids interference with long-term research and monitoring activities or possible duplication of effort. Persons planning new projects within the Area should consult with established programs working within the Area before initiating the work.

Any specific sites of long-term monitoring shall be appropriately marked on site and on maps of the Area. The coordinates of the spatial position should be reported to the appropriate national authority.

To avoid interference with long-term research and monitoring activities or duplication of effort, persons planning new projects within the Area should coordinate with established programs and/or appropriate national authorities.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable after the visit has been completed in accordance with national procedures.
- Such reports should include, as appropriate, the information identified in the visit report form contained in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Parties that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Parties should, wherever possible, deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organising the scientific use of the Area.
- The appropriate authority should be notified of any activities/measures that might have been undertaken, and / or of any materials released and not removed, that were not included in the authorized permit.
- Any suspected signs of highly pathogenic avian influenza in the area shall be reported immediately to the appropriate national competent authority, which shall forward this information to the World Organisation for Animal Health (WOAH).

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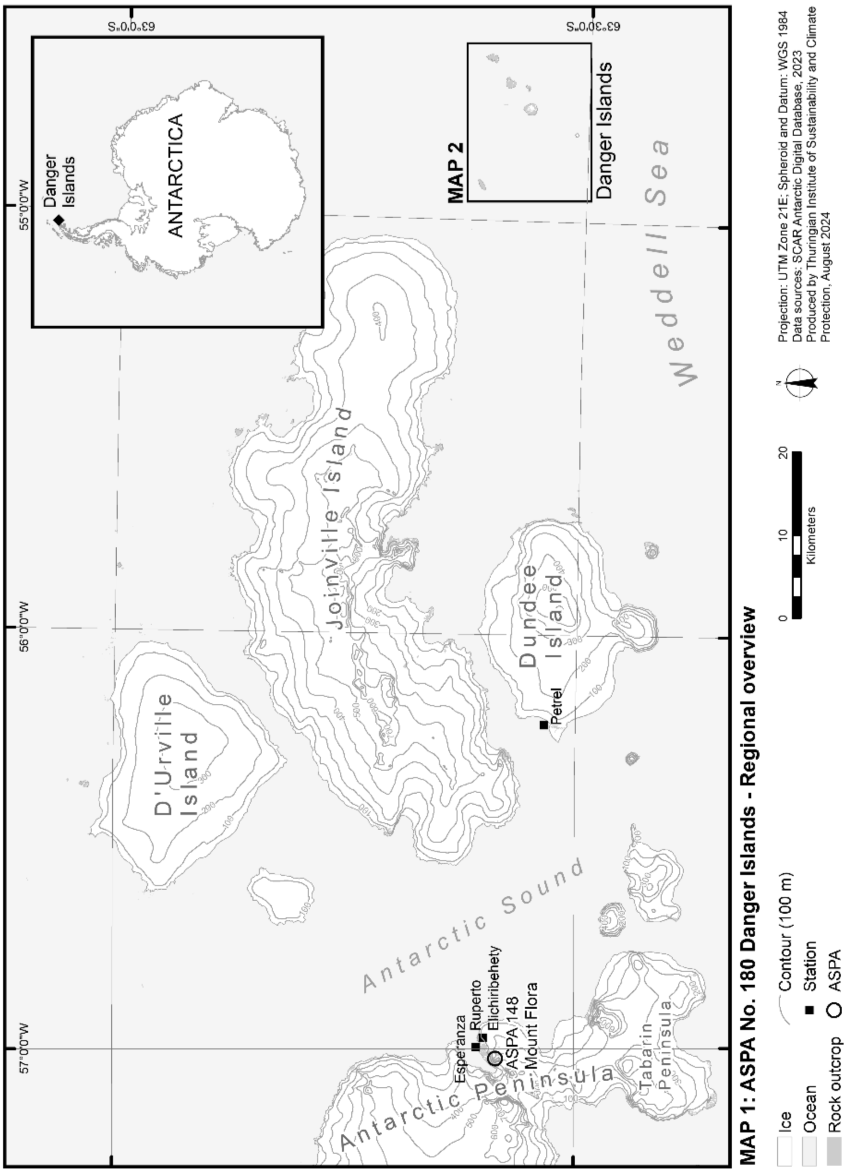
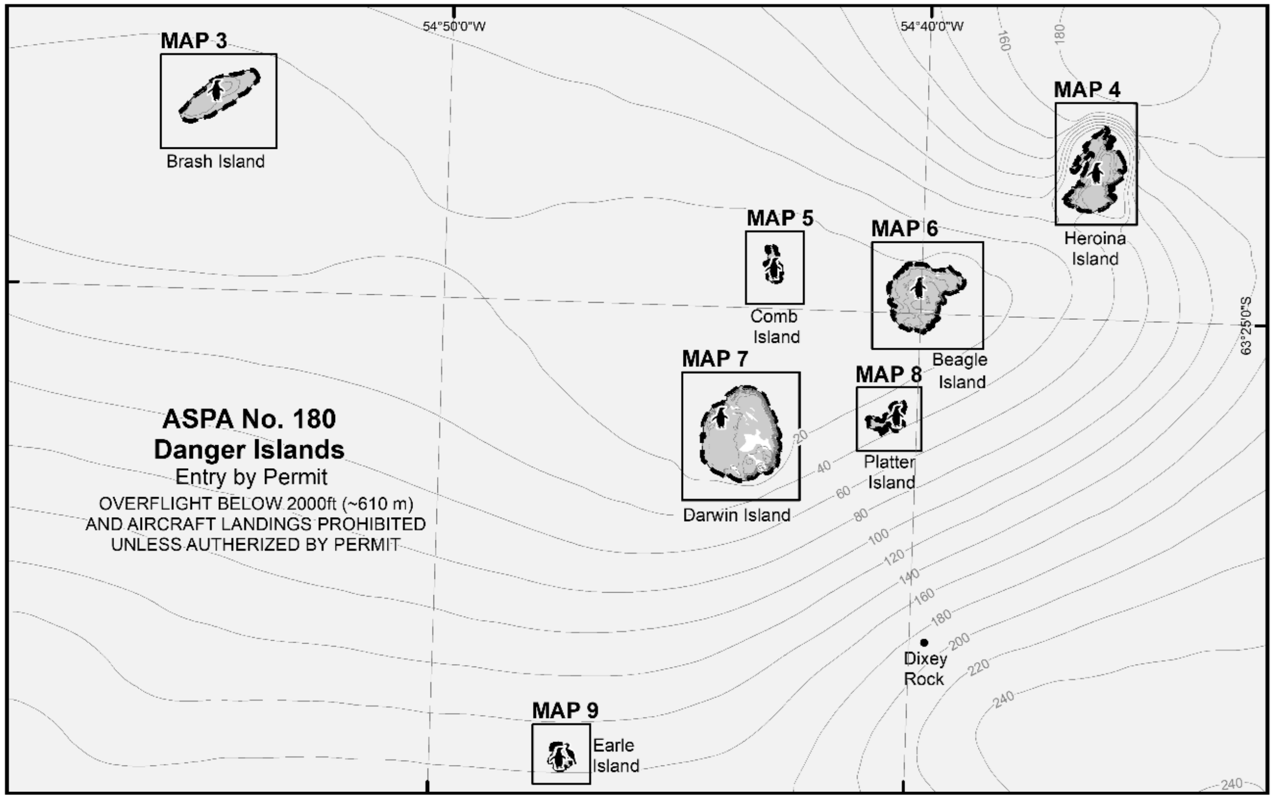
Appendix 1 – Maps





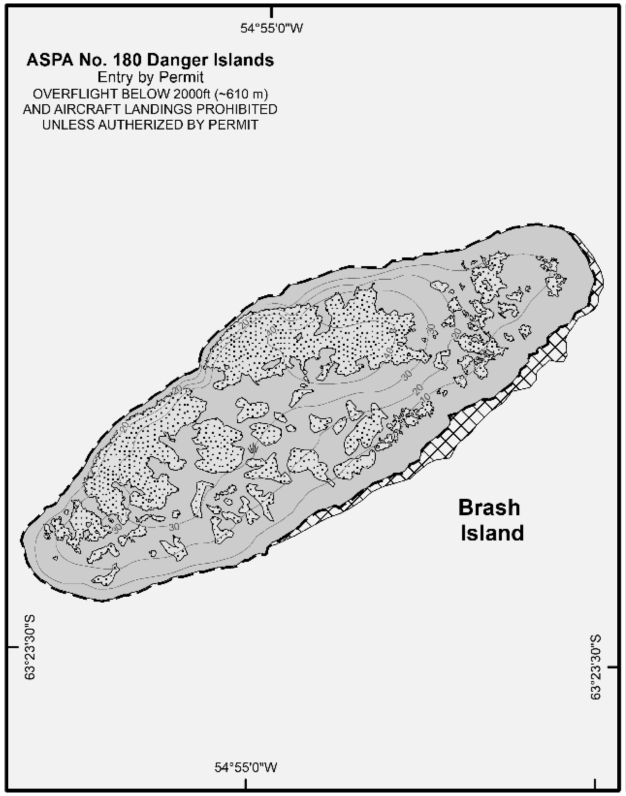
MAP 2: ASPA No. 180 Danger Islands - Overview

Coastline
Contour (20m)
Isobath (20m)
Permenant ice
Ice free ground
Ocean
Penguin colony
Antarctic shag colony
ASPA boundary

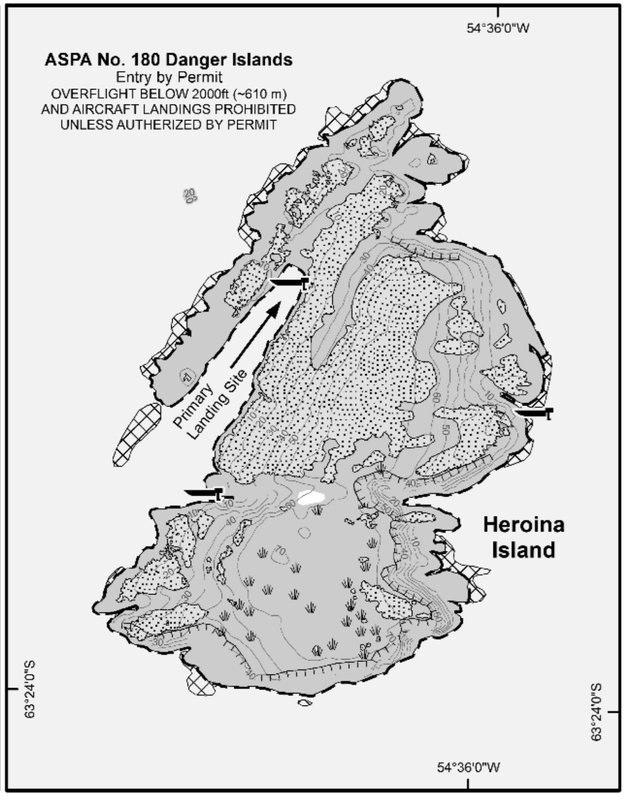
0 1,5 3
Kilometers

N

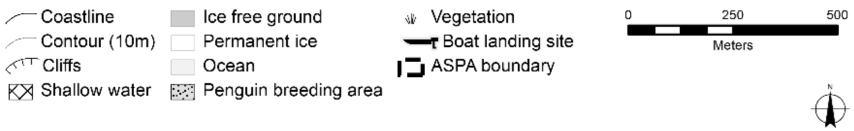
Projection: UTM Zone 21E; Spheroid and Datum: WGS 1984
Data sources:
Coastline, Penguin breeding area, Vegetation: WorldView2 image (30Dec2020);
Permenant ice: Sentinel2 image (13Feb2021);
Contour: REMA; Bathemetry: IBCSOv2
Produced by Thuringian Institute of Sustainability and Climate Protection, August 2024



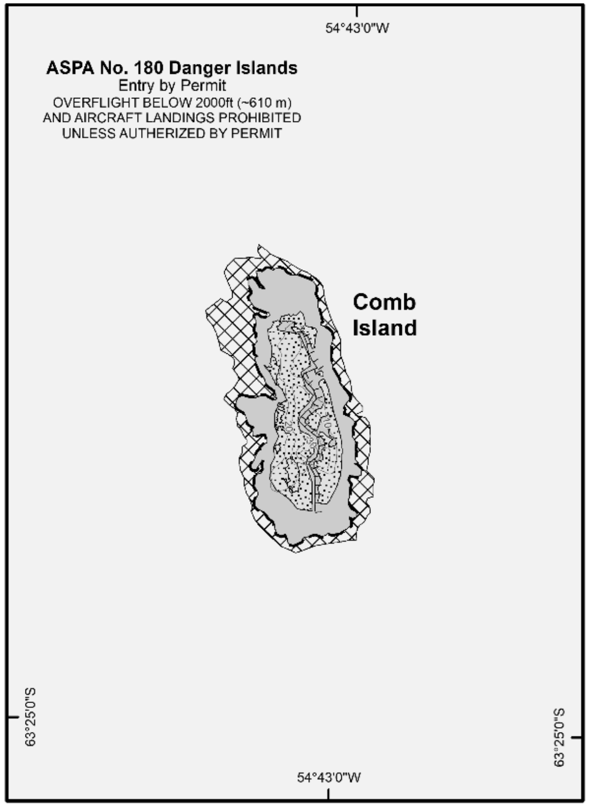
MAP 3: ASPA No. 180 Danger Islands (Brash Island)



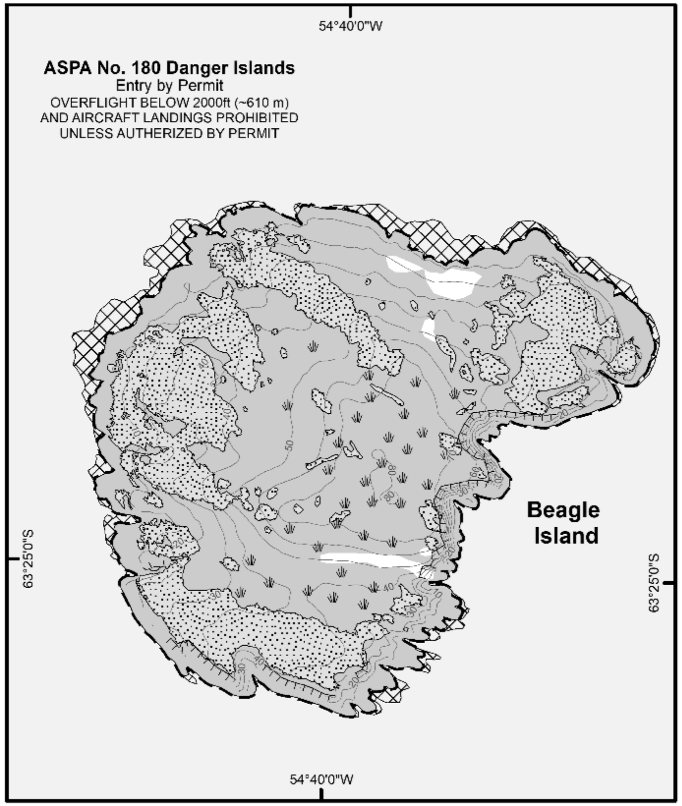
MAP 4: ASPA No. 180 Danger Islands (Heroina Island)



Projection: UTM Zone 21E; Spheroid and Datum: WGS 1984
Data sources:
Coastline, Penguin breeding area, Vegetation,
Shallow water: WorldView2 image (30Dec2020);
Permenant ice: Sentinel2 image (13Feb2021);
Contour: REMA (WV02 08Feb2017)
Produced by Thuringian Institute for Sustainability and Climate Protection, August 2024



MAP 5: ASPA No. 180 Danger Islands (Comb Island)

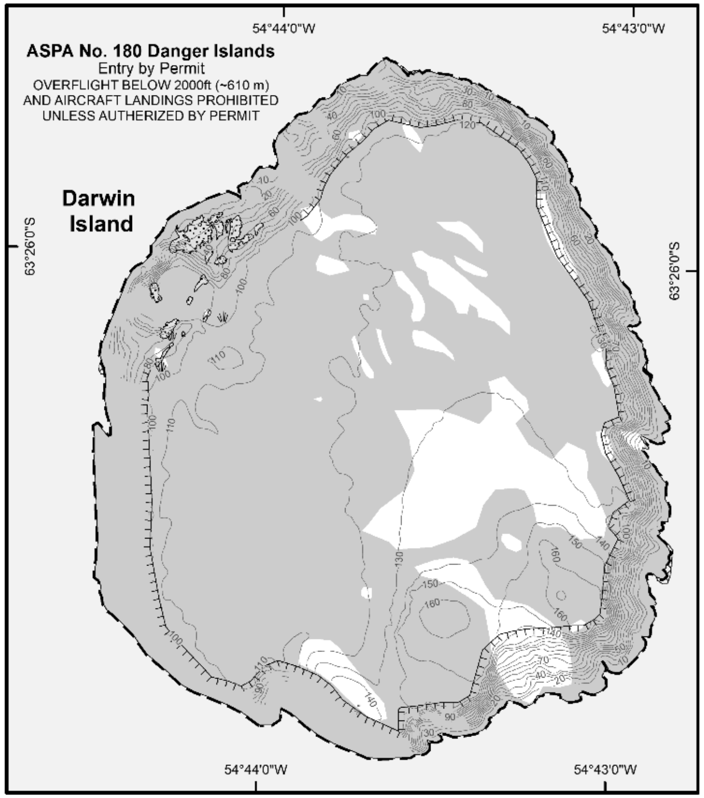


MAP 6: ASPA No. 180 Danger Islands (Beagle Island)

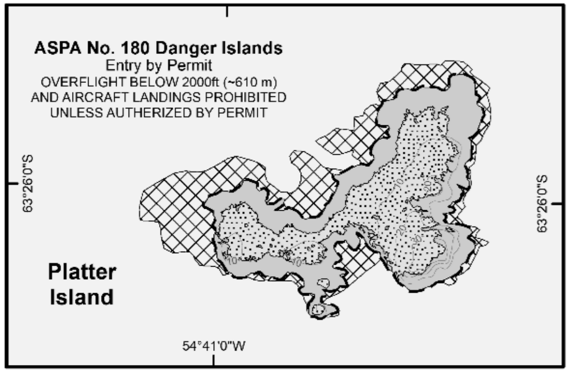
Coastline
Contour (10m)
Cliff
Shallow water
Ice free ground
Permenant ice
Ocean
Penguin breeding area
Vegetation
ASPA boundary

