Final Report of the Forty-third Antarctic Treaty Consultative Meeting

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Maipú 757, Piso 4
C1006ACI Ciudad Autónoma
Buenos Aires - Argentina
Tel: +54 11 3991 4250
ats@ats.aq

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Acronyms and abbreviations

ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACBR	Antarctic Conservation Biogeographic Region
ASMA	Antarctic Specially Managed Area
ASOC	Antarctic and Southern Ocean Coalition
ASPA	Antarctic Specially Protected Area
ATS	Antarctic Treaty System or Antarctic Treaty Secretariat
ATCM	Antarctic Treaty Consultative Meeting
ATCP	Antarctic Treaty Consultative Party
ATME	Antarctic Treaty Meeting of Experts
BP	Background Paper
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources and/or Commission for the Conservation of Antarctic Marine Living Resources
CCAS	Convention for the Conservation of Antarctic Seals
CCRWP	Climate Change Response Work Programme
CEE	Comprehensive Environmental Evaluation
CEP	Committee for Environmental Protection
COMNAP	Council of Managers of National Antarctic Programs
EIA	Environmental Impact Assessment
EIES	Electronic Information Exchange System
HCA	Hydrographic Committee on Antarctica
HSM	Historic Site or Monument
IAATO	International Association of Antarctica Tour Operators
IBA	Important Bird Area
ICAO	International Civil Aviation Organization
ICG	Intersessional Contact Group
IEE	Initial Environmental Evaluation
IGP&I Clubs	International Group of Protection and Indemnity Clubs
IHO	International Hydrographic Organization
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IOPC Funds	International Oil Pollution Compensation Funds
IP	Information Paper
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
MPA	Marine Protected Area
NCA	National Competent Authority
RCC	Rescue Coordination Centre
SAR	Search and Rescue
SCAR	Scientific Committee on Antarctic Research
SC-CAMLR	Scientific Committee of CCAMLR
SGCCR	Subsidiary Group on Climate Change Response
SGMP	Subsidiary Group on Management Plans
SOLAS	International Convention for the Safety of Life at Sea
SOOS	Southern Ocean Observing System

SP	Secretariat Paper
ToR	Term of Reference
UAV/RPAS	Unmanned Aerial Vehicle / Remotely Piloted Aircraft System
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VSSOS	Vessel-Supported Short Overnight Stay
WMO	World Meteorological Organization
WP	Working Paper
WTO	World Tourism Organization

PART II

Measures, Decisions and Resolutions (Cont.)

4. Management Plans

Larsemann Hills, East Antarctica
Antarctic Specially Managed Area No. 6
Management Plan

1. Introduction

The Larsemann Hills are an ice-free area of approximately 40 km^2 and the southernmost coastal ‘oasis’ in the Prydz Bay region of East Antarctica. Coastal ice-free areas are rare in Antarctica and as such the Larsemann Hills region is environmentally, scientifically and logistically significant.

In 2007 the Larsemann Hills were designated an Antarctic Specially Managed Area (ASMA) in response to a joint nomination by Australia, China, India, Romania and the Russian Federation. The primary reason for designation was to promote coordination and cooperation by Parties in the planning and conduct of activities in the region – with the view to achieving greater environmental protection outcomes.

The original management plan for Larsemann Hills ASMA No. 6 was adopted under Measure 2 (2007). A revised management plan for the Area was adopted under Measure 15 (2014).

1.1 Geography

The Larsemann Hills are located approximately halfway between the Vestfold Hills and the Amery Ice Shelf on the south-eastern coast of Prydz Bay, Princess Elizabeth Land, East Antarctica (69°30’S, 76°19’58”E) (Map A). The ice-free area consists of two major peninsulas (Stornes and Broknes), four minor peninsulas, and approximately 130 near-shore islands. The eastern-most peninsula, Broknes, is further divided into western and eastern components by Nella Fjord. The closest significant ice-free areas are the Bølingen Islands (69°31’58”S, 75°42’E) 25 km to the south-west and the Rauer Islands (68 °50’59”S, 77°49’58”E) 60 km to the north-east.

Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) the Larsemann Hills is located within Environment D *East Antarctic coastal geologic*. Based on the Antarctic Conservation Biogeographic Regions (Resolution 3 (2017)), the Larsemann Hills is located within Biogeographic Region 7 *East Antarctica.*

1.2 Human presence

1.2.1 History of human visitation

The Larsemann Hills area was first charted in 1935 by a Norwegian expedition under Captain Klarius Mikkelsen. While brief visits were made by several nations during the following 50 years, human activity of a significant or sustained nature did not occur until the mid-1980s. The period 1986 to 1989 saw rapid infrastructure development in the area; an Australian summer research base (Law Base), a Chinese research station (Zhongshan) and a USSR (Russia) research station (Progress) were established within approximately 3 km of each other on eastern Broknes. A 2000 m skiway was also operated by USSR (Russia) on the ice plateau south of Broknes and used for over 100 intra-continental flights during this period. Zhongshan and Progress are operated year round, as is Bharati station which was established by India in 2012/13. Law Base is seasonally operated.

1.2.2 Science

Station-based research includes hydrology, glaciology, meteorology, seismology, geomagnetics, atmospheric chemistry, Global Positioning System (GPS) tracking, atmospheric and space physics, and human physiology. Field-based research in the Larsemann Hills has focused on geology, geophysics, geomorphology, Quaternary science, glaciology, hydrology, limnology, ecology, geoecology, biology, and studies of biodiversity (including molecular), biotechnology and human impacts.

1.2.3 Tourist visits

Sporadic ship-based tourist visits were made to the area in the 1990s. These involved half-day trips, during which passengers were transported ashore by helicopter to view station areas, lakes, bird colonies and other features around eastern Broknes by foot.

1.2.4 Future activities

Continuing human activity in the Larsemann Hills is promoted by the coastal location and ice-free landscape. Commitment to ongoing use by the Parties active in the area is evident both in the development and redevelopment of station facilities, and the staging of inland traverses from the area. Primary attention will be given to safety of road improvements including the proposed levelling of the ridge on the road between Progress and the aerodrome.

1.3 Period of designation

The ASMA is designated for an indefinite period. The management plan is to be reviewed at least every 5 years.

2. Values of the Area

The Prydz Bay region contains a number of rock outcrops and offshore islands which represent a significant fraction of the ice-free component of the East Antarctic coastline. Comprising an ice-free area of approximately 40 km^2, the Larsemann Hills represent the southernmost coastal ‘oasis’ (69°30’S) in this geographic sector, and the second largest after the Vestfold Hills (~410 km^2), 110 km to the north-east. Such coastal oases are particularly rare in Antarctica. As such, the Larsemann Hills represents a significant biogeographical location of environmental, scientific and logistical value.

2.1 Environmental and scientific values

Much of the scientific research in the Larsemann Hills depends on the natural environment being in a relatively undisturbed state, and for this reason the protection of scientific values will to a large extent contribute to the understanding and protection of the abundant environmental values of the area.

With their geology significantly different from that of other outcrops in the Prydz Bay region, the Larsemann Hills provide a significant geological window into the history of Antarctica. Widespread exposed geological and geomorphological features provide a valuable insight into landscape formation, and the history of the polar ice-sheet and sea level. Many of these features are highly vulnerable to physical disturbance.

Broknes peninsula is one of very few coastal areas of Antarctica that remained partially ice-free through the last glaciation, and sediments deposited there contain continuous biological and palaeoclimate records dating back some 130 000 years.

Stornes and Brattnevet peninsulas are unique in terms of their extensive development of diverse suites of borosilicate and phosphate mineral assemblages that are scientifically significant in their variety and origin. Ongoing research seeks to identify the geologic processes that have concentrated boron and phosphorus to such an extent. Stornes also has sediments containing abundant well-preserved foraminifera, diatoms and molluscs. The outstanding geological values of Stornes, and its value as a reference site for the more heavily impacted Broknes, are afforded protection within Antarctic Specially Protected Area (ASPA) No. 174 Stornes.

The Larsemann Hills contain more than 150 lakes. Although some of the most scientifically important lakes are on eastern Broknes, the lakes of the Larsemann Hills are collectively recognised as the ASMA’s most important ecological feature. The lakes are particularly valuable for their relatively simple natural ecosystems. As they are susceptible to physical, chemical and biological modification, a catchment-based approach to management of human activities is appropriate in protecting their scientific values. The snowfields on these catchments and streams are also important subjects for the measurement of natural hydrological processes and any expansion of human impacts.