0 250 500
Meters

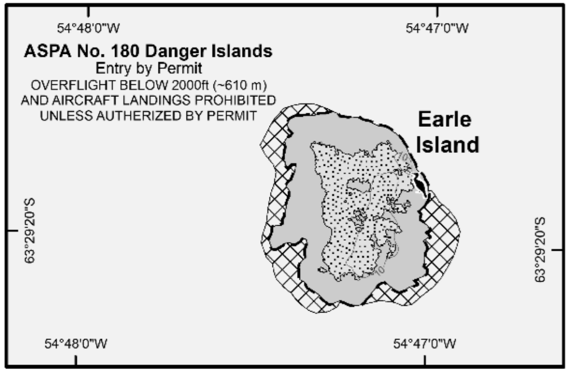
Projection: UTM Zone 21E; Spheroid and Datum: WGS 1984
Data sources:
Coastline, Penguin breeding area, Vegetation,
Shallow water: WorldView2 image (30Dec2020);
Permenant ice: Sentinel2 image (13Feb2021);
Contour: REMA (WV02 08Feb2017)
Produced by Thuringian Institute of Sustainability and Climate Protection, August 2024



MAP 7: ASPA No. 180 Danger Islands (Darwin Island)



MAP 8: ASPA No. 180 Danger Islands (Platter Island)



MAP 9: ASPA No. 180 Danger Islands (Earle Island)

Coastline
Contour (10m)
Cliff
Shallow water
Permenant ice
Ice free ground
Ocean
Penguin breeding area
Vegetation
Antarctic shag colony
ASPA boundary

0 250 500 Meters

Projection: UTM Zone 21E; Spheroid and Datum: WGS 1984
Data sources:
Coastline, Penguin breeding area, Vegetation,
Shallow water: WorldView2 image (30Dec2020);
Permenant ice: Sentinel2 image (13Feb2021);
Contour: REMA (WV02 08Feb2017);
Antarctic shags: Borowicz et al. (2020)
Produced by Thuringian Institute for Sustainability and Climate Protection, August 2024

Appendix 2 – Figures

Figure 1 Primary landing site at Heroina Island, Danger Islands Expedition 2015: Credit: Tom Hart, © Oxford University/Penguinwatch

Figure 2 Adélie penguins on sea ice next to Comb Island, Danger Islands Expedition 2015: Credit: Michael Polito, © Louisiana State University

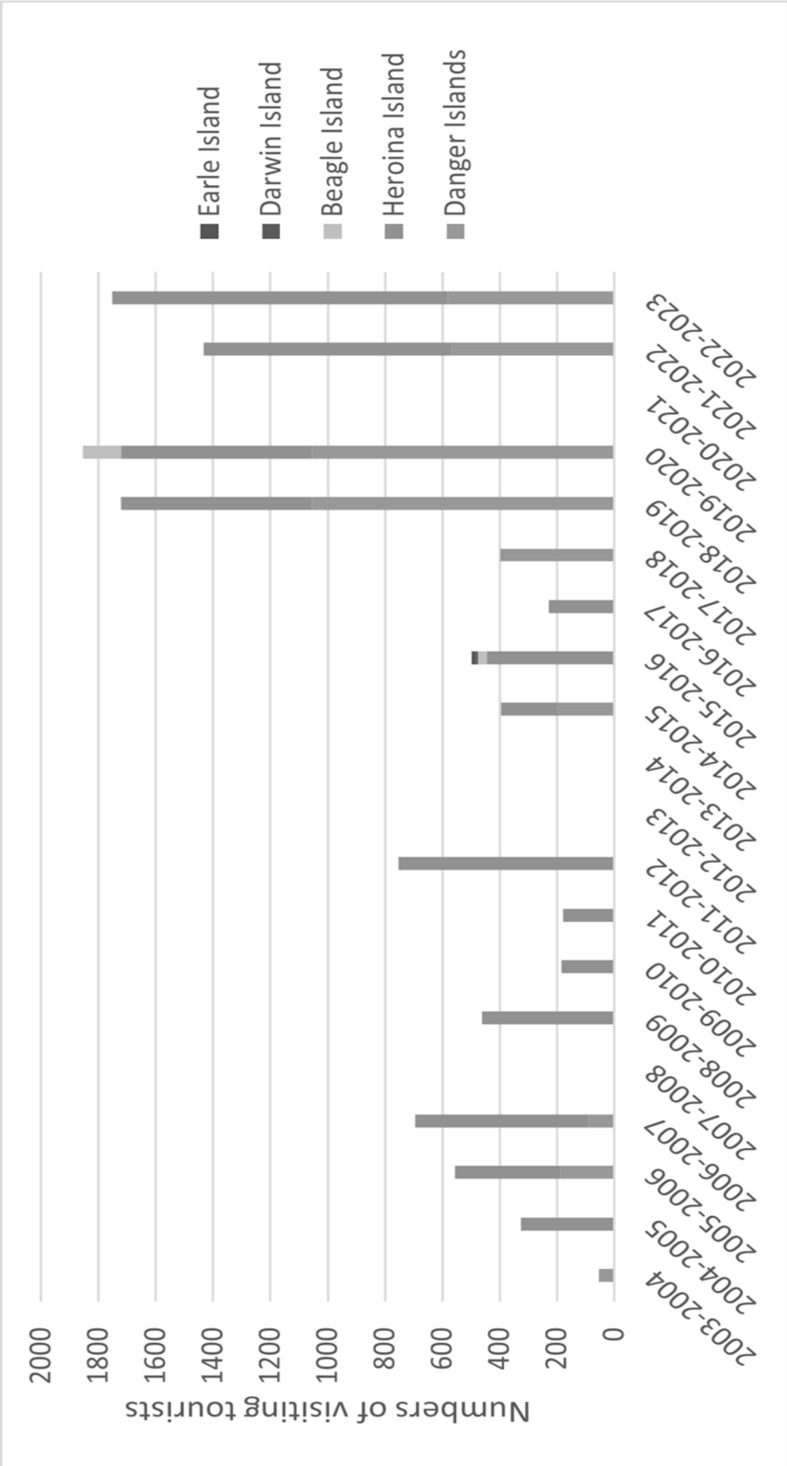


Figure 3 History of touristic visits to the Danger Islands. Data: IAATO Jan 2024.

Appendix 3 Tables

Table 1: List of species present in the Danger Islands (Borowicz et al. 2018, suppl. Tab. 1). B = Verified as breeding, I = Individuals present, NB = Verified as not breeding, -= Not observed or No data

Species	Beagle	Brash	Comb	Darwin	Dixey Rock	Earle	Heroina	Platter	Scud Rock
Birds									
Adélie penguin (*Pygoscelis adeliae*)	B	B	B	B	NB	B	B	B	NB
Gentoo penguin (*Pygoscelis papua*)	NB	B	B	–	NB	B	B	B	NB
Chinstrap penguin (*Pygoscelis antarctica*)	NB	NB	NB	–	NB	NB	B	NB	NB
Antarctic shag (*Phalacrocorax atriceps*)	NB	NB	–	–	NB	B	I	B	NB
Skua species (*Stercorarius spp.*)	–	I	I	B	–	B	B	I	–
Southern giant petrel (*Macronectes giganteus*)	NB	I/NB	NB	–	–	NB	I/NB	I/NB	–
Cape (pintado) petrel (*Daption capense*)	–	–	–	–	–	–	B	B	–
Snow petrel (*Pagodroma nivea*)	–	–	B	–	–	I	I	–	–
Wilson's storm petrel (*Oceanites oceanicus*)	–	B	–	–	–	–	I	I	–
Kelp gull (*Larus dominicanus*)	–	B	I	–	–	I	I	I	–
Snowy sheathbill (*Chionis albus*)	–	B	B	I	–	B	B	B	–
Antarctic tern (*Sterna vittata*)	–	–	I	–	–	–	I	–	–
Seals									
Weddell seal (*Leptonychotes weddelli*)	–	–	I	–	–	I	I	I	–

Table 2: Available data on seabird population numbers. Counts are given including the count accuracy using the scale of (Ainley, 1993; Croxall and Kirkwood, 1979): N1 and C1 = nests or chicks dividually counted, accurate to better than ±5%; N2: Nests counted in known Area then extrapolated over total site Area, accurate to 5–10 %; N3: Accurate estimate of nests, accurate to 10–15 %; N4: Rough estimate of nests, accurate to 25–50 %; N5: Estimate of nests to nearest order of magnitude. Where an accuracy was not indicated, it is indicated as "UNK". The source of the counts are indicated by superscripted letters: a (Borowicz et al., 2018), b (Lynch et al., 2008), c (Lynch et al., 2013), d (Lynch and LaRue, 2014), e (Naveen et al., 2000), for more recent updates please see https://www.penguinmap.com/mapppd/

Location	**Date**	**Adélie p. [PB]**	**Gentoo p. [PB]**	**Chinstrap p. [PB]**	**Antarctic shag. [PB]**	**Source**
Beagle Island	Jan. 1999	20,000 – >100,000 (UKN)				(Naveen et al., 2000)
	22.01.2011	96,892 (N5)				(Lynch and LaRue, 2014)
	Dec. 2015	284,535 (N2)	0 (N1)	0 (N1)		(Borowicz et al., 2018)
Brash Island	2000-02-23	123,666 - 228,268 (95th percentile CI)				(Lynch and Schwaller, 2014)
	Dec. 2015	94,951 (N2)	2,270 (N1)	0 (N1)		(Borowicz et al., 2018)
Comb Island	January 1999	100 – 7,499 (UKN)				(Naveen et al., 2000)
	22.01.2011	3,311 (N5)				(Lynch and LaRue, 2014)
	Dec. 2015	12,000 (N4)	186 (N1)	0 (N1)		(Borowicz et al., 2018)
Darwin Island	Jan. 1999	20,000 – >100,000 (UKN)				(Naveen et al., 2000)
	2000-02-23	5,384 – 9,931 (95th percentile CI)				(Lynch and Schwaller, 2014)
	Dec. 2015	5,804 (N1)	0 (N1)	0 (N1)		(Borowicz et al., 2018)
Earle Island	2000-02-23	17,361 – 32,163 (95th percentile CI)				(Lynch and Schwaller, 2014)
	Dec. 2015	21,071 (N2)	847 (N1)	0 (N1)	156 (N1)	(Borowicz et al., 2018)
Heroína Island	December 1996	285,115 - 305,165 (N2)	215 (N1)			(Naveen et al., 2000)

	3 February 2006		142 chicks (C1)			(Lynch et al., 2008)
	21 January 2008		173 chicks (C1)			(Lynch et al., 2013)
	22.01.2011	51,358 (N5)				(Lynch and LaRue, 2014)
	Dec. 2015	292,363 (N2)	999 (N2)	27 (N1)		(Borowicz et al., 2018)
Platter Island	Jan. 1999	7,500 to 19,999 (UKN)				(Naveen et al., 2000)
	22.01.2011	27,902 (N5)				(Lynch and LaRue, 2014)
	Dec. 2015	40,803 (N1)	223 (N1)	0 (N1)		(Borowicz et al., 2018)

Measure 16 (2024)

Antarctic Specially Protected Area No 181 (Farrier Col, Horseshoe Island, Marguerite Bay): Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Noting that the Committee for Environmental Protection ("CEP") has endorsed a Management Plan for ASPA 181;

Recognising that this area supports outstanding environmental, scientific, historic, aesthetic or wilderness values, or ongoing or planned scientific research, and would benefit from special protection;

Desiring to designate Farrier Col, Horseshoe Island, Marguerite Bay as ASPA 181 and to approve the Management Plan for this Area;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. Farrier Col, Horseshoe Island, Marguerite Bay be designated as Antarctic Specially Protected Area No 181; and
2. the Management Plan, which is annexed to this Measure, be approved.

Management Plan for Antarctic Specially Protected Area No 181

FARRIER COL, HORSESHOE ISLAND, MARGUERITE BAY

Introduction

The primary reason for the designation of Farrier Col, Horseshoe Island, Marguerite Bay (Lat. 67°49' S, Long. 67°13' W; area c. 0.4 km²) as an Antarctic Specially Protected Area (ASPA) is to protect scientific and environmental values associated with the freshwater lakes in the Area (see Maps 1, 2 and 3). The Area also protects outstanding wilderness and aesthetic values.

ASPA 181 consists of largely ice-free undulating ground located on Farrier Col, at an altitude of c. 90 to 160 m above sea level and located more than 500 m from the coast (Maps 2 and 3). The Area is considered to be of sufficient size as it incorporates the scientifically important lakes and much of the associated lake catchment areas.

Farrier Col was originally designated as an Antarctic Specially Protected Area through Measure 16 (2024) after a proposal by Belgium, Türkiye and the United

Kingdom. It was designated on the grounds that the Area contains a combination of outstanding scientific and environmental values associated with its freshwater lakes.

Earlier activities in the Area were predominantly associated with scientific research, including lake coring to establish the glacial history of the area. Planned scientific activities within the Area include monitoring of lakes for anthropogenic pollutants that are derived from local and global sources, and analysis of the variation in lake hydrological features, chemistry and biodiversity under different environmental conditions, including those resulting from climate change. Planned activities in the vicinity of Area will be predominantly limited to the use of the access corridor between the Area sub-sites to facilitate access from the Turkish Scientific Research Camp to the rest of the island (see Maps 1 and 2). Tourism activity near the Area is currently minimal.

Resolution 3 (2008) recommended that the Environmental Domains Analysis for the Antarctic Continent be used as a dynamic model for the identification of Antarctic Specially Protected Areas within the systematic environmental-geographical framework referred to in Article 3(2) of Annex V to the Protocol (see also Morgan et al., 2007). Using this model, ASPA 181 Farrier Col, Horseshoe Island, Marguerite Bay, is contained within Environment Domain B (Antarctic Peninsula mid-northern latitudes geologic). Other protected areas contained within Domain B include ASPAs 108, 115, 134, 140, 153, 177 and ASMA 4. Resolution 3 (2017) further recommended that the Antarctic Conservation Biogeographic Regions (ACBRs) be used for the identification of areas that could be designated as Antarctic Specially Protected Areas within the systematic environmental-geographic framework referred to in Article 3(2) of Annex V to the Environmental Protocol. ASPA 181 is located within ACBR 3 Northwest Antarctic Peninsula (Resolution 3 (2017)).

Five other ASPAs are present within the Marguerite Bay area (ASPA 107 Emperor Island, Dion Islands, Marguerite Bay, Antarctic Peninsula; ASPA 115 Lagotellerie Island, Marguerite Bay, Graham Land; ASPA 117 Avian Island, Marguerite Bay, Antarctic Peninsula; ASPA 129 Rothera Point, Adelaide Island; and ASPA 177 Léonie Islands and South-east Adelaide Island, Antarctic Peninsula) (see Map 1). ASPAs 107 and 117 were designated to protect primarily their avifauna, ASPA 129 was designated to monitor the impact of the nearby Rothera Research Station on an Antarctic fellfield ecosystem and ASPA 115 was designated to protect regionally rich terrestrial biological communities. ASPA 177 was designated to protect the avifauna and terrestrial biological communities of the area, established research sites and wilderness and aesthetic values. Therefore, ASPA 181 Farrier Col, Horseshoe Island, Marguerite Bay, complements the local network of ASPAs by primarily protecting freshwater lake environments, which are little represented in other protected areas in the region.

1. Description of values to be protected

The proposed ASPA contains a combination of outstanding scientific, environmental, wilderness and aesthetic values.

- Sediment cores from Puller Lake contain material radiocarbon dated to 36,000 years old, with unequivocal evidence of biological occupation from at least 29,000 years ago for aquatic mosses and 21,000 years ago for zooplankton. This is the longest known biological occupation of any lake in the Antarctic Peninsula region, most being less than 9000 years old. Thus, these lakes were likely refugia for biota through the last glacial cycle – one of very few such locations known – and make the site of importance for future scientific research.
- The oligotrophic lakes are exceptional as few other examples exist in the region. Furthermore, the lakes contain the fairy shrimp, Branchinecta gaini (Daday 1910), which is the largest freshwater invertebrate in Antarctica, and form the southern boundary of its known range on Horseshoe Island.
- The Area has been subject to little human impact and no human infrastructure is present. With the exception of scientific and operational personnel working at the Turkish Scientific Research Camp, the number of visitors to the vicinity of the Area is low, but tourist visitation is increasing. A draft Comprehensive Environmental Evaluation (CEE) has been submitted regarding the construction and operation of the Turkish Antarctic Research Station (TARS) that is proposed to be established on Horseshoe Island. The CEE aims to minimize the impacts of human activities. The TARS will provide logistical support for the delivery of research projects and the collection of long-term scientific datasets by Turkish and international researchers.
- The Area is situated in a location with exceptional views of the ocean, and the mountains and glaciers of islands in Marguerite Bay and the Antarctic Peninsula. The degree of disturbance and modification in the Area is very low and limited to research activities. The lakes themselves represent a tranquil environment surrounded by majestic scenery. As a result, the Area is considered to be of outstanding aesthetic and wildness value.

2. Aims and objectives

Management at Farrier Col aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research in the Area provided it is for compelling reasons that cannot be served elsewhere, and which will not jeopardise the natural ecological system in the Area;
- allow visits for management purposes in support of the aims of the Management Plan;
- prevent or minimise the introduction to the Area of non-native plants, animals and microorganisms;
- preserve the natural ecosystem of the Area as a reference area for future studies.

3. Management activities

The following management activities are to be undertaken to protect the values of the Area:

- Visits shall be made as necessary to assess whether the ASPA continues to serve the purpose for which it was designated and to ensure management and maintenance measures are adequate.
- The Management Plan shall be reviewed at least every five years and updated as required.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- A copy of this Management Plan shall be made available at Rothera Research Station (UK; Lat. 67°34' S, Long. 68°07' W), Teniente Luis Carvajal Station (Chile; Lat. 67°46' S, Long. 68°55' W) San Martín Base (Argentina; Lat. 68°08' S, Long. 67°06' W) and the Turkish Scientific Research Camp (Lat. 67°49' S, Long. 67°14' W).
- Copies of this Management Plan shall be made available to vessels and aircraft planning to visit the vicinity of the Area.
- All scientific and management activities undertaken within the Area shall be subject to an Environmental Impact Assessment, in accordance with the requirements of Annex I to the Protocol on Environmental Protection to the Antarctic Treaty.
- Visiting field parties shall be briefed fully by the national authority on the values to be protected within the Area and the measures and mitigation measures detailed in this Management Plan.
- All pilots operating in the region will be informed of the location, boundaries and restrictions applying to entry and overflight within the Area.
- National Antarctic programmes operating in the Area will consult together to ensure the implementation of the management activities detailed above.