In addition, a number of lakes in the Larsemann Hills area are characterised by floods, (accompanied by) the destruction of snow and ice dams, damming of water bodies, and the discharge of water through emerging channels. These features are of interest both from the point of view of science and within the framework of measures to ensure the safety of transport operations.

The comparatively benign microclimate and the occurrence of fresh water in summer also support Antarctic life forms. Snow petrels, Wilson's storm petrels and south polar skuas breed in the area, and Weddell seals haul out close to shore to breed and moult. Mosses, lichens and cyanobacterial mats are widely distributed, and found in high concentrations in some locations. The comparative accessibility of these biological sites makes them a valuable and vulnerable characteristic of the area.

Due to the area's short, concentrated and well-documented history of human activity, the Larsemann Hills also presents an excellent opportunity to study and quantify the impacts of humans.

2.2 Logistical values

As the site of the year-round stations of three national Antarctic programs, the Larsemann Hills ASMA is an important logistical support base for access to the southern Prydz Bay region and the Antarctic interior including to Kunlun station at Dome A (China), Vostok (Russia) and the Groves Mountains region. Australia and China have conducted substantial inland traverses supported by facilities in the Larsemann Hills. From 2008 Russia relocated its support base for the resupply of Vostok from Mirny to the Larsemann Hills.

The presence of a Russian-serviced, existing snow airstrip that operates medium-haul aircraft also increases the logistical value of the area, as does the use of Thala Fjord as a backup option for unloading ships to increase the success and safety of cargo operations. Given the long-term nature of the icebergs blocking the sea passage to Progress and Zhongshan stations, the use of the Thala Fjord for sustainable supply of stations on the Broknes Peninsula and for delivery of cargo to inland stations is important. Russia plans to use the Thala Fjord starting from 2021/22 summer season to deliver construction materials and fuel to Vostok station. Access will be via the Stornes Peninsula, along the border with ASPA 174 Stornes, which is currently the only passage between Thala Fjord and the continent. To support safe passage, work has been carried out since 2015 to identify glacial crevasses and hazardous water bodies.

2.3 Wilderness and aesthetic values

Stornes and the minor peninsulas and near shore islands show less evidence of human presence than elsewhere in the ASMA. The aesthetic value of the ASMA's rugged ice-free hills interspersed by lakes and fjords against the backdrops of the Dålk Glacier, near shore islands, icebergs and plateau is noteworthy and warrants protection.

3. Aims and objectives

The Larsemann Hills are designated as an ASMA in order to protect the environment by promoting coordination and cooperation by Parties in the planning and conduct of human activities in the Area.

Through the adoption of this Management Plan, Parties commit to:

- providing guidance on the appropriate conduct of activities to all visitors including personnel involved in national research programs, transitory national program visitors and participants in non-governmental activities;
- minimising cumulative and other environmental impacts by encouraging communication and a consistent, cooperative approach to environmental protection in the conduct of research and support activities;
- minimising physical disturbance, chemical contamination and biological impacts in the region, primarily through appropriately managing vehicle usage;
- preventing contamination of the environment through the implementation of comprehensive waste management practices and the appropriate handling and storage of harmful substances;
- implementing measures needed to protect the environment from the accidental introduction or release of non-native species;

- maintaining the wilderness and aesthetic values of the area;
- safeguarding the ability to conduct scientific research by not compromising the scientific values of the area; and
- improving understanding of natural processes in the area, including through the conduct of cooperative monitoring and recording programs.