4. Period of designation

The ASPA is designated for an indefinite period.

5. Maps

Map 1. Antarctic Specially Protected Area No 181, Farrier Col, Horseshoe Island, Marguerite Bay, location map, showing the location of the Turkish Scientific Research Camp (Türkiye), San Martín Base (Argentina), Teniente Luis Carvajal Station (Chile) and Rothera Research Station (UK). Also shown are the locations of the other protected areas in the region: Rothera Point, Adelaide Island (ASPA 129), Emperor Island, Dion Islands, Marguerite Bay, Antarctic Peninsula (ASPA 107), Leonie Islands and South-east Adelaide Island, Antarctic Peninsula (ASPA 177), Lagotellerie Island, Marguerite Bay, Graham Land (ASPA 115) and Avian Island, Marguerite Bay, Antarctic Peninsula (ASPA 117). 'Base Y' (UK) (Historic Monument No 63) on Horseshoe Island is shown. Inset: the location of the region relative to the Antarctic Peninsula. Map details: WGS 1984 UTM Zone 19S, central meridian 68°W.

Map 2. Antarctic Specially Protected Area No 181, Farrier Col, Horseshoe Island, Marguerite Bay. Inset (left): Location of Horseshoe Island in relation to the Antarctic Peninsula. Inset (right): Location of Farrier Col in relation to Horseshoe Island. The access corridor, located between the two ASPA sites, is the safest, shortest and most practical route for access to the rest of the island. Main panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Horseshoe Island panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Antarctic Peninsula panel: WGS 1984 Antarctic Polar Sterographic, central meridian 62.5°W.

Map 3. Simplified map of Antarctic Specially Protected Area No 181, Farrier Col, Horseshoe Island, Marguerite Bay. Inset (left): Location of Horseshoe Island in relation to the Antarctic Peninsula. Inset (right): Location of Farrier Col in relation to Horseshoe Island. The access corridor, located between the two ASPA sites, is the safest, shortest and most practical route for access to the rest of the island. Main panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Horseshoe Island panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Antarctic Peninsula panel: WGS 1984 Antarctic Polar Sterographic, central meridian 62.5°W.

6. Description of the Area

6(i) Geographical coordinates and natural features

- *Boundaries and co-ordinates*

The Area encompasses all of the ice-free ground, permanent ice, semi-permanent ice and lakes found within the boundaries (see Maps 2 and 3, and the boundary co-ordinates provided in Table 1). In large part, the ASPA boundary encloses the catchment area of the lakes, and generally includes a 10-20 m buffer zone beyond the catchment area extent. The ASPA is divided into two sub-sites (northern site and southern site) by an access corridor (c. 50 m wide) that is the safest, shortest and most practical route for access to the rest of the island from the Turkish Scientific Research Camp. The corridor passes through the catchment areas of Rasp, Puller and Pritchel Lakes, which has necessitated the need for measures to reduce the risk of impacts to the lakes (see section 6(ii) Access to the Area). To the north of the lakes, the catchment area likely extends to the summit of Mt Searle across areas of permanent ice (see Map 2). To allow access to the rest of the island via routes over permanent ice to the north of the lakes (and to the south of Mt. Searle), the northern boundary of the ASPA follows the current extent of ice-free ground. The position of the boundary may need to be revised should the extent of the permanent ice change, for instance, as a result of climate change.

- *General description*

Horseshoe Island is the third largest island within the Marguerite Bay, with an area of c. 60 km². Glaciers or semi-permanent ice and snow cover 66% of the island. Mount Searle (537 m a.s.l.) and Mount Breaker (879 m a.s.l) are the highest peaks on the island. Farrier Col is a largely ice-free area located in an isthmus at the centre of the island. Four freshwater lakes are located on the plateau of Farrier Col (c. 90 m a.s.l.) and are the main features protected within the ASPA.

- *Climate*

Marguerite Bay and the islands to the west of the Fallières Coast are under a cold and dry maritime climate (Yıldırım, 2020). Climatic data collected at Base Y for four years (1955/56 to 1958/59) showed the mean annual temperature to be -6.9°C, mean daily duration of sunshine from February to March to be 5.5 h, mean annual relative humidity as 76%, and the average number of days per year with cloud and gales 217 and 30 days, respectively (Longton, 1967). A weather station was installed on Farrier Col (Lat. 67°49'47” S, Long. 68°14'04” W) by the Turkish State Meteorological Service in 2020. Climatic data for Farrier Col is available for the period Feb 2020 to Feb 2023 and is shown in Table 2.

- *Geology*

The geology of Horseshoe Island is complex and exhibits a large degree of variation (Matthews, 1983). The southern half of the island is dominated by coarse grained/megacrystic granite that has been dated as Late to Mid-Cretaceous (106 – 67 Ma). The granites intrude earlier, more mafic intrusive rocks (gabbro-diorite), with the granite being cut by north-south trending dolerite dykes. Gneissose metamorphic rocks are locally dominant across eastern Horseshoe Island at Square Bay and Bourgeois Fjord.

The geology of the isthmus region, which includes Farrier Col, is also complex and is dominated by strongly foliated black schists, quartz-mica schists and silicified metasedimentary rocks. The metasedimentary succession has a near vertical foliation across the low-lying, but prominent, hillocks of this region (e.g., Forge, Blacksmith and Bellows Knolls). There are also coarse grained, matrix-supported conglomerate units associated with the metasedimentary rocks, which are host to granite cobbles that have been dated as Silurian in age. The metasedimentary rocks are intruded by gneissic granite, which is in turn intruded by a later granodiorite pluton that is characterized by abundant mafic xenoliths. The entire succession is cut by quartz-feldspar porphyry dykes. Volcanic rocks are reported from the northeast of Gaul Cove and comprise dark grey laminated siliceous units associated with agglomerate dykes (Matthews, 1983).

- *Geomorphology*

Horseshoe Island is of considerable interest in terms of its glacial and periglacial landscape evolution and for glacio-isotatic investigations because of well-preserved landforms and deposits (Yıldırım, 2020). Horseshoe Island is comprised of three distinct geomorphologic sectors, i.e., the northern, central and southern sectors (see Map 2, second inset). The northern and southern sectors are still under the influence of glaciers, with the northern sector partly covered by a remnant of an ice cap and the higher, larger and more rugged southern sector containing a diverse range of erosional glacial landforms such as nunataks, horns, arètes, glacial steps, cirques and truncated spurs.

Farrier Col is located within the central sector and is rich in terms of glacial and periglacial landforms and deposits such as frost shattered bedrock, patterned ground and talus cones. The plateau area of Farrier Col is around 90 m a.s.l where four freshwater lakes are situated. The plateau resembles a subtle knock and lochan topography with irregular depressions. Till produced as a result of palaeoglacial activity on Farrier Col plateau is generally not well preserved. However, this till is the source of the finer material that is found in frost-sorted polygons. Glacial till, within an east–west oriented high moraine, defines the boundary between Farrier Col and the more glaciated northern sector. The terminal moraine of Shoesmith Glacier defines the boundary between the southern sector and Farrier Col. The presence of several moraine ridge crests on Farrier Col indicates the recent recession of Shoesmith Glacier. The western and eastern coasts of Farrier Col comprise well-preserved uplifted shorelines as an indicator of glacio-isostatic processes.

- *Freshwater bodies*

The Area contains approximately 38,700 m² of lacustrine environment in the form of the four oligotrophic lakes: Clincher Lake, Puller Lake, Pritchel Lake in the northern sub-site, and Rasp Lake in the southern sub-site. The size and depth of the lakes may vary due to changing levels of meltwater input from surrounding snow slopes and levels of evaporation. All the lakes have a closed catchment, i.e., they do not have outflows.

- Puller Lake is an elongate, shallow clear water lake, 162 m long, 64 m wide (approximate area 8600 m²) and up to 3.2 m deep situated at an altitude of c. 90 m above sea level. The water chemistry is typical of a polar freshwater oligotrophic lake (see Table 3). Profiles of the water column (measured on 17 Jan 2003) showed a marginally warmer surface layer to 1.6 m followed by steady cooling through the lower water column. The water column is otherwise well mixed with little change in conductivity, and no evidence of oxygen depletion with depth. Of the four lakes on Farrier Col, Puller Lake has been subject to the highest level of scientific investigation.
- Clincher Lake is the most westerly of the lakes on Farrier Col. It is roughly circular in shape, has a maximum width of c. 115 m. and has an area of approximately 6850 m². Details of its water chemistry are available in Table 3.
- Pritchel Lake is the most north-easterly and largest of the lakes on Farrier Col. It is roughly circular in shape with a maximum width of c. 175 m and an area of approximately 14,500 m². A small island, c. 20 x 30 m across, is present in Pritchel Lake; decreases in water level can cause the development of an isthmus on the south side of the island that can link the island to the rest of the col (as shown by aerial images collected at different times). Details of its water chemistry are available in Table 3.
- Rasp Lake is the only lake within the Area’s southern sub-site. It is an elongate lake, c. 170 m long and 90 m wide, with an approximate area of

8750 m². Its catchment area extends southwest to the summit of Forge Knoll, northeast to the summit of Blacksmith Knoll and south to the summit of Bellows Knoll. Rasp Lake has not been the subject of substantial research activity.

- *Freshwater biological communities*

The diversity of Antarctic freshwater fauna is poor, as compared with the marine fauna, owing to the more extreme and variable environmental conditions. Comprehensive investigations into the biological communities present within the lakes of Farrier Col have not been undertaken. However, Puller Lake contains the fairy shrimp, Branchinecta gaini (Daday 1910), which is the largest freshwater invertebrate in Antarctica, with a length of 16 mm, and is present at the southern boundary of its known range on Horseshoe Island. It generally survives the winter as dormant eggs, with juveniles and adults being microbivorous. The freshwater copepod Boeckella poppei is found in several lakes on Horseshoe Island including Puller Lake (Hodgson et al., 2013; Maturana et al., 2022). Being only c. 3.2 m deep, light penetrates to the bottom of Puller Lake, resulting in well-developed benthic and epilithic mats of cyanobacteria, and a grazing zooplankton community (Hodgson et al., 2013).

Diatoms are silica-shelled eukaryotic aquatic phytoplankton that are amongst the most important primary producers and play roles in various biogeochemical processes. The occurrence of different diatom species is strongly influenced by the chemical characteristics of a water body. Shifts in dominant diatom species over time can therefore be used as a proxy for reconstructing past environmental changes (Wasell & Håkansson, 1992). Therefore, sediments in the lakes on Horseshoe Island, including Farrier Col, can be used to track past environmental changes, particularly given the exceptional length of their sedimentary record. Analysis of the diatom community in a sample containing mosses from the littoral zone of Puller Lake showed 12 species in total, based on the analysis of 400 specimens. The diatom community was dominated by a several Gomphonema species. Psammothidium subatomoides, Humidophila australis and Pinnularia australomicrostauron all had a relative abundance between 3 and 1.5%; other species had a relative abundance below 1% (Verleyen et al. 2021). Further work on samples collected from Puller Lake and Clincher Lake suggested the presence of the diatom species Gomphonema sarcophagus, Planothidium lanceolatum, Achnanthes spp., Achnanthes sinaensis, Achnanthidium spp., Navicula spp. and several unidentified species (Cura, 2020).

Analysis of the 16S and 18S rRNA genes in a sample containing mosses from the littoral zone of Puller Lake using high-throughput sequencing showed that four of the most abundant prokaryotic operational taxonomic units (OTUs) belonged to the Cyanobacteria and another OTU was an unclassified Bacteroidetes belonging to the Saprospiraceae. Two OTUs that could be classified to the genus level belonged to the cyanobacterial genera Leptolyngbya and Pseudanabaena. Two out of the five most abundant eukaryotic OTUs were classified as species belonging to the tardigrade genera Acutuncus and Diphascon. The three other dominant eukaryotic

OTUs were a protist belonging to the Labyrinthulea, a green algae and an unclassified rotifer (E. Verleyen, pers. comm., 13 January 2023).

The lakes of Farrier Col were likely refugia for biota through the last glacial cycle (see section on Glacial History), and as such are one of very few such locations known in Antarctica. Consequently, the lakes are of substantial importance for future scientific research.

- *Terrestrial biological communities*

While no comprehensive survey of terrestrial and freshwater biodiversity has been undertaken within the Area, it is thought that the biota of Farrier Col will comprise a subset of the species found elsewhere on Horseshoe Island (BAS, 2020). A list of vascular plant, moss, lichen, cyanobacteria and algal species recorded on the island is provided in Table 4. Patchy moss beds are present within the Area, particularly towards the edges of the lakes. While little is known of the Area's terrestrial invertebrate fauna, Block and Starý (1996) reported the presence of the common oribatid mite, Alaskozetes antarcticus (Michael, 1903).

- *Vertebrate fauna*

No seal or penguin species are routinely found within the Area due to its inland location at c. 90 m a.s.l. A small number of Adélie penguin (Pygoscelis adeliae) breed on Horseshoe Island, and Weddell (Leptonychotes weddellii), crabeater (Lobodon carcinophaga), and Antarctic fur seal (Arctocephalus gazella) haul out sites are found around the coast within c. 500 m of the ASPA boundary. Flying birds observed within the Area include south polar skua (Catharacta maccormicki), Antarctic tern (Sterna vittata), and Antarctic imperial shag (Leucocarbo bransfieldensis).

- *Glacial history*

Sediment records obtained from the lakes of Farrier Col have been of great importance in providing evidence of late-Quaternary environmental change in the Marguerite Bay region (Hodgson et al., 2013). Lake sediment cores were radiocarbon dated and analysed using a combination of sedimentological, geochemical and microfossil methods. Chronologies for the sediment cores were established by AMS radiocarbon (^{14}C) dating of macrofossils including microbial mats, fragments of the moss Warnstorfia fontinaliopsis (Muell. Hal.) Ochyra, and preserved eggs of the fairy shrimp Branchinecta gaini Daday, 1910 (Hodgson et al., 2013).

Results suggested the following:

- Farrier Col was subject to a non-erosive glacial regime from 35,780 (38,650–33,380) or 32,910 (34,630–31,370) cal yr BP onwards.
- The earliest onset of deglaciation on Farrier Col, as indicated by the presence of moss fragments embedded within the lake sediment matrix, was 28,830

cal yr BP, which is the earliest reported for the region and immediately post-dates Antarctic Isotopic Maximum 4 (Hodgson et al., 2013). This corresponds with regional evidence for ice sheet thinning after c. 30,000 cal yr BP.

- At least one part of the ice sheet in inner Marguerite Bay was <140 m thick (relative to present sea level) from 21,110 cal yr BP. This was indicated by the colonisation of Puller Lake by B. gaini from 21,110 (21,510–20,730 interpolated) cal yr BP, which required the existence of a perennial water body. This coincides with, or immediately post-dates Antarctic Isotopic Maximum 2.
- The Holocene deglaciation of Horseshoe Island commenced from 10,610 (11,000–10,300) cal yr BP as revealed by radiocarbon dated aquatic moss fragments in Puller Lake, which was followed by a peak abundance of B. gaini eggs at 9830 (9940 to 9720 interpolated) cal yr BP and accompanied by a positive shift in $d^{13}C$ suggesting the freshwater biota was well established at this time. Palaeoclimate data, including from lake sediments, suggested an extended period of regional warming sometime between 6200 and 2030 cal yr BP.
- The onset of Neoglacial conditions commenced from 2030 cal yr BP in the area around Farrier Col. This was indicated by decreases in organic carbon and sediment accumulation in Puller Lake cores caused by nearby snowbanks expanding across the lakes as the climate cooled.
- An increased sedimentation rate in the Puller Lake sediment core, after c. 400 (490–310) cal yr BP, which may be a response to the regional late-Holocene warming of the Antarctic Peninsula.

Cosmogenic ^{10}Be exposure dating of samples collected from four erratic pink granite boulders (three of which were located within the Area, close to Puller Lake) allowed researchers to identify the age of deglaciation as 9.4 ± 0.8 ka, which confirmed a rapid thinning of the Marguerite Trough Ice Stream at the onset of the Holocene (Çiner et al., 2019).

- *Human impact*

Horseshoe Island was discovered and named by the British Graham Land Expedition under John Rymill who first mapped the area by land and from the air in 1936–37. While substantial long-term human activity has occurred on the island, much of which was associated with the British Base Y located to the north of the island, evidence of human impact within the Area is limited. Base Y was operated year-round from 1955 to 1959, was last used to support research activities in 1969 and has since been designated as HSM 63. Site Guidelines for Visitors have been developed for Base Y, which receives regular visits and landings from yachts and larger vessels (over 2300 visitors in 2019/20). Earlier levels of tourist visitation to Farrier Col were likely to be low, but recent observations suggest this could be increasing with a tourist camping site recently established close to the Turkish Scientific Research Camp, c. 400 m from the Area. Camping debris, possibly dating back to the 1980s, was discovered and recorded during the Fourth Turkish Antarctic Expedition I (TAE-4) outside the Area, close to the shoreline of Lystad Bay.

The lakes within ASPA 181 are located c. 400 m from the temporary Turkish Scientific Research Camp, which was constructed in 2019 on the shore of Lystad Bay, to the west of Farrier Col. Plans are now in place to construct a permanent research station in the same general location, which once completed will accommodate up to 50 personnel in summer and c. 12 during the winter. Construction is due to commence in the near future, and the research station is anticipated to be in use for a minimum of 25 years.

Samples of newly fallen snow, old snow, as well as water from lakes, ponds and streams were collected from locations, including Farrier Col, for a study of trace and major elements (Kakareka, 2022). High enrichment factors from some elements (especially in newly fallen snow) indicated possible anthropogenic impact connected with long-range air mass transfer.

Analyses of polyaromatic hydrocarbons, polychlorinated biphenyl and metal found in sediments collected from Puller, Clincher and Pritchel Lakes are shown in Tables 5, 6 and 7, respectively (Turkiye, 2021). Analyses targeting eleven organochlorine pesticides (OCPs) in lake sediments detected only dichlorodiphenyltrichloroethane (DDT) derivatives and hexachlorocyclohexanes (HCH) isomers with the concentrations at trace levels. In general, the levels of pollutants detected in lake sediments were low. However, for most pollutants analysed, detected levels were highest in Puller Lake (see Tables 5, 6 and 7).

6(ii) Access to the Area

- No point for accessing the Area is specified, although the access point shall be selected to minimize potential trampling impacts within the Area (see Section 7 (ii) Access to, and movement within or over the Area).
- Due to the steep terrain, access to the Area is generally by foot. Occasionally, overland vehicles (such as snowmobiles, quad bikes and utility vehicles) may be used to approach the Area, including within the access corridor that is located between the two Area sub-sites (see Maps 2 and 3); however, overland vehicle use within the Area is prohibited. In order to minimize impacts on periglacial landforms and terrestrial biological communities, overland vehicles approaching the Area should adhere to the mitigation measures in the associated Environmental Impact Assessment.
- The access corridor between the northern and southern sites of the ASPA passes through the catchment areas of Rasp, Puller and Pritchel Lakes. Soil/substrate compression and mobilization caused by vehicle use in the corridor may increase minerogenic input into the lakes. Furthermore, any pollution events, including vehicle fuel spills, within the corridor could have major negative impacts upon the values of the Area. Taking these factors into consideration, use of vehicles within the access corridor, should be minimized. Care should be taken to avoid pollution events when transiting across the lakes' catchment area via this corridor. Refueling of vehicles in the corridor should be avoided. When vehicles are used to move along the access corridor, then it is recommended that appropriate absorbent fuel spill

kits be carried to contain any spilt fuels. A programme to monitor the potential impacts of human activity in the corridor has been initiated.

6(iii) Location of structures within and adjacent to the Area

The temporary Turkish Scientific Research Camp is located c. 400 m west of the Area (see Maps 2 and 3). Historic Site and Monument (HSM) No 63 'Base Y', a historic British scientific station, is located 3.5 km to the northwest. Site Guidelines for Visitors have been agreed for Horseshoe Island (No 24, agreed through Resolution 4 (2014), available at: https://www.ats.aq/devAS/Ats/Guideline/7119d548-3a5c-4f09-b5f3-9db689252464) primarily to inform visitation of the HSM 63. A meteorological station (Lat. 67°49'47" S, Long. 68°14'04" W) and a Global Navigation Satellite System (GNSS) station (Lat. 67°49'30" S, Long. 67°13'45" W) are present to the west of the Area.

Year-round scientific research stations operate in the vicinity (see Map 1): San Martín Base (Argentina; Lat. 68°08' S, Long. 67°06' W) which is located 34 km south-southeast and Rothera Research Station (UK; Lat. 67°34' S, Long. 68°07' W) which is 47.4 km to the northwest. A currently summer-only station, Teniente Luis Carvajal (Lat. 67°46' S, Long. 68°55' W), has been operated by Chile at the southern end of Adelaide Island since 1985, on the site of the previous British Adelaide Island station.

6(iv) Location of other protected areas in the vicinity

The nearest protected areas to Farrier Col are ASPA 115 Lagotellerie Island, Marguerite Bay, Antarctic Peninsula (9.5 km), ASPA 107 Emperor Island, Dion Islands, Marguerite Bay, Antarctic Peninsula, (62 km west), ASPA 117 Avian Island, Marguerite Bay, Antarctic Peninsula (70 km west), ASPA 177 Leonie Islands and south-east Adelaide Island, Antarctic Peninsula (50 km to the northwest) and ASPA 129 Rothera Point, Adelaide Island (47.5 km to the northwest) (see Map 1). Several HSMs are located in the vicinity: 'Base Y' (UK) on Horseshoe Island (HSM No 63); 'Base E' (UK) (HSM No 64) and buildings and artefacts at and near East Base (US) (HSM No 55), both on Stonington Island; and installations of San Martín Base (Argentina) at Barry Island (HSM No 26).

6(v) Special zone within the Area

None.

7. Permit conditions

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority as designated under Article 7 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty.

Conditions for issuing a Permit to enter the Area are that:

- it is issued for a compelling scientific purpose that cannot be served elsewhere;
- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardise the natural ecological system in the Area;
- any management activities are in support of the objectives of this Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit must be carried within the Area;
- permits shall be issued for a stated period;
- a report or reports are supplied to the authority or authorities named in the Permit;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

7(ii) Access to, and movement within or over, the Area

\- *Access on foot*

- Movement within the Area shall be on foot.
- Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects, i.e., all movement should be undertaken carefully so as to minimise disturbance to the soil, periglacial features and vegetated surfaces, walking on rocky terrain if practical.

\- *Overland vehicles*

- Overland vehicles are prohibited within the Area.

\- *Aircraft*

- Winged aircraft, helicopters and RPAS are not permitted to land within the Area.
- Low altitude helicopter overflight of the air is permitted to facilitate delivery or retrieval of cargo essential for scientific or environmental management purposes.
- Use of helicopter smoke grenades is prohibited within the Area unless absolutely necessary for safety. If used all smoke grenades should be retrieved.
- Within the Area the operation of aircraft should be carried out, as a minimum requirement, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). When

conditions require aircraft to fly at lower elevations than recommended in the guidelines, aircraft should maintain the maximum elevation possible and minimize the time taken to transit.

- *RPAS*

- Operation of RPAS within or over the Area shall be in accordance with the 'Environmental guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica' (Resolution 4 (2018)) (available at: https://documents.ats.aq/recatt/att645_e.pdf).
- Where practicable, consider operating RPAS at times of the day or year when the risk of disturbance to species present is minimised.

- *Watercraft*

- Use of small boats in the lakes within the Area is permitted. To reduce the potential for pollution and to minimise disturbance of the water column and underlying microbial mats and soft sediments, propulsion of boats using propellors or other forms of mechanical propulsion is prohibited. Boats should be propelled and maintained in position on the lakes by, for example, securing clean floating ropes across the lake and using the ropes to pull the boat into the desired position and secure it there. In circumstances where the use of ropes is not practicable, the use of oars to manually propel boats is permitted, but particular care shall be taken to minimize disturbance to the water column and underlying microbial mats and sediment.
- To prevent the short-range transfer of native freshwater species or propagules between the lakes, appropriate biosecurity practices shall be employed to adequately clean small boats and any associated equipment, including ropes.
- Diving in the lakes is prohibited.

7(iii) Activities which may be conducted in the Area

- Scientific research that will not jeopardise the ecosystem or scientific values of the Area and which cannot be served elsewhere;
- Essential management activities, including monitoring.
- Due to the hydrological dynamics of the lakes' catchment area, the characteristics of the lakes (e.g., size, depth, degree of ice cover) may vary at different times of the year. The capacity for potentially rapid change in lake characteristics shall be taken into consideration during the planning and execution of any activities within the Area.

7(iv) Installation, modification or removal of structures

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be free of organisms, propagules (e.g., seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area (see Section 7(vi)). Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of field camps

- Camping within the Area is prohibited.
- Accommodation may be available at the nearby Turkish Scientific Research Camp or planned Turkish Antarctic Research Station.

7(vi) Restrictions on materials and organisms which can be brought into the Area

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic, limnological and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. Further guidance can be found in the CEP Non-native Species Manual (Resolution 4 (2016)) and the SCAR Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica (Resolution 5 (2018)). In view of the presence of small numbers of breeding birds within the Area, no poultry products, including wastes from such products and products containing uncooked dried eggs, shall be released into the Area.

To reduce the risk of contamination of the lakes, the use of equipment requiring hydrocarbon fuels (e.g., petrol, diesel, paraffin, etc.) in the Area shall be minimized to the maximum extent practicable. No fuel, chemicals or other potential pollutants shall be stored in the Area.

7(vii) Taking or harmful interference with native flora or fauna

Taking or harmful interference with native flora or fauna is prohibited, except by Permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals is involved, the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica (Resolution 4 (2019)) should be used as a minimum standard.

7(viii) Collection and removal of materials not brought into the Area by the Permit holder

Collection or removal of anything not brought into the Area by the Permit holder shall only be in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted in instances where it is proposed to take, remove or damage such quantities of soil, native flora or fauna that their distribution or abundance on Horseshoe Island would be significantly affected. Anything of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorized, may be removed unless the impact of removal is likely to be greater than leaving the material in situ; if this is the case the appropriate authority should be notified.

7(ix) Disposal of waste

All wastes, including all human waste, shall be removed from the Area.

7(x) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

- Permits may be granted to enter the Area to carry out scientific research, monitoring and site inspection activities, which may involve the collection of a small number of samples for analysis, to erect or maintain signboards, or to carry out protective measures.
- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Scientific activities shall be performed in accordance with the SCAR Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica (Resolution 5 (2018)). Geological research shall be undertaken in accordance with the SCAR Environmental Code of Conduct for Geosciences Field Research Activities in Antarctica (Resolution 1 (2021)).

7(xi) Requirements for reports

- In order to manage and coordinate human activities in the Area and avoid possible conflict of interest and promote cooperation, where feasible, Parties are encouraged to exchange information with the proponents regarding any planned visit to the Area in advance of the visit proceeding.
- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and in accordance with national procedures.
- Such reports should include, as appropriate, the information identified in the visit report form contained in the Revised Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2, 2011).

- The appropriate authority should be notified of any activities/measures undertaken, and/or of any materials released and not removed, that were not included in the authorized permit.
- Wherever possible, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Parties working in the Area are encouraged to exchange information on visit reports annually. Wherever possible, Parties should deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organizing the scientific use of the Area.

8. Supporting documentation

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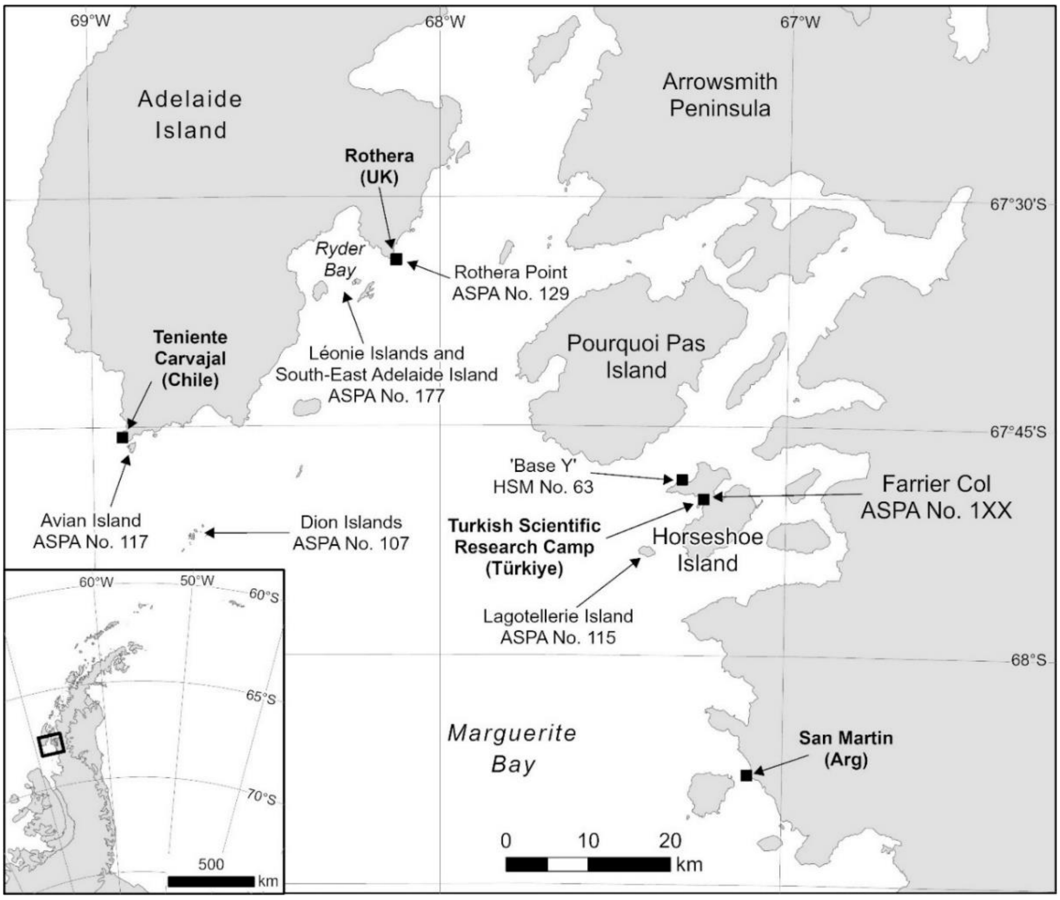
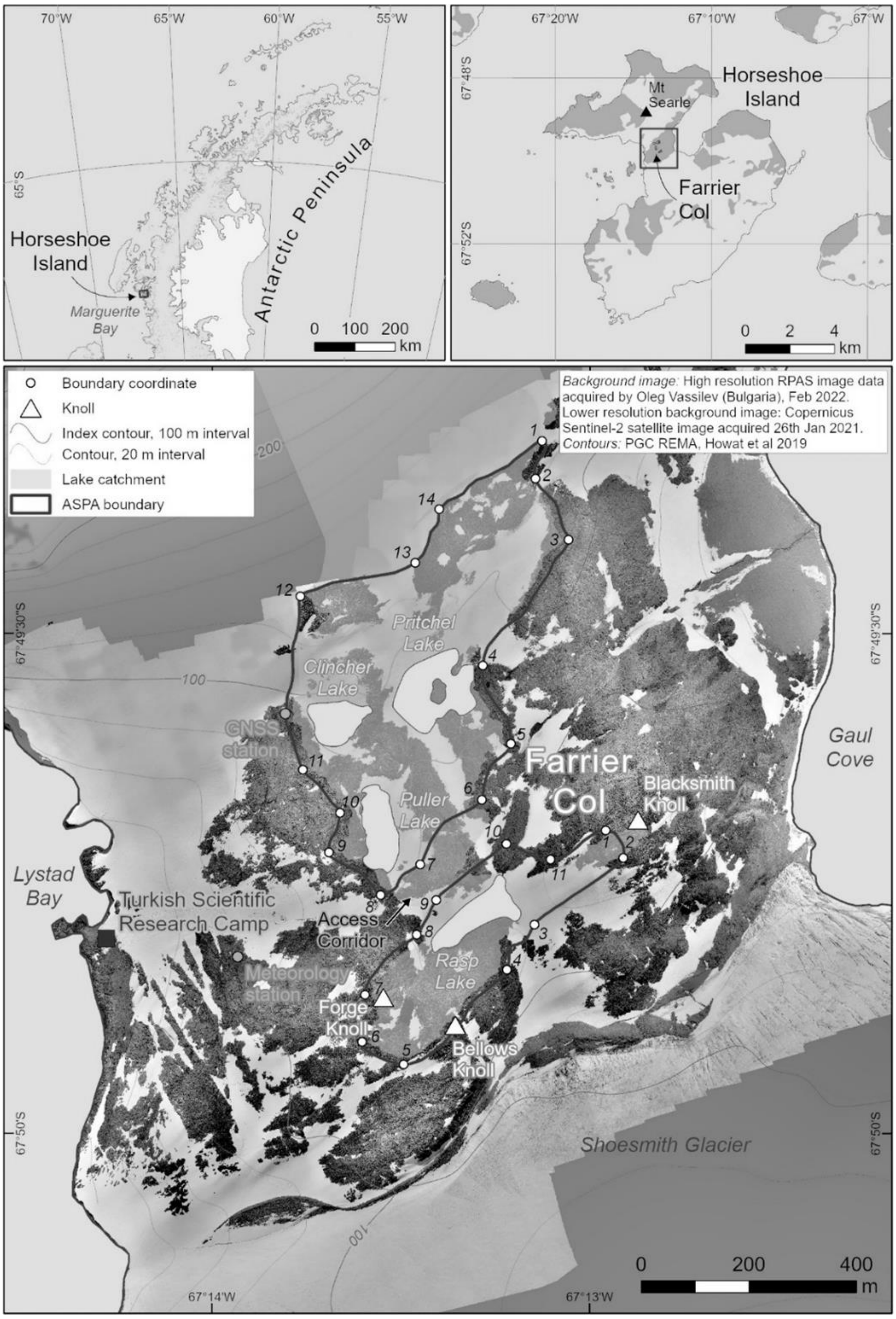
Map 1. Antarctic Specially Protected Area No 181, Farrier Col, Horseshoe Island, Marguerite Bay, location map, showing the location of the Turkish Scientific Research Camp (Türkiye), San Martín Base (Argentina), Teniente Luis Carvajal Station (Chile) and Rothera Research Station (UK). Also shown are the locations of the other protected areas in the region: Rothera Point, Adelaide Island (ASPA 129), Emperor Island, Dion Islands, Marguerite Bay, Antarctic Peninsula (ASPA 107), Leonie Islands and South-east Adelaide Island, Antarctic Peninsula (ASPA 177), Lagotellerie Island, Marguerite Bay, Graham Land (ASPA 115) and Avian Island, Marguerite Bay, Antarctic Peninsula (ASPA 117). 'Base Y' (UK) (Historic Monument No 63) on Horseshoe Island is shown. Inset: the location of the region relative to the Antarctic Peninsula. Map details: WGS 1984 UTM Zone 19S, central meridian 68°W.



Map 2. Antarctic Specially Protected Area No 181, Farrier Col, Horseshoe Island, Marguerite Bay. Inset (left): Location of Horseshoe Island in relation to the Antarctic Peninsula. Inset (right): Location of Farrier Col in relation to Horseshoe Island. The access corridor, located between the two ASPA sites, is the safest, shortest and most practical route for access to the rest of the island. Main panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Horseshoe Island panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Antarctic Peninsula panel: WGS 1984 Antarctic Polar Sterographic, central meridian 62.5°W.



Map 3. Simplified map of Antarctic Specially Protected Area No 181, Farrier Col, Horseshoe Island, Marguerite Bay. Inset (left): Location of Horseshoe Island in relation to the Antarctic Peninsula. Inset (right): Location of Farrier Col in relation to Horseshoe Island. The access corridor, located between the two ASPA sites, is the safest, shortest and most practical route for access to the rest of the island. Main panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Horseshoe Island panel: WGS 1984 UTM Zone 19S, central meridian 67.25°W. Antarctic Peninsula panel: WGS 1984 Antarctic Polar Sterographic, central meridian 62.5°W.