4. Description of the Area

4.1 Geography and Area boundary

The ASMA comprises the ice-free area and near-shore islands collectively known as the Larsemann Hills (see Map A), and the adjacent plateau. The ASMA includes the land:

beginning at	69°23'20"S, 76°31'0"E east of the southern tip of Dalkoy and from there,
north to	69°22'20"S, 76°30'50"E north of Dalkoy
north-west to	69°20'40"S, 76°21'30"E north of Striped Island
north-west to	69°20'20"S, 76°14'20"E north-east of Betts Island
south-west to	69°20'40"S, 76°10'30"E north-west of Betts Island
south-west to	69°21'50"S, 76°2'10"E north-west of Osmar Island
south-west to	69°22'30"S, 75°58'30"E west of Osmar Island
south-west to	69°24'40"S, 75°56'0"E west of Mills Island
south-east to	69°26'40"S, 75°58'50"E south of Xiangsi Dao
south-east to	69°28'10"S, 76°1'50"E south-west of McCarthy Point
south-east to	coastline at 69°28'40"S, 76°3'20"E
north-east to	69°27'32"S, 76°17'55"E south of the Russian airstrip site
south-east to	69°25'10"S, 76°24'10"E on the western side of the Dålk Glacier
north-east to	69°24'40"S, 76°30'20"E on the eastern side of the Dålk Glacier, and
north-east returning to	69°23'20"S, 76°31'0"E.

The intention is however to manage, in accordance with this management plan, the conduct of all substantial human activity associated with the Larsemann Hills.

No artificial boundary markers are in place.

4.2 Climate

A major feature of the climate of the Larsemann Hills is the existence of persistent and strong katabatic winds that blow from the north-east on most summer days. Daytime air temperatures from December to February frequently exceed 4˚C and can exceed 10˚C, with the mean monthly temperature a little above 0˚C. Mean monthly winter temperatures mostly range between –15˚C and –18˚C. Precipitation occurs as snow and rarely exceeds 250 mm water equivalent annually. Snow cover is generally deeper and more persistent on Stornes than Broknes. The pack ice is extensive inshore throughout summer, and the fjords and bays are rarely ice-free.

4.3 Natural features

4.3.1 Geology

The Larsemann Hills (and neighbouring Bolingen Islands and Brattstrand Bluffs) differ from other parts of Prydz Bay, mainly due to the absence of mafic dykes and large charnockite bodies. Bedrock exposures in the Larsemann Hills are composed of supracrustal volcanogenic and sedimentary rocks metamorphosed under granulite facies conditions (800–860˚C, 6–7 kbar at peak) during the early Palaeozoic 'Pan-African' event (~500-550 Ma). Peak metamorphic conditions were followed by decompression. The rocks were subjected to extensive melting and several deformational episodes, and have been intruded by several generations of pegmatites and granites. The supracrustal rocks are underlain by, and possibly derived from, a Proterozoic orthopyroxene-bearing orthogneiss basement.

4.3.2 Geomorphology

The elongated form of the large-scale topographic features of the Larsemann Hills results from compositional layering, folds and faults (lineaments) in the metamorphic bedrock. The landscape is dissected by large, structurally-controlled, steep-sided fjords and valleys rarely exceeding 100 m in depth on land; the longest is 3 km (Barry Jones Bay). The maximum elevation above mean sea level is 162 m (Blundell Peak).

The coastline is generally bedrock, and beaches occur only at the heads of fjords or in isolated sheltered bays. There are several sequences of ice-dammed lakes and associated gorges and alluvial fans. The offshore islands are likely to be roches moutonnees, isolated by the current sea level.

Landforms produced by wind are common, though ice and salt wedging clearly play a considerable role in grain detachment with wind primarily acting as a transporting agent. Periglacial landforms are also widespread, but not particularly abundant or well developed.

True soils are virtually absent due to a lack of chemical and biological soil-forming processes. Surficial deposits are widespread but confined to lower areas and include snow patch gravels, wind-deposited materials, talus and fluvially deposited materials. Very thin soils (less than 10 cm) are also found in association with scattered moss beds and discontinuous lichen. A permafrost layer exists 20–70 cm below the surface in some areas.

On north-eastern Stornes at approximately 69^{o}31'48"S, 76^{o}07'E there is an outcrop of post-depositionally placed marine Pliocene (4.5–3.8 Ma) sediment up to 40 cm thick. These sediments occupy a narrow bench approximately 55 m above sea level and yield abundant well-preserved foraminifera and reasonably well-preserved diatoms and molluscs.

On Broknes, areas that have remained ice-free through the Last Glacial Maximum contain sediment deposits (in lakes) that record climate, biological and ecological changes spanning the last glacial cycle.