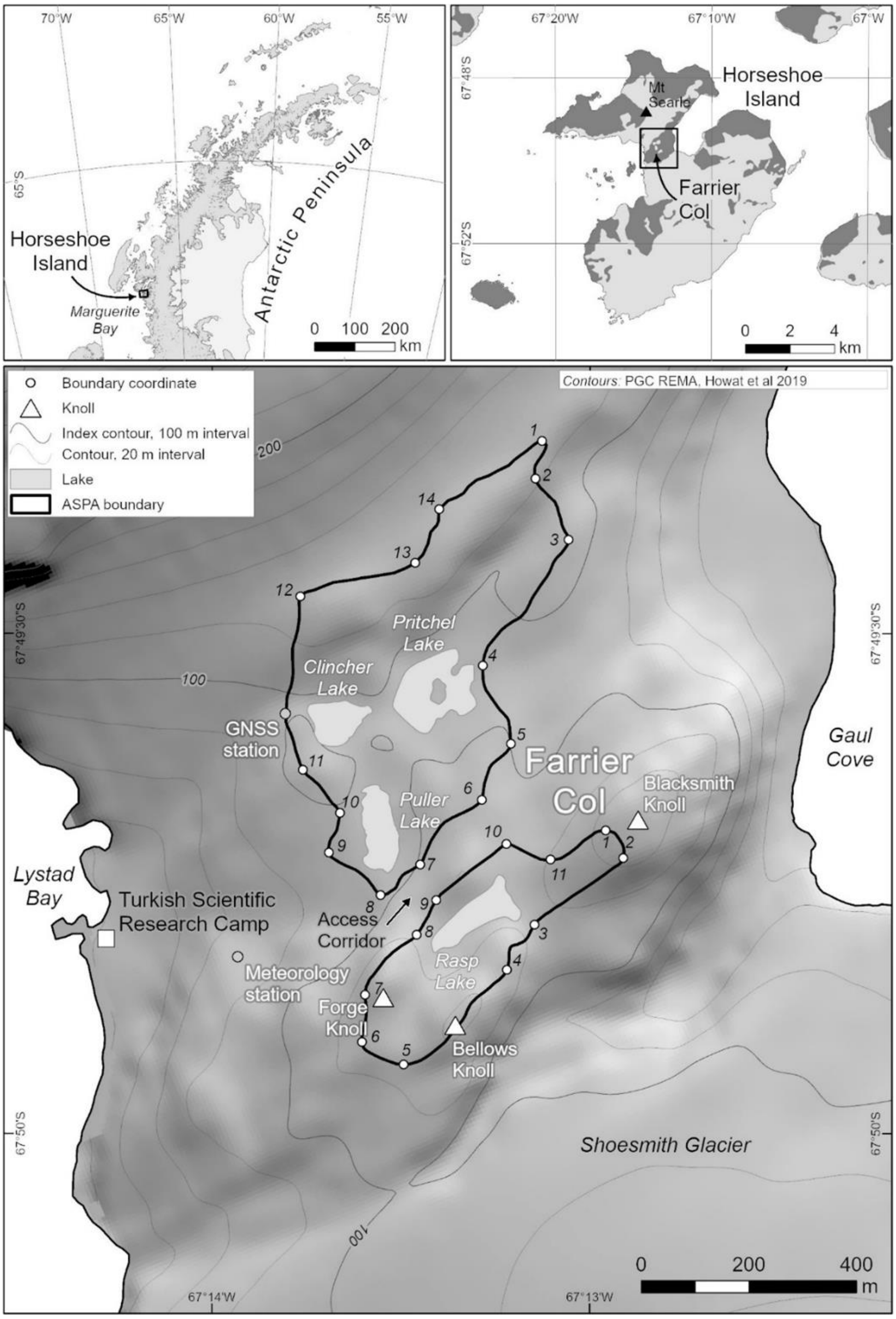


Table 1. Boundary coordinates for the northern and southern sites of ASPA 181 Farrier Col, Horseshoe Island, Marguerite Bay. Points are shown on Maps 2 and 3.

Boundary coordinate number	Longitude	Latitude
Northern site		
1	-67.21878263	-67.82179297
2	-67.21907028	-67.82241960
3	-67.21761067	-67.82343954
4	-67.22140222	-67.82553113
5	-67.22016102	-67.82683532
6	-67.22142951	-67.82777553
7	-67.22415282	-67.82885042
8	-67.22590717	-67.82936468
9	-67.22818502	-67.82865503
10	-67.22770047	-67.82799528
11	-67.22933526	-67.82727561
12	-67.22944681	-67.82438248
13	-67.22438900	-67.82382615
14	-67.22332292	-67.82293240
Southern site		
1	-67.21597795	-67.82828623
2	-67.21518982	-67.82873758
3	-67.21911005	-67.82985578
4	-67.22032635	-67.83060515
5	-67.22487722	-67.83218431
6	-67.22672053	-67.83181176
7	-67.22659234	-67.83102289
8	-67.22430032	-67.83002271
9	-67.2234479	-67.82944674
10	-67.22034093	-67.82850793
11	-67.21841171	-67.82877090

Table 2. Summary of meteorological data collected at Farrier Col, Horseshoe Island, from February 2020 - February 2023.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Temp (ºC)	1.9	2.3	-3.3	-3.2	-4.0	-5.2	-7.1	-7.6	-5.4	-3.8	-0.4	0.6
Mean Pressure (mbar)	977	977	979	978	986	979	986	980	974	970	970	972
Mean Relative Humidity (%)	66	70	69	70	74	75	74	68	75	68	71	73
Mean Wind Speed (m s^{-1})	6.2	5.9	5.5	5.8	5.7	5.8	5.2	6.9	5.9	7.0	6.8	5.2

Table 3. Water chemistry of Puller, Clincher and Pritchel Lakes, Farrier Col, Horseshoe Island. Data are taken from Hodgson et al. (2013), Cura (2020) and Türkiye (2021).

		Puller Lake		Clincher Lake		Pritchel Lake*
		2003	2022	2003	2022	2022
Temperature, oxygen saturation, conductivity, dissolved oxygen and pH						
Temperature	°C	3.7	2.8	5.6	1.1	1.4
Oxygen saturation	%	96.2	-	122	-	-
Conductivity	$\mu S\ cm^{-1}$	131.2	108	166.8	122	128
Dissolved oxygen	mg/l	-	12.7	-	11.8	12.3
pH		-	8.0	-	8.1	8.1
Anions						
Cl	mg/l	28	-	41.4	-	-
SO_4–S	mg/l	13.1	-	20.1	-	-
Cations, incl. Si						
Al	mg/l	<0.002	-	<0.002	-	-
Fe	mg/l	0.016	-	0.003	-	-
Mg	mg/l	2	-	3.03	-	-
Ca	mg/l	1.43	-	2.08	-	-
K	mg/l	0.72	-	0.894	-	-
Na	mg/l	14.6	-	21.8	-	-
Si	mg/l	0.054	-	0.054	-	-
Nutrients						
NO_3–N	mg/l	<0.100	-	<0.100	-	-
NH_4–N	mg/l	0.036	-	0.015	-	-
PO_4–P	mg/l	<0.005	-	<0.005	-	-
Total Nitrogen (N), Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC)						
Total N	mg/l	0.14	-	0.07	-	-
TOC	mg/l	1.1	<5	0.78	<5	-
DOC	mg/l	1.06	-	0.91	-	-

* Data represent the mean of four replicate measurements taken from Pritchel Lake (see Türkiye 2021, Table 4.2)

Table 4. Species of vascular plants, bryophytes, lichens, cyanobacteria and algae known to occur on Horseshoe Island. The Area is likely to contain a subset of the species listed below. Data taken from Broady (1979), Komarkova et al. (1985) and the British Antarctic Survey Plant Database (https://data.bas.ac.uk/metadata.php?id=GB/NERC/BAS/PDC/00023).

Vascular plants
Colobanthus quitensis (Kunth.) Bartl. (N.B. This is an old record and the presence of *C. quitensis* on the island may now be in doubt.)

Bryophytes
Bartramia patens Brid.
Bryum argenteum Hedw
Bryum pseudotriquetrum (Hedw.) Gaertn.
Ceratodon purpureus (Hedw.) Brid
Coscinodon reflexidens Mull. Hal.
Pohlia nutans (Hedw.) Lindb.
Sanionia uncinata (Hedw.) Loesk.
Schistidium antarctici (Card.) L. Savic. & Smirn.
Syntrichia magellanica (Mont.) R.H. Zander
Syntrichia sarconeurum Ochyra & R.H. Zander
Willia austroleucophaea (Besch.) Broth.

Lichens
Acarospora convoluta Darb.
Acarospora macrocyclos Vain.
Buellia cladocarpiza M. Lamb
Buellia subpedicellata (Hue) Darb.
Caloplaca isidioclada Zahlbr.
Candelariella vitellina (Hoffm.) Mull. Arg.
Catillaria corymbosa (Hue) M. Lamb
Haematomma erythromma (Nyl.) Zahlbr.
Huea coralligera (Hue) Dodge & Baker
Lecania brialmontii (Vain.) Zahlbr.
Lecanora atrobrunnea
Lecanora physciella (Darb.) Hertel
Lecidea atrobrunnea (Ram.) Schaer.
Leptogium puberulum Hue
Physcia caesia (Hoffm.) Furnr.
Placopsis pycnotheca Lamb

Catillaria corymbosa (Hue) M. Lamb
Haematomma erythromma (Nyl.) Zahlbr.
Huea coralligera (Hue) Dodge & Baker
Lecania brialmontii (Vain.) Zahlbr.
Lecanora atrobrunnea
Lecanora physciella (Darb.) Hertel
Lecidea atrobrunnea (Ram.) Schaer.
Leptogium puberulum Hue
Physcia caesia (Hoffm.) Furnr.
Placopsis pycnotheca Lamb
Polycauliona candelaria (L.) Th. Fr.
Pseudephebe minuscula (Nyl. ex Arnold) Brodo & Hawksw.
Pseudephebe pubescens (L.) Choisy
Psoroma cinnamomeum Malme
Rhizocarpon disporum (Hepp) Mull. Arg.
Rhizoplaca aspidophora (Vain.) Redon
Rhizoplaca melanophthalma (Ram.) Leuck. & Poelt
Sphaerophorus polycladus Mull. Arg.
Umbilicaria decussata (Vill.) Zahlbr.
Usnea sphacelata R. Br.
Usnea subantarctica F.J. Walker
Xanthoria elegans (Link.) Th. Fr.

Cyanobacteria

Anabaena sp.
Leptoyngbya spp.
Nostoc spp.
Oscillatoria amoena Gom.
Oscillatoria spp.
Phormidium autumnale (Ag.) Gom.
Phormidium frigidum Fritsch
Phormidium priestleyi Fritsch

Phormidium rubroterricola Gardner
Plectonema sp.
Schizothrix fragilis (Kuetz.) Gom.
Schizothrix sp.
Tolypothrix tenuis Kuetz.

Eukaryotic algae

Monodus subterraneus Boye Pet,
Heterococcus sp.
Chlorhormidium flaccidum (A. Br.) Fott
Stichococcus bacillaris Naeg. *sens. ampl.*

Table 5. Polyaromatic hydrocarbon (PAH) levels in lake sediment samples collected within the Area (µg/kg dry mass) (see Türkiye, 2021)

Compound	Puller Lake	Clincher Lake	Pritchel Lake
Naphthalene	3.5	3.0	4.1
Acenaphthylene	0.150	0.045	bdl
Acenaphthene	0.077	0.079	0.069
Fluorene	0.69	0.27	0.18
Phenanthrene	14.0	12.0	9.7
Anthracene	0.670	0.072	0.073
Fluoranthene	7.5	8.3	4.7
Pyrene	7.9	9.3	5.0
Benzo(a)anthracene	0.330	0.055	0.100
Chrysene	0.34	0.033	0.041
Benzo(b)fluoranthene	1.600	0.110	0.092
Benzo(k)fluoranthene	0.519	bdl	bdl
Benzo(a)pyrene	0.770	0.030	0.099
Indeno(1,2,3,c-d)pyrene	0.290	0.039	0.050
Dibenzo(a,h)anthracene	0.049	bdl	bdl
Benzo(g,h,i)perylene	0.300	0.041	0.048
Total PAHs	39	33	24

*bdl: Below detection limit

Table 6. Polychlorinated biphenyl (PCB) levels in lake sediment samples collected within the Area (μg/kg dry mass) (see Türkiye, 2021)

Compound	Puller Lake	Clincher Lake	Pritchel Lake
PCB 28/31	0.0078	0.0043	0.0035
PCB 52	0.0044	0.0028	0.0041
PCB 101	bdl	bdl	0.0035
PCB 118	0.0058	bdl	0.0078
PCB 138	0.0078	0.0035	0.0051
PCB 153	0.0100	bdl	00.0061
PCB 180	0.0090	bdl	0.0032
Total PCBs	0.0450	0.0110	0.0330

*bdl: Below detection limit

Table 7. Metal levels in lake sediment samples collected within the Area (μg/kg dry mass) (see Türkiye, 2021)

Metal	Puller Lake	Clincher Lake	Pritchel Lake
Al	69455	62509	61851
As	4.7	3.8	4.7
Cd	0.18	0.14	0.09
Co	11.0	12.0	9.2
Cr	43	41	30
Cu	19	17	28
Fe	39567	36674	36190
Li	16	18	12
Mn	601	642	607
Ni	12	13	10
Pb	20	18	20
V	103	97	95
Zn	90	103	79
Hg	bdl	bdl	bdl

*bdl: Below detection limit

Measure 17 (2024)

Antarctic Specially Protected Area No 182 (Western Bransfield Strait and Eastern Dallmann Bay): Management Plan

The Representatives,

Recalling Articles 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty providing for the designation of Antarctic Specially Protected Areas ("ASPA") and approval of Management Plans for those Areas;

Recalling

- Recommendation XVI-3 (1991), which designated Western Bransfield Strait, off Low Island, South Shetland Islands, as Site of Special Scientific Interest ("SSSI") No 35 and annexed a Management Plan for the Site;
- Measure 3 (2001), which extended the expiry date of SSSI 35;
- Decision 1 (2002), which renamed and renumbered SSSI 35 as ASPA 152;
- Measures 2 (2003), 10 (2009) and 9 (2015), which adopted revised Management Plans for ASPA 152;
- Recommendation XVI-3 (1991), which designated East Dallmann Bay, off Brabant Island as SSSI 36 and annexed a Management Plan for the Site;
- Measure 3 (2001), which extended the expiry date of SSSI 36;
- Decision 1 (2002), which renamed and renumbered SSSI 36 as ASPA 153;
- Measures 2 (2003), 11 (2009) and 10 (2015), which adopted revised Management Plans for ASPA 153;

Recalling that Recommendation XVI-3 (1991) did become effective and was withdrawn by Measure 10 (2009);

Recalling that Measure 3 (2001) did not enter into effect and was withdrawn by Measure 4 (2011);

Noting that the Committee for Environmental Protection ("CEP") has endorsed a new ASPA at Western Bransfield Strait and Eastern Dallmann Bay, incorporating ASPAs 152 and 153, and has endorsed the Management Plan annexed to this Measure;

Recognising that this area supports outstanding environmental, scientific, historic, aesthetic or wilderness values, or ongoing planned scientific research, and would benefit from special protection;

Desiring to designate Western Bransfield Strait and Eastern Dallmann Bay as ASPA 182, incorporating ASPAs 152 and 153, and to approve the Management Plan for this Area;

Recommend to their Governments the following Measure for approval in accordance with paragraph 1 of Article 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. Western Bransfield Strait and Eastern Dallmann Bay be designated as Antarctic Specially Protected Area No 182;
2. the Management Plan, which is annexed to this Measure, be approved;
3. the Management Plan for Antarctic Specially Protected Area No 152, annexed to Measure 9 (2015), and the Management Plan for Antarctic Specially Protected Area No 153, annexed to Measure 10 (2015), be revoked; and
4. Antarctic Specially Protected Areas No 152 and No 153 shall not be used as future designations.

Management Plan for Antarctic Specially Protected Area No 182

WESTERN BRANSFIELD STRAIT AND EASTERN DALLMANN BAY

Introduction

The Area comprises two separate marine sites located in the region of western Bransfield Strait and in Dallmann Bay, near Brabant Island, Palmer Archipelago. Site A (area ~910 km²) is located off the western and southern coasts of Low Island, South Shetland Islands, lying between 63°15'S and 63°30'S; 62°00'W and 62°45'W. Site B (area ~610 km²) is located off the western and northern coasts of Brabant Island, between 63°53'S and 64°20'S, and between 62°16'W and 62°45'W. Designation is on the grounds that the shallow shelves in the region near Low Island and at eastern Dallmann Bay, extending to a depth of ~200 m, are the only two known sites in the vicinity of Palmer Station (USA) that are suitable for minimally invasive benthic sampling for fish and other organisms. The sites are of exceptional scientific interest because they offer unique opportunities to study the composition, structure and dynamics of several accessible marine communities. These studies have been carried out for over more than 50 years, over 30 of which special protection has been in place. The time-series of scientific data acquired from these sites is particularly valuable for studies of long-term change, and this research is on-going. The Area is one of only a few Antarctic Specially Protected Areas (ASPAs) in Antarctica designed to protect values associated with the marine benthos for scientific purposes, specifically benthic fish, invertebrates and other organisms living in waters down to 200 m in depth. Special protection is needed to ensure that these values are maintained, especially because other activities such as tourism and marine harvesting are taking place nearby. Proposed by the United States of America: adopted by Recommendation XVI-3 (Bonn, 1991: SSSI No 35); date of expiry extended by Measure 3 (2001); renamed and renumbered by Decision 1 (2002); revised Management Plans adopted by Measure 2 (2003), Measure 10 (2009), Measure 9 (2015) and Measure 10 (2015). The Area is approved under the Convention on the Conservation of Antarctic Marine Living Resources (CAMLR Convention) in accordance with Decision 9 (2005).

The Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and Antarctic Conservation Biogeographic Regions (Resolution 3 (2017)) classifications are based on terrestrial criteria, and therefore have limited applicability in marine environments. Four Important Bird Areas (IBAs) are located adjacent to but outside of the Area on Low Island.

1. Description of values to be protected

Western Bransfield Strait (between latitudes 63°20'S and 63°35'S and longitudes 61°45'W and 62°30'W, area ~916 km²) was originally designated as a Site of Special Scientific Interest through Recommendation XVI-3 (1991, SSSI No 35). Eastern Dallmann Bay (between latitudes 63°53'S and 64°20'S and from longitude 62°48'W eastward to the western shore of Brabant Island, area ~610 km²) was originally designated as a Site of Special Scientific Interest through Recommendation XVI-3 (1991, SSSI No 36). Both sites were proposed by the United States of America. The sites were renamed and renumbered as Antarctic Specially Protected Area (ASPA) No 152 and ASPA No 153 respectively by Decision 1 (2002). They were designated on the grounds that shallow shelves within these two areas were the only two known sites in the vicinity of Palmer Station that are suitable for minimally invasive benthic sampling for fish and other organisms. From an ecological standpoint, the sites offer unique opportunities to study the composition, structure, and dynamics of several accessible marine communities. The sites, and in particular their benthic fauna, are of exceptional scientific interest and require long-term protection from potential harmful interference. The Area is used in over 90 percent of specimen collections carried out by US researchers who are actively studying such fish communities within the region (Detrich pers. comms. 2022).

The boundaries of both ASPA No 152 and ASPA No 153 were revised by Measure 2 (2003) to include more of the shallow shelf down to ~200 m depth. The present Management Plan has merged ASPA No 152 and ASPA No 153 into a single ASPA, with the former ASPAs being referred to as Site A and Site B respectively (Map 1). The boundaries of the Area at Site A at Western Bransfield Strait remain between latitudes 63°15'S and 63°30'S and longitudes 62°00'W and 62°45'W and are defined in the northeast by the shoreline of Low Island, encompassing an area of ~910 km² (Map 2). The boundaries of Site B at Dallmann Bay remain between latitudes 63°53'S and 64°20'S and longitudes 62°16'W and 62°45'W and are defined in the east by the shoreline of Brabant Island, encompassing an area of ~610 km² (Map 3).

The Area continues to be considered important for obtaining scientific samples of fish and other organisms for studies of the composition, structure and dynamics of the marine communities, and the original reasons for designation are reaffirmed in the current Management Plan. In addition, the Area is recognized as an important spawning ground for several fish species, including the rockcod Notothenia coriiceps and the icefish Chaenocephalus aceratus. Fish have been collected from the Area by scientists from Palmer Station since the early 1970s. The Area is within the research area of the Palmer Long Term Ecological Research (LTER) Program; fish collected from the Area are used in the study of biochemical and physiological adaptations to low temperatures. Some of the fish collected have been used for comparative studies with the more heavily impacted Arthur Harbor area. Scientific research is also being undertaken on the benthic faunal communities. The time-series of scientific data acquired from these sites is particularly valuable for studies of long-term change, and research is on-going. The Area is one of only a few ASPAs in Antarctica designed to protect values associated with the marine benthos for scientific purposes, specifically benthic fish, invertebrates and other organisms living in waters down to

200 m in depth. Special protection is needed to ensure that these values are maintained and are not inadvertently compromised, especially because other activities such as tourism and marine harvesting are taking place nearby.

2. Aims and objectives

Management at Western Bransfield Strait aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human presence and disturbance in the Area;
- allow scientific research on the marine environment while ensuring protection from over-sampling;
- allow other scientific research within the Area provided it will not compromise the values for which the Area is protected;
- allow visits for educational and outreach purposes (such as documentary reporting (visual, audio or written) or the production of educational resources or services) provided such activities are for compelling reasons that cannot be served elsewhere and will not compromise the values for which the Area is protected;
- prevent or minimize the possibility of introduction of non-native species (e.g. alien plants, animals and microbes) to the Area;
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- A map showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently and copies of this Management Plan shall be made available at Palmer Station (United States).
- National programs shall ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and nautical charts for which they are responsible.
- Copies of this Management Plan shall be made available to vessels operating within or over the Area, including those transiting, and the appropriate national authority shall inform relevant personnel on such vessels of:

- the location, boundaries and restrictions applying within the Area;
- the need for awareness of potential equipment deployed within the Area for scientific purposes, either at the surface or submarine. Such equipment may include buoys, 'high-flyer' buoys, with or without lights or radio beacons, or other equipment such as lines, nets or autonomous surface or submarine craft, or similar.

- Buoys or other markers or structures installed within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer needed.

- The Area shall be visited as necessary to assess whether it continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1. ASPA No 182 Regional overview. Coastline data are derived from the SCAR Antarctic Digital Database (ADD) Version 7.2 (2021). Bathymetry is derived from the International Bathymetric Chart of the Southern Ocean (IBCSO) v1.0 (2013). Bird data: Harris (2021). Important Bird Areas: BirdLife International (Harris et al. 2015). Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 63°15'S; 2nd 64°00'S; Central Meridian: 62°00'W; Latitude of Origin: 65°00'S; Spheroid and horizontal datum: WGS84; Horizontal accuracy: maximum error of ±100 m. Principal isobath 200 m. Inset: location of Map 1, ASPA No 182 Site A Western Bransfield Strait, and Site B Eastern Dallmann Bay, Antarctic Peninsula.

Map 2. ASPA No 182: Site A Western Bransfield Strait. Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 63°15'S; 2nd 63°30'S; Central Meridian: 62°15'W; Latitude of Origin: 64°00'S; Spheroid and horizontal datum: WGS84; Horizontal accuracy: maximum error of ±100 m. Isobath interval 200 m.

Map 3. ASPA No 182: Site B Eastern Dallmann Bay. Map specifications: same as Map 2 except Standard parallels: 1st 64°00'S; 2nd 64°15'S; Central Meridian: 62°30'W, Latitude of Origin: 65°00'S.

6. Description of the Area

6(i) Geographical coordinates, boundary markers and natural features

- *Overview*

Bransfield Strait is a deep water passage approximately 220 km long and 120 km wide between the Antarctic Peninsula and the numerous islands that comprise the South Shetland Islands. The Drake Passage is to the north and to the west is the Bellingshausen Sea. The Area comprises two marine sites (A and B) in the vicinity of western Bransfield Strait: Site A is located adjacent to Low Island, and Site B is located adjacent to Brabant Island (Map 1). Site A was formerly ASPA No 152 Western Bransfield Strait and Site B was formerly ASPA No 153 Eastern Dallmann Bay. These two ASPAs are merged in the current Management Plan because they share similar physical and ecological characteristics that are of scientific interest and the objectives of protection are identical for both sites.

Site A lies approximately 80 km west of the Antarctic Peninsula, mostly within the 200 m isobath directly south and west of Low Island (Map 1). Low Island is the southern-most of the South Shetland Islands, lying 60 km south-west of Deception Island and 25 km south-east of Smith Island. To the west and south of Low Island the sea floor slopes gently from the intertidal zone to depths of approximately 200 m out to ~20 km from shore. The sea floor slopes steeply to the east of Low Island, reaching depths of up to 1200 m in this part of Boyd Strait and Bransfield Strait. The sea floor within the Area is generally composed of muddy sediments containing gravel or small stones, and of sessile epifaunal communities (Troncoso et al. 2008), which either remain firmly attached to substrates or move very slowly (Robinson et al. 1996).

Site B is situated approximately 65 km west of the Antarctic Peninsula, between Brabant Island and Anvers Island, located largely within eastern Dallmann Bay; Bransfield Strait lies to the north and Gerlache Strait to the south (Map 1). Brabant Island is mountainous and mainly ice-covered, rising to 2520 m at Mount Parry. The western coastline comprises rock and ice cliffs and ice-free headlands, interspersed by steep boulder and narrow pebble beaches. Rock platforms are exposed at low tide in various locations north of Driencourt Point. Numerous rocky islets extend several kilometers offshore, including Astrolabe Needle (104 m) ~2 km south of Claude Point. West of Brabant Island the sea floor slopes moderately from the intertidal zone to depths of approximately 200 m before the slope descends to a depth of 400-600 m beyond the western boundary of Site B. The gradient from the shore down to 200 m slopes more gently in the north of Site B. Most of Site B lies within the 200 m depth contour west and north of Brabant Island (Map 1). The sea floor in the Area is generally composed of a matrix of soft sand, mud and cobbled-rock.

The boundaries of the Area are designed to protect scientific and ecological values present in the marine environment at depths down to 200 m. Restricting access to, and transit over, the sea surface is not considered necessary in order to protect these values, and for this reason both horizontal and vertical boundaries of the Area are defined (Figure 1).

- *Horizontal boundaries*

The horizontal boundary is defined using a combination of lines of latitude and longitude and adjacent island coastlines, broadly approximating the area within the 200 m depth as defined by isobaths in the International Bathymetric Chart of the Southern Ocean (IBCSO v.1.0, 2013) (Map 1). These horizontal boundaries allow for easy identification of the Area when navigating, and represent a proxy for the marine area lying between 20 m and 200 m in depth.

Site A western Bransfield Strait extends a maximum of ~28 km north-south and ~37.5 km east-west, encompassing an area of ~910 km^2 (Map 1). Site B eastern Dallmann Bay extends a maximum of ~50 km north-south and ~24 km east-west, encompassing an area of ~610 km^2.

Boundary markers have not been installed because in the marine area this is impractical, and the island coastlines are provide visually obvious boundary features.

Site A western Bransfield Strait boundary, line coordinates (Maps 1 and 2):

- North (A to B): line of latitude at 63°15'S.
- Northeast (B to C): coastline of Low Island, extending from 63°15'S 62°12'40''W (B) in the north (near Cape Wallace) to 63°21'05''S 62°00'W (C) in the south (near Cape Hooker).
- East (C to D): line of longitude at 62°00'W.
- South (D to E): line of latitude at 63°30'S.
- West (E to A): line of longitude at 62°45'W.

Site B eastern Dallmann Bay boundary, corner coordinates (Maps 1 and 3):

- Northwest: 63°53'S 62°45'W (A).
- Northeast: 63°53'S 62°16'W (B); 64°02'S 62°16'W (C) (~3.7 km north of Duclaux Point).East: coastline of Brabant Island extending from point 'C' (64°02'S 62°16'W) in Bouquet Bay to Fleming Point (64°20'S 62°35'W) (D)South: 64°20'S 62°35'W (D) (Fleming Point); 64°20'S 62°40'W (E).
- West (central): 64°10'S 62°40'W (F); 64°00'S 62°45'W (G) (~13 km west of Cape Roux).

- *Vertical boundaries*

The upper vertical boundary of the Area is defined as a depth of 20 m (Figure 1), which takes into account the maximum draft of any shipping anticipated in the region. The lower vertical boundary is defined as the seafloor, which is of variable depth extending down to approximately 200 m within the Area (Map 1, Figure 1). The coastlines of Low Island and Brabant Island are used as pragmatic boundaries to define the lateral extent of the Area where the 20 m isobath configuration is uncertain.

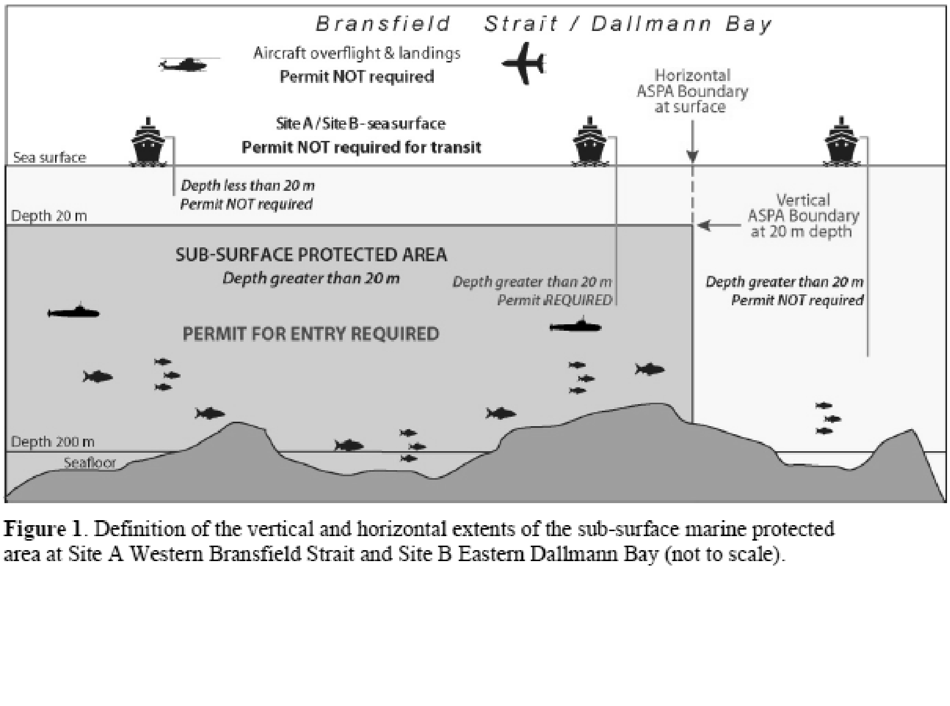


Figure 1. Definition of the vertical and horizontal extents of the sub-surface marine protected area at Site A Western Bransfield Strait and Site B Eastern Dallmann Bay (not to scale).

- *Oceanography, climate and marine geology*

There is considerable year-to-year variation in sea ice within the Bransfield Strait region, although coverage appears to be less than 100 days per year (Parkinson 1998). Rates of sea ice advance and retreat along the northwestern Antarctic Peninsula are also variable. Sea ice advance is for approximately five months followed by approximately seven months of retreat. Ice growth is fastest in June and July and the fastest decay is in December and January (Stammerjohn & Smith 1996). Measurements made within the Bransfield Strait between 20th January and 9th February 2001 indicate that ocean temperatures in the Area averaged between 1.7 and 1.8ºC at 5 m depth and 0.2 to 0.3ºC at the 150 m contour (Catalan et al. 2008). Water salinity within the Area ranged between 34.04 and 34.06 psu at 5 m, whilst at 150 m depth salinity reached 34.40 psu. Sea ice coverage averages approximately 140 days per year within Eastern Dallmann Bay and persists for approximately 82% of the winter period (Stammerjohn et al. 2008). Sea ice concentrations show considerable interannual variability, which has been linked to phase changes in ENSO and the Southern Annular Mode (SAM) (Stammerjohn et al. 2008).

Wind is predominantly from the NNW direction, resulting in a southward flowing coastal current along the western Antarctic Peninsula (Hofman et al. 1996). Coupled with the northward flow of the Antarctic Circumpolar Current, this results in a predominantly clockwise circulation in Bransfield Strait (Dinniman & Klinck 2004; Ducklow et al. 2007), dominated by the Gerlache Strait Current and the Bransfield Strait Current (Zhou et al. 2002; 2006). Drifters deployed as part of RACER (Research on Antarctic Coastal Ecosystems and Rates) between 1988 and 1990 indicate that eddie formation within Site A is minimal and that a strong north-easterly flow originates to the south of Low Island (Zhou et al. 2002). The current bifurcates to the west of Low Island, with water flowing to the north-east to merge with the Bransfield Strait Current and to the north-west, towards Smith Island. Local circulation is also influenced by tides, with tide records obtained at Low Island during a six-week period in December 1992 to January 1993 recording a maximum level variation of 1.70 m (López et al. 1994). There is an east – west flow within the northern part of Site B and the formation of eddies between Metchnikoff Point and Astrolabe Needle (Zhou et al. 2002). Tidal variation on Brabant Island is almost two meters and observations made while fishing indicate strong near-shore currents (Furse 1986).

Seismic measurements from the Seismic Experiment in Patagonia and Antarctica (SEPA) monitoring station, located on the north-eastern coast of Low Island, have detected significant earthquake activity within the Area, which is thought to result from the intersection of the Hero Fracture Zone with the South Shetland Platform at Smith Island (Maurice et al. 2003). During the Spanish Antarctic campaign of 2006/07, an additional seismic monitoring station was installed on the southern coast of Low Island, in order to extend geodetic monitoring within the Bransfield Strait area (Berrocoso et al. 2007).

- *Marine biology*

The predominantly soft sand / mud / cobbled-rock substrate of the Area supports a rich benthos with numerous fish species, invertebrates (sponges, anemones, annelids, molluscs, crustaceans, asteroids, ophiuroids, echinoids, holothurioids, brachiopods, tunicates), and marine plants, in several distinct communities. Detailed information on the zooplankton or marine flora within the Area is not available.

Site A:

Fish species commonly collected near Low Island at depths of 80 to 200 m include Chaenocephalus aceratus, Harpagifer bispinis, Notothenia coriiceps, Gobionotothen gibberifrons (formerly N. gibberifrons), Parachaenichthys charcoti and Trematomus newnesi (Grove and Sidell 2004; Lau et al. 2001). Species rarely found at Low Island include Champsocephalus gunnari, Chionodraco rastrospinosus and Pseudochaenichthys georgianus. In addition, the Low Island shelf appears to be a spawning ground for several fish species, for example the ice fish Chaenocephalus aceratus and N. coriiceps, with the family Nototheniidae, representing the bulk of fish larvae and juveniles captured in the area (Catalan et al. 2008). Other juvenile fish species collected close to Low Island include Trematomus lepidorhynus and Notothenia kempi. Site A is a mating ground for yellowbelly rockcod (Notothenia coriiceps) (indicated by eggs) (Kellermann 1996). The fish spawn in May / June. The large eggs, around 4.5 mm in diameter, are pelagic after fertilization and ascend to the surface waters where they incubate during the winter. Larval species recorded in Site A include Bathylagus antarcticus, Electrona antarctica, Gymnodraco acuticeps, Nototheniops larseni, Notothenia kempi and Pleuragramma antarcticum (Sinque et al. 1986; Loeb et al. 1993; Morales-Nin et al. 1995).

Specimens collected during April-June 2008 and 2010 were used to investigate protein folding in Gobionotothen gibberifrons in relation to warming oceans (Cuellar et al. 2014).

The following benthic amphipod species have been recorded within Site A: Ampelisca barnardi, A. bouvieri, Byblis subantarctica, Epimeria inermis, E. oxicarinata, E. walkeri, Eusirus antarcticus, E. perdentatus, Gitanopsis squamosa, Gnathiphimedia sexdentata, Jassa spp., Leucothoe spinicarpa, Liljeborgia georgiana, Melphidippa antarctica, Oediceroides calmani, O. lahillei, Orchomenella zschaui, Parharpinia obliqua, Parepimeria bidentata, Podocerus septemcarinatus, Prostebbingia longicornis, Shackeltonia robusta, Torometopa perlata, Uristes georgianus and Waldeckia obesa (Wakabara et al. 1995).

Molluscan assemblages have been analysed at four sample sites within the Area as part of an integrated study of the benthic ecosystem of Bransfield Strait, which was carried out between 24 January and 3 March 2003 (BENTART 03) and from 2 January to 17 February 2006 (BENTART 06) (Troncoso et al. 2008). The most abundant species in the Area was the bivalve Lissarca notorcadensis, distantly followed by Pseudamauropsis aureolutea, which was the most widely distributed. Other species collected included Marseniopsis conica, Onoba gelida, Yoldiella profundorum, Anatoma euglypta, Chlanidota signeyana and Thyasira debilis.

Site B:

Fish commonly collected within a depth range of 80 to 200 m at Eastern Dallmann Bay include Gobionotothen gibberifrons, Chaenocephalus aceratus, Champsocephalus gunnari, Pseudochaenichthys georgianus and Chionodraco rastrospinosus (Eastman and Lannoo 2004; Dunlap et al. 2002). In addition to more common species, sampling carried out between 15th June and 4th July 2001 collected numerous specimens of Lepidonotothen larseni, Lepidonotothen nudifrons Notothenia rossii and Notothenia coriiceps and examples of Parachaenichthys charcoti, Chaenodraco wilsoni, Dissostichus mawsoni, Trematomus eulepidotus and Lepidonotothen squamifrons (Eastman & Sidell 2002; Grove & Sidell 2004). Specimens of Trematomus newnesi and Gymnodraco acuticeps have been collected occasionally within Site B (Hazel & Sidell 2003; Wujcik et al. 2007). Larval species recorded at Site B include Artedidraco skottsberg, Gobionotothen gibberifrons, Lepidonotothen. nudifrons and Pleuragramma antarcticum (Sinque et al. 1986; Loeb et al. 1993).

Invertebrates collected at Site B have included varieties of sponge, anemone, annelid, mollusc, crustacean, asteroid, ophiuroid, echinoid, holothurioid and tunicate. Acoustic echo-sounding was used to measure aggregations of Antarctic krill (Euphausia superba) within Site B during cruises between 1985 and 1988 (Ross et al. 1996). Aggregations were generally recorded in the upper 120 m of the water column. The lowest numbers of aggregations were observed in early spring, increasing to a maximum in late summer and early winter and spawning occurs from November to March (Zhou et al. 2002). Site B provides a food-rich nursery for krill, which may become entrained within the vicinity by eddy currents.

- *Marine mammals*

Satellite tracking studies carried out on humpback whales (Megaptera novaeangliae) between January 2004 and 2006 suggest that they pass close to Site A and may enter it during foraging, and numerous animals passed through Site B (Dalla Rosa et al. 2008). The broader Gerlache Strait region was identified as an important feeding ground. Southern elephant seals (Mirounga leonina) were tracked within Site A using satellite transmitters between December 1996 and February 1997 (Bornemann et al. 2000).

Numerous marine mammals were observed in Dallmann Bay between January 1984 and March 1985 (Furse 1986). Humpback whales (Megaptera novaeangliae) were the most frequently sighted whale species, with possible sightings of killer whales (Orcinus orca) off Metchnikoff Point in May and June 1985. Minke whales have been sighted to the north of Brabant Island during the austral summer (Dec – Feb) (Scheidat et al. 2008).

Crabeater seals (Lobodon carcinophagus), southern elephant seals (Mirounga leonina), numerous Antarctic fur seals (Arctocephalus gazella), leopard seals (Hydrurga leptonyx) and Weddell seals (Leptonychotes weddellii) have been observed near Metchnikoff Point (Furse 1986).

- *Birds*

Approximately 300 000 pairs of Chinstrap penguins (Pygoscelis antarcticus) breed at ~13 locations on and near to the shore of Low Island (Harris 2021), most of which are in colonies located along or near the northeastern boundary of Site A. The largest colonies near Site A are at Cape Wallace (~40 000 pairs), Cape Garry (~210 000 pairs), Jameson Point (~33 000 pairs) and Cape Hooker (~15 200 pairs) (Map 2). These breeding sites have been identified by BirdLife International as Important Bird Areas because of their large Chinstrap penguin colonies (Harris et al. 2015). It is expected that the large colonies of Chinstrap penguin influence Site A. Small colonies of Imperial shags (Leucocarbo atriceps bransfieldensis) have been observed at Cape Garry, on an island between Cape Garry and Jameson Point, and on an island near Cape Wallace (Poncet and Poncet, unpublished data Feb 1987, in Harris 2021) (Map 2).

Two colonies of Chinstrap penguin have been recorded on the northwestern coast of Brabant Island adjacent to Site B. Approximately 5000 pairs were counted at Metchnikoff Point and approximately 250 pairs at Claude Point in 1985 (Woehler 1993). Colonies of Antarctic fulmars (Fulmarus glacialoides) have been observed on the northern coast of Brabant Island (Poncet and Poncet, unpublished data: in Harris 2021) and 1000 pairs were estimated to be nesting along Cape Cockburn cliffs in 1987, near the northeastern boundary of Site B (Creuwels et al. 2007). Antarctic shags (Leucocarbo atriceps bransfieldensis) have been observed breeding at four locations along the western coast of Brabant Island (Poncet & Poncet, unpublished data from Jan-Feb 1987, in Harris 2021). Other birds observed breeding on the western coast of Brabant Island and frequenting Site B are: Antarctic terns (Sterna vittata), Black-bellied storm petrels (Fregetta tropica), Brown skuas (Catharacta antarctica), Cape petrels (Daption capense), Snowy sheathbills (Chionis alba), Kelp gulls (Larus dominicanus), Snow petrels (Pagodroma nivea), South polar skuas (Catharacta maccormicki) and Wilson's storm petrels (Oceanites oceanicus) (Parmelee & Rimmer 1985; Furse 1986). Antarctic petrel (Thalassoica antarctica), Black-browed albatross (Diomedea melanophris), Southern giant petrel (Macronectes giganteus) commonly forage in the Area (Furse 1986).

- *Human activities / impacts*

Fish collected within the Area have been used for a variety of biochemical, genetic and physiological research, including: studies of the adaptations in fish that enable proteins to function at low temperatures (Detrich et al. 2000; Cheng & Detrich 2007); the adaptations of muscle and energy metabolism, including the processing of fatty acids to low temperatures (Hazel & Sidell 2003; Grove & Sidell 2004); efficient genome transcription in cold water (Lau et al. 2001; Magnoni et al. 1998); the influence of hydrostatic pressure on enzyme function within fish livers (Ciardiello et al. 1999); cardiovascular adaptations of icefishes, in compensation for their complete lack of haemoglobin (Sidell & O'Brien 2006); and biochemical processes in icefish (Cuellar et al. 2014; Devor 2013; Mueller et al. 2011; Mueller et al. 2012; Teigen 2014).

Specimens collected during sampling in March and April 1991, 1992, and 1993 were used in comparative studies of Polynuclear Aromatic Hydrocarbon (PAH) contamination in fish with those collected from Arthur Harbor and the effects of Diesel Fuel Arctic (DFA) on Notothenia gibberifrons (now Gobionotothen gibberifrons) (McDonald et al. 1995; Yu et al. 1995). The former study found levels of contamination in fish sampled from the Area were considerably lower than those sampled from the vicinity of the 1989 Bahia Paraiso wreck in Arthur Harbor and that fish captured near US scientific stations are exposed to PAH, albeit low levels (McDonald et al. 1992 and 1995). However, concentrations of PAH were higher than had been expected in fish collected from within the Area, with levels found to be similar to those in fish sampled from near Old Palmer Station.

A British Joint Services Expedition involving 35 team members spent one year on Brabant Island from January 1984 to March 1985 (Furse 1986). Several camps and numerous caches were established along the western coastline, including a main base camp at Metchnikoff Point. Some of the camp structures, equipment and supplies were abandoned following the expedition. A large amount of visible waste from the expedition was cleaned up by the UK in 2017, although due to ice cover and the dispersal of small fragments it was not possible at that time to remove all traces of the expedition (United Kingdom 2017). The UK aims to revisit the site in the future to complete the clean-up. The level of impact of the expedition on the terrestrial and adjacent marine environments is unknown.

The Brabant Island – Anvers Island region is popular for tourism and visits are made regularly to Dallmann Bay, and in particular Metchnikoff Point (Table 1, Section 8). It is not clear where in Dallmann Bay the reported tourist visits took place, although it is thought that ship activity occurs predominantly within western Dallmann Bay, specifically along the coast of Anvers Island and close to the Melchior Islands (Crosbie pers. comm. 2008). In February 2010 a vessel collided with and injured a humpback whale during approach to Dallmann Bay (Liggett et al. 2010).

6(ii) Access to the Area

Access to the Area is generally by ship from Bransfield Strait, Drake Passage, Boyd Strait, or Gerlache Strait. Access to the Area may be made by air or over sea ice when conditions allow. Access routes into or within the Area have not been defined. Specific access policies are set out in Section 7(ii) below.

6(iii) Location of structures within and adjacent to the Area

There are no structures known to be within or near Site A, or within Site B. Structures and other material from the UK Joint Services Expedition to Brabant Island (January 1984 to March 1985) may remain near Site B on the western shores of Brabant Island, notably at Metchnikoff Point. The nearest scientific stations to Site A are Decepción (Argentina) and Gabriel de Castilla (Spain), both ~70 km to the northeast on Deception Island. The nearest stations to Site B are: Melchior (Argentina), Melchior Islands, Dallmann Bay ~15 km southwest; Primavera (Argentina) ~65 km east; and to the southwest Gabriel González Videla (Chile) ~55 km, Port Lockroy (UK) ~75 km, Yelcho (Chile) ~80 km, and Palmer (US) ~90 km.

6(iv) Location of other protected areas in the vicinity

The nearest protected areas to Site A Western Bransfield Strait and Site B Eastern Dallmann Bay are Port Foster and other parts of Deception Island (ASPAs No 145 and No 140 respectively), which lie ~70 km to the northeast, and ASPA No 134 Cierva Point which lies ~65 km to the southeast (Map 1). Antarctic Specially Managed Area (ASMA) No 7 Southwest Anvers Island and Palmer Basin lies ~80 km to the southwest on the southern coast of Anvers Island and ASMA No 5 Deception Island lies ~70 km to the northeast (Map 1).

6(v) Special zones within the Area

None.

7. Terms and conditions for entry permits

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a permit issued by an appropriate national authority. Conditions for issuing a permit to enter the Area are that:

- it is issued only for scientific purposes, in particular for research on the marine environment and ecosystem, or for educational purposes that cannot be served elsewhere, or for reasons essential to the management of the Area such as inspection, maintenance or review;
- the actions permitted are in accordance with the Management Plan;
- the activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the environmental and scientific values of the Area;
- it is issued for compelling educational or outreach purposes that cannot be served elsewhere, and which do not conflict with the objectives of this Management Plan;
- the permit shall be issued for a finite period;
- the permit, or a copy, shall be carried by persons responsible for accessing the Area.

7(ii) Access to, and movement within or over, the Area

- Access to, and movement within or over, the sea surface above the sub-surface boundary of the Area (Figure 1) by boat, vehicle, aircraft, or on foot are not subject to any special restrictions and do not require a permit.
- There are no specific restrictions on routes of access into, or movement within, the sub-surface Area, although movements should be kept to the

minimum necessary consistent with the objectives of any permitted activity. Every reasonable effort should be made to minimize disturbance.

- Surface vessels operating over the Area are prohibited from anchoring within the Area, except in compelling circumstances when a permit to anchor may be granted in support of meeting:
  - the objectives of the Area; or
  - scientific or management needs within the Area; or
  - scientific or management needs in terrestrial areas adjacent to the boundaries of the Area.
- There are no special overflight restrictions over the Area, and piloted aircraft may land when sea ice conditions allow, although pilots should take into account the large penguin colonies present near the boundaries of the Area, particularly on the coast of Low Island (Map 1).
- There are no special restrictions on use of Remotely Piloted Aircraft Systems (RPAS) over the Area, although pilots should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

7(iii) Activities that may be conducted in the Area

- Scientific research that will not jeopardize the values of the Area.
- Activities with educational and / or outreach purposes (such as documentary reporting (e.g. visual, audio or written) or the production of educational resources or services) that are for compelling reasons which cannot be served elsewhere and which will not compromise the values for which the Area is protected. Educational aims do not include tourism.
- Essential management activities, including monitoring and inspection.

7(iv) Installation, modification or removal of structures / equipment

- No structures are to be erected within the Area except as specified in a permit and permanent structures or installations are prohibited.
- All structures, scientific equipment or markers installed in the Area must be authorized by permit and clearly identified by country, name of the principal investigator, year of installation and date of expected removal. All such items should be clean as required under Section 7(vi), and made of materials that pose minimal risk of contamination of the Area.
- Equipment deployed within the Area for scientific purposes should be identifiable by vessels operating in the vicinity by aids such as flags, lights or radio beacons to the maximum extent practicable. Scientists deploying such equipment should, to the extent practicable, notify other vessels operating in the vicinity at the time at which deployments are being made.
- Installation (including site selection), maintenance, modification or removal of structures or equipment shall be undertaken in a manner that minimizes disturbance to flora and fauna.

- Removal of specific structures or equipment for which the permit has expired shall be the responsibility of the authority which granted the original permit, and shall be a condition of the permit.

7(v) Location of field camps

None.

7(vi) Restrictions on materials and organisms that may be brought into the Area

In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, restrictions on materials and organisms which may be brought into the area are:

- Deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. Precautions shall be taken to prevent the accidental introduction of animals, plant material, micro-organisms and non-sterile soil from other biologically distinct regions (within or beyond the Antarctic Treaty area).
- Visitors shall ensure that scientific and / or logistic structures, equipment and markers brought into the Area are clean. To the maximum extent practicable, equipment to be used within the Area (e.g. including submersibles, Remotely Operated Vehicles, diving equipment, nets and lines etc.) shall be thoroughly cleaned before entering the Area. Visitors should also consult and follow as appropriate recommendations contained in the most recent edition of the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016); CEP 2019).
- Poultry and all poultry products are prohibited from the Area.
- Herbicides and pesticides are prohibited from the Area.
- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be limited to such quantities that will have no significant impact on the values of the Area.
- Fuel, food, and other materials shall not be stored in the Area, unless required for essential purposes connected with the activity for which the permit has been granted. In general, all materials introduced shall be for a stated period only and shall be removed at or before the conclusion of that stated period;
- All materials shall be used, stored and handled so that risk of their introduction into the environment is minimized.
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.

7(vii) Taking of, or harmful interference with, native flora and fauna

Taking or harmful interference with native flora or fauna is prohibited, except in accordance with a permit issued under Article 3 of Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(viii) Collection or removal of materials not brought into the Area by the permit holder

- Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted if there is a reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, native flora or fauna that their distribution or abundance within the Area would be significantly affected. This includes biological samples and rock or seafloor specimens.
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorized, may be removed from any part of the Area, unless the impact of removal is likely to be greater than leaving the material in situ: if this is the case the appropriate authority should be notified and approval obtained.
- The appropriate national authority should be notified of any items removed from the Area that were not introduced by the permit holder.

7(ix) Disposal of waste

- All wastes, including human wastes, shall be removed from the Area.
- Discharge of any wastes into the sea from vessels while operating anywhere within or over the boundaries of the Area is prohibited, as such discharges may enter the Area. This provision is in addition to the requirements of Annex IV on Prevention of Marine Pollution under the Protocol on Environmental Protection to the Antarctic Treaty.

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan

Permits may be granted to enter the Area to:

- carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
- install, deploy or maintain markers, structures or scientific equipment;
- carry out protective measures;
- carry out research or management in a manner that avoids interference with long-term research and monitoring activities. Persons planning new projects within the Area should consult with established programs working within the Area, such as those of the United States, before initiating the work.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable after the visit has been completed in accordance with national procedures and permit conditions.
- Such reports should include, as appropriate, the information identified in the Visit Report form contained in Appendix 2 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organizing the scientific use of the Area.
- The appropriate authority should be notified of any activities / measures that might have exceptionally been undertaken, or anything removed, or anything released and not removed, that were not included in the authorized permit.

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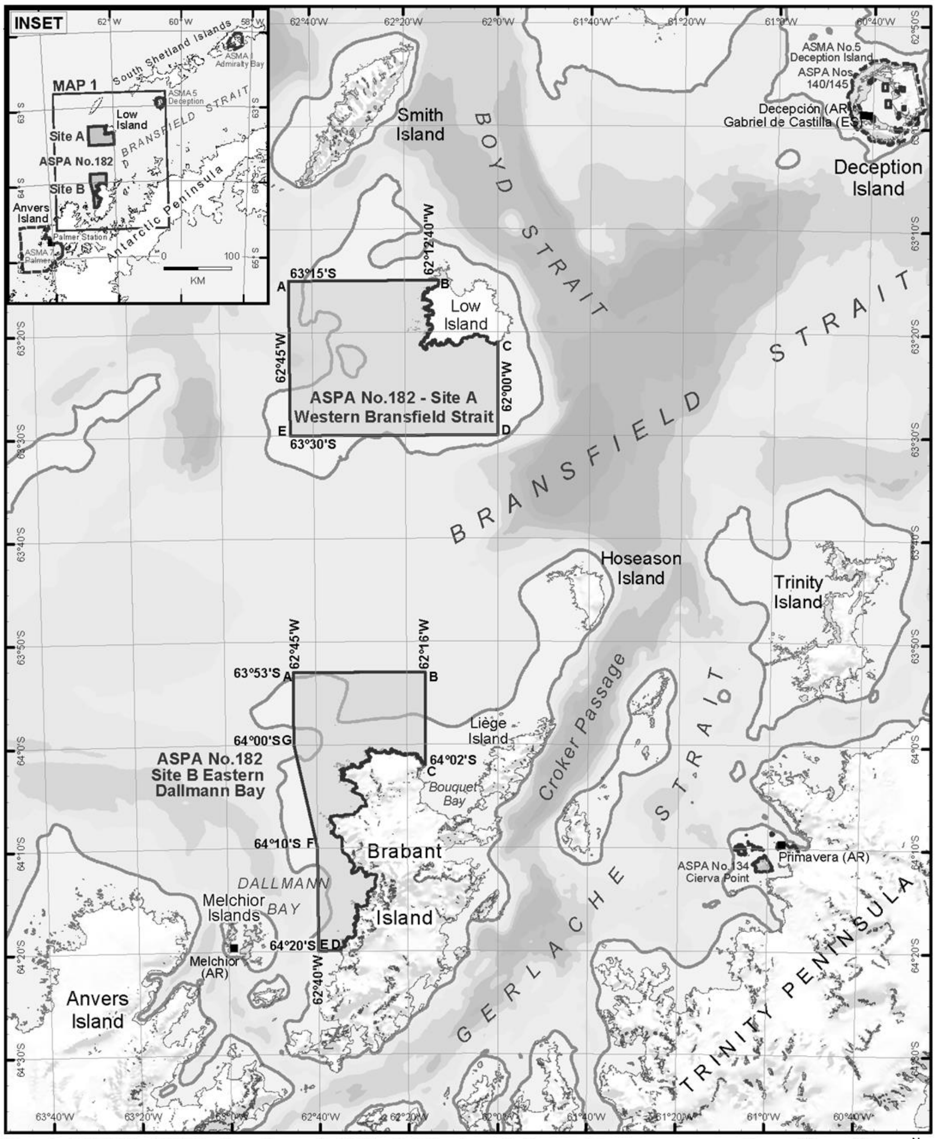
Table 1. Tourism activity in the vicinity of Site B, Eastern Dallmann Bay, 1991/92 to 2019/20. Numbers given in brackets indicate activity at Metchnikoff Point.

Year	No. of vessels	Total No. of Visitors	Small-boat cruise (pax)	Small-boat landing (pax)	Helicopter flight	Kayaking	Scuba diving
1991-92	(1)		(12)				
1992-93							
1993-94	1		84				
1994-95							
1995-96	2		104				
1996-97	1		70				
1997-98	(1)			(55)			
1998-99	(1)			(2)			
1999-00	2		102				
2000-01	0		0				
2001-02	(1)		0 (96)				
2002-03	0		0				
2003-04	0	0	0	0	0	0	0
2004-05	1	56	0	0	0	0	0
2005-06	7	1399	467	0	0	107	0
2006-07	8	1232	318	0	0	101	0
2007-08	8	10,068	61	0	0	0	0
2008-09	9	6545	170	0	0	0	0
2009-10	9	13,759	107	0	0	0	0
2010-11	9	2402	103	0	26	0	14
2011-12	4	2131	78	0	0	0	0
2012-13	8	3715	0	4	0	0	0
2013-14	9	3558	29	0	0	0	0
2014-15		5273	120	8	0	8	0
2015-16		5351	363	0	0	56	0
2016-17		10376	12	0	0	7	0
2017-18		6168	0	0	0	0	0
2018-19		7136	0	0	0	0	0
2019-20		11053	10	0	0	5	0

Data source: IAATO 2021.



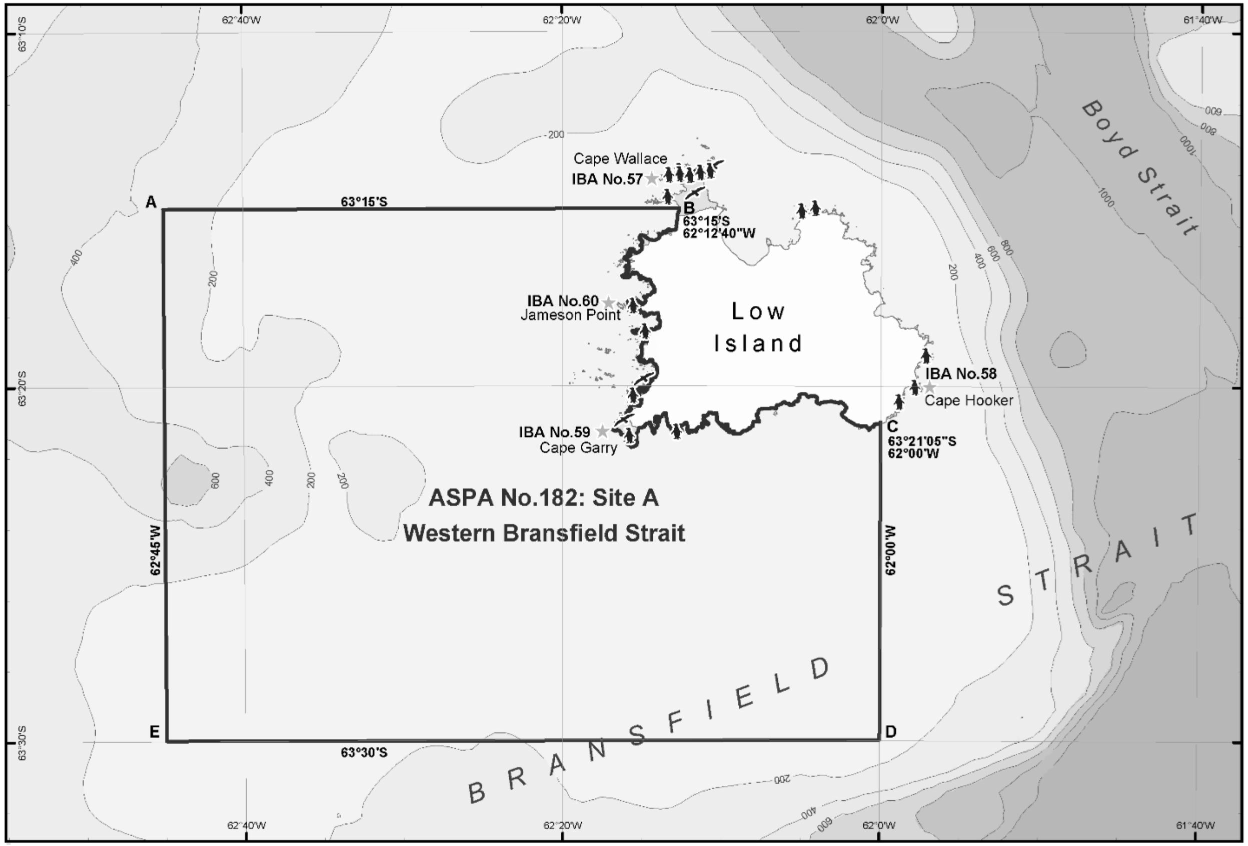
Map 1: ASPA No.182 Western Bransfield Strait & Eastern Dallmann Bay

29 Jul 2024 (v1)
United States Antarctic Program
Environmental Research & Assessment

0 10 20
Kilometers

- Permanent ice
- Ice-free ground
- Isobath (200 m)
- Antarctic Specially Managed Area
- Antarctic Specially Protected Area
- Permanent station

Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84
Data sources: Coast & topography: SCAR ADD (v7.2 2021); Bathymetry: IBCSO (v1.0, 2013)
Protected areas: ERA Antarctic Protected Areas v8.0 (2024).



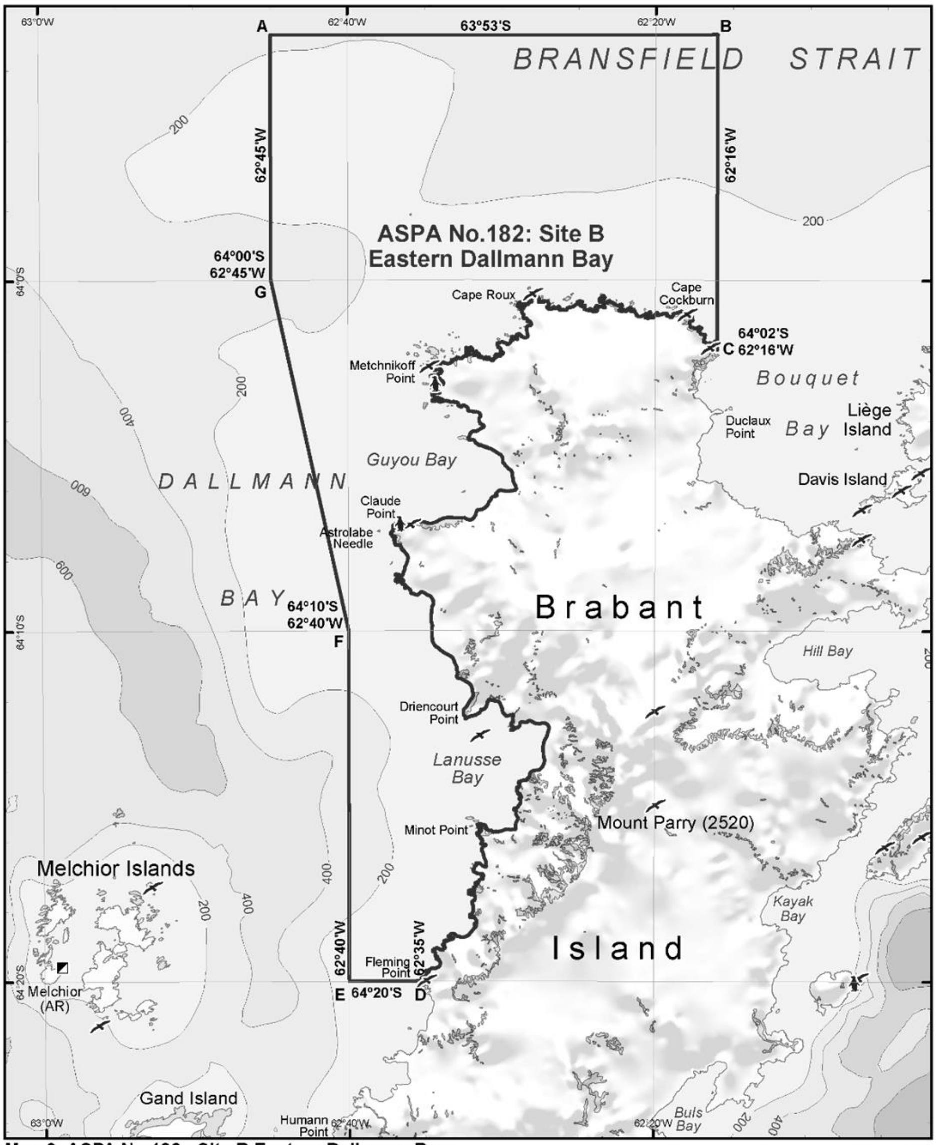
Map 2: ASPA No.182 - Site A Western Bransfield Strait

29 Jul 2024 (v1.0)
United States Antarctic Program
Environmental Research & Assessment

Permanent ice	Permanent station (year round)	Important Bird Area
Ice-free ground	Permanent station (summer)	Flying bird colony
Isobath (200 m)	Protected area boundary	Penguin colony

0 5 10
Kilometers

Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84
Data sources: Coast & topography: SCAR ADD (v7.2, 2021);
Bathymetry: IBCSO (v1.0, 2013);
Bird data: Harris (2021); IBA: Birdlife International / ERA (2021);
Protected areas: ERA Antarctic Protected Areas v8.0 (2024).



Map 3: ASPA No.182 - Site B Eastern Dallmann Bay

29 Jul 2024 (v1.0)
United States Antarctic Program
Environmental Research & Assessment

Permanent ice
Ice-free ground
Isobath (200 m)
Permanent station (year round)
Permanent station (summer)
Protected area boundary
Important Bird Area
Flying bird colony
Penguin colony

0 5 10
Kilometers

Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84
Data sources: Coast & topography: SCAR ADD (v7.2, 2021);
Bathymetry: IBCSO (v1.0, 2013);
Bird data: Harris (2021); IBA: Birdlife International / ERA (2021);
Protected areas: ERA Antarctic Protected Areas v8.0 (2024).

Measure 18 (2024)

Revised List of Antarctic Historic Sites and Monuments: new Historic Sites and Monuments No 96 and updating information for Historic Sites and Monuments No 93, 63, 75, and 24

The Representatives,

Recalling the requirements of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty to maintain a list of current Historic Sites and Monuments ("HSM") and that such sites "shall not be damaged, removed or destroyed";

Recalling

- Resolution 3 (2009), which recommended that Parties use the Guidelines for the designation and protection of Historic Sites and Monuments;
- Resolution 2 (2018), which recommended that Parties use the Guidelines for the assessment and management of Heritage in Antarctica;
- Recommendation VII-9, which added Amundsen's Cairn to the "List of Historic Monuments Identified and Described by the Proposing Government or Governments";
- Measure 4 (1995), which added Base Y on Horseshoe Island, Marguerite Bay, western Graham Land to the list of HSM;
- Measure 1 (2001), which added 'A' Hut of Scott Base, Ross Island to the list of HSM;
- Measure 12 (2019), which added the wreck of the Endurance to the list of HSM, and Measure 18 (2022), which amended HSM 93;
- Decision 1 (2019), which added new information fields to the List of HSM;
- Decision 1 (2021), which sets out the information contained in fields that continue to be a formal part of the List of HSM and that changes to these fields would require adoption through a Measure;
- Measure 23 (2021), which adopted the reformatted List of HSM;

Desiring to update the descriptions of Historic Sites and Monuments numbers 93, 63, 75 and 24;

Desiring to add a Commemorative plaque commemorating the first visit to the Lake Untersee area to the list as HSM 96;

Recommend to their Governments the following Measure for approval in accordance with paragraph 2 of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:
That:

1. the information in the List of Historic Sites and Monuments for HSM 93, be amended as below:
   - Description: Wreck of the vessel Endurance, including all artefacts contained within or formerly contained within the ship, which may be lying on the seabed in or near the wreck within a 1500 m radius. This includes all fixtures and fittings associated with the ship, including the ship's wheel, bell, etc. The designation also includes all items of personal possessions left on the ship by the ship's company at the time of its sinking.

2. the information in the List of HSM for HSM 63, be amended as below:

- Description: ‘Base Y’ on Horseshoe Island, Marguerite Bay, western Graham Land. Noteworthy as a relatively unaltered and completely equipped British scientific base of the late 1950s. ‘Blaiklock’, the refuge hut located on Blaiklock Island at 67° 32’ 31.7768’’ S, 67° 11’ 50.6349’’ W, is considered an integral part of the base.
- Management tools: Visitor Site Guidelines – 24. Horseshoe Island. A Conservation Management Plan has been prepared.
- Physical features of the environment and cultural and local context: The site located on a small isthmus on Sally Cove consists of the original main building, a weather balloon shed, dog pens, emergency store, plus a refuge on Blaiklock Island some 20 miles north. There are two masts on high points near the main building, and two small wooden boats in a small cove to the north. Inside, the station contains almost all of its original contents, fixtures and fittings, including kitchen utensils, stocks of food and fuel, workshop tools, radio equipment, and a diesel generator. The excellent condition and completeness of both the buildings and artefacts are of considerable historical significance; together they provide a very special time-capsule of British life and science in the Antarctic during the late 1950s. Historic former science and sledging station now managed by the UK Antarctic Heritage Trust as a heritage site. www.ukaht.org. The site has a comprehensive conservation Management Plan and is actively conserved by a professional conservation team.

3. the information in the List of HSM for HSM 75, be amended as below:

- Name: Hillary's TAE/IGY Hut 'A', Geomagnetic Huts ‘G’ and ‘H’ – Scott Base, Ross Island Description: Hut A of Scott Base, being the only existing Trans Antarctic Expedition 1956/1957 building in Antarctica sited at Pram Point, Ross Island, Ross Sea Region, Antarctica. Huts G and H are both original buildings from the International Geophysical Year. They remain in the original sites as built in 1957, to the north-west of Hut A. Their physical positions are inextricably linked to a continuous record of scientific observations of the earth’s magnetism, unbroken since 1957. They were prefabricated buildings, designed specially for Antarctic conditions and without ferrous components of any sort, thereby enabling their use for geomagnetic purposes.
- Type: Station and huts
- Conservation status: Following major conservation work by the New Zealand-based Antarctic Heritage Trust 2016-17, Hut A is structurally sound and weathertight and artefact collection has been conserved. Annual monitoring and maintenance ensure ongoing stability of this building. Conservation works have yet to be carried out on Huts G and H. The buildings are structurally sound and serviceable, showing the wear and tear expected for buildings some 65 years old. The New Zealand-based Antarctic Heritage Trust intend to carry out asbestos removal and conservation works on the buildings in the coming years.
- Description of the historical context: These buildings represent the beginnings of the New Zealand Antarctic programme in 1957, the base from which Sir Edmund Hillary mounted his traverse to the South Pole by tractor, in support of the Trans Antarctic Expedition. The geomagnetic huts were the hub of the contribution from NZ scientists to the International Geophysical Year (1957-58) and constitute an important site in the history of science on the Antarctic continent; they have provided a continuous international record of scientific observations of the earth’s magnetism, unbroken between 1957-2023.
The huts are closely associated with a number of scientists from 1957–58 to the present day; Dr Trevor Hatherton’s name in particular is well known and highly regarded internationally in the annals of Antarctic science.

- Applicable criteria in accordance with Resolution 3 (2009):
  - a particular event of importance in the history of science or exploration of Antarctica occurred at the place
  - a particular association with a person who played an important role in the history of science or exploration of Antarctica
  - representative of, or forms part of, some wide-ranging activity that has been important in the development and knowledge of Antarctica
  - particular technical, historical, cultural or architectural value in its materials, design or method of construction
- Management tools: Conservation Management Plan, Code of Conduct, Hut guide system, Briefing to all Scott Base arrivals, Historic Sites and Monuments in the Ross Sea Region poster displayed at stations in the region.
- Physical features of the environment and cultural and local context: The huts are in the immediate vicinity of Scott Base. Hut A is frequently visited by local base staff from Scott Base and McMurdo, and by seasonal tourist visits. Hut A is kept heated and well maintained. Huts G and H are both still on their original sites, as built in 1957, to the north-west of Hut A.

4. the information in the List of HSM for HSM 24, be amended as below:
   - Description: Rock cairn, known as 'Amundsen's cairn', in Queen Maud Range, erected by Roald Amundsen on 6 January 1912 on a peak Amundsen named Bettytoppen, on his way back to Framheim from the South Pole.
   - Location: 85°10'23,8"S 163°36'5,9"W
   - Conservation status: The cairn remains intact. There is a paraffin tank inside the cairn, which is in good condition. A tin box containing two notes which was originally placed in the cairn by Amundsen, has long since been removed. A plaque commemorating Amundsen's expedition is placed at the base of the cairn.

5. the following be added to the List of HSM as below:
   - No: 96
   - Name: Commemorative plaque commemorating the first visit to the Lake Untersee area.
   - Description: A brass plaque measuring 220 mm × 120 mm, 4 mm thick, with the names of five members of the 14th Soviet Antarctic Expedition who visited the area in 1969, mounted on an aluminium pipe set on a rocky surface.
   - Location: 71° 20' 25.0" S, 13° 27' 00" E
   - Proposing Party: Russian Federation
   - Party undertaking management: Russian Federation
   - Type: Commemorative plaque
   - Conservation status: In good condition
   - Description of the historical context: At the beginning of 1969, the first visit to Lake Untersee took place. Members of the geological and geophysical team of the 14th Soviet Antarctic Expedition (14 SAE) conducted the first ground survey of the area, which included glaciological, geomorphological, ornithological and hydrological observations, depth measurements and water sampling, collection of materials on moraine deposits and seabed sediments. The first description of the lake area showed its uniqueness and promise for further research and also served as the basis for subsequent expeditions to this area.
   - Applicable criteria in accordance with Resolution 3 (2009): a) a particular event of importance in the history of science or exploration of Antarctica occurred at the place.

- Management tools: Management activities do not require a formal Management Plan. Observation and necessary actions to maintain the HSM in proper condition will be carried out during scientific expeditions in this area.
- Physical features of the environment and cultural and local context: The plaque is mounted on an aluminium pipe installed on a rocky surface, on the top of a ridge extending north-south, at its southernmost point, directly above the slope towards the lake.

6. the Secretariat of the Antarctic Treaty be requested to update the list annexed to Measure 23 (2021) and make it available on its website.

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