4.3.3 Lakes and snowfields

The Larsemann Hills contains more than 150 lakes ranging in salinity from fresh to slightly saline, and in size from shallow ponds to large ice-deepened basins, although most are small (5000–30 000 m^2) and shallow (2–5 m). The surfaces of the lakes freeze during winter, and most thaw for up to 2 months in summer, allowing them to be well-mixed by the katabatic winds. Most lakes are fed by snow melt and some have entrance and exit streams that flow persistently during the summer and provide habitat for crustaceans, diatoms and rotifers. Such streams are particularly evident on Stornes.

Small catchment areas and the near pristine waters make the Larsemann Hills lakes particularly susceptible to impacts resulting from human activities. Research has shown that several lakes on eastern Broknes in the immediate vicinity of the station areas and their interlinking roads have experienced modified water chemistries and inputs of nutrients, melt water and sediment. Whilst these lakes clearly exhibit human impacts, the majority of the lakes on Broknes and elsewhere in the Area appear largely unmodified.

The lakes on east Broknes have the longest sediment record of any surface lakes in Antarctica. It appears that the ice sheet did not advance beyond Lake Nella and did not scour Progress Lake so these lakes and the lakes towards the north end of the peninsula are particularly valuable to the science community.

The surface area of the Larsemann Hills' snowfields has increased by an estimated 11% during the last 50 years. In the summer period, a temporal hydrographical net is forming from thawing water from snowfields and glaciers. Streams transport water, ions, suspended matter and pollutants on catchments areas and to the lakes and bays.

According to the results of observations in recent years, a number of lakes in the area are characterised by periodic floods. Detailed studies devoted to these phenomena have been carried out on the water bodies of the

Broknes Peninsula since the 2017/2018 season, and include hydrological and geophysical surveys as well as long-term observations of the dynamics of water bodies. The frequency and nature of floods is determined by a number of factors, including the climatic and geomorphological features of each water body. Floods of Kristalnoe (Progress) (LH-59) and Discussion lakes occur almost annually, and of Bolder (LH-73) every few years as critical water levels are reached.

4.3.4 Lake and stream biota

The most diverse and widespread group of primary producers of the continental waterbodies of the oasis is cyanobacteria (blue-green algae), among which there are many species endemic to Antarctica and the Prydz Bay region. Second in terms of species diversity and distribution are diatoms. About 40% of diatom taxa living in the fresh and brackish waters of the Larsemann Hills are endemic to Prydz Bay or to the Antarctic (found mainly in the eastern part of Broknes). Green algae also play a significant role. Desmids are represented by only four species belonging to three genera: *Actinotaenium*, *Cosmarium* and *Staurastrum*, but often co-dominate in algal communities. They usually live in benthic communities, but species of the genus *Cosmarium* are occasionally noted in the plankton as well. Golden algae occur either in the plankton (species of the genus *Paraphysomonas*) or as resting stages (stomatocysts) on the bottom of the lakes. Dinophyte algae (dinoflagellates) are also found in the plankton of freshwater waterbodies, but their abundance varies significantly from year to year.

The most noticeable feature of the biota of almost all the region's lakes is the presence of vast blue-green felt covers of cyanobacteria (cyanobacterial mats) which have accumulated here since the retreat of the glaciers, and in some places are up to 130 000 years old. These mats are usually from 1 to 10 cm thick, but in rare cases can reach 1.5 m which is not observed in other freshwater Antarctic systems. These mats contain cyanobacteria, eukaryotic algae (green, desmid, diatoms) and resting stages of planktic species of golden algae. The basis of the mat is composed of filamentous cyanobacteria, usually from the genera *Leptolyngbya*, *Phormidesmis* and *Pseudanabaena*. Similar communities, but of a lesser thickness and different species composition of algae and cyanobacteria, are often found in temporary reservoirs and watercourses and wet seepage areas.

Heterotrophic nanoflagellates are more common than autotrophic nanoflagellates, although their species diversity is small (only three or four species in most lakes). Ciliates are found in low numbers, with *Strombidium* the most common species. A species of *Holyophyra* is also found in most lakes. Rotifers occur sporadically in a number of lakes, and the cladoceran *Daphniopsis studeri* is widespread but found in low numbers.

4.3.5 Seabirds

South polar skuas (*Catharacta maccormicki*), snow petrels (*Pagodroma nivea*) and Wilson's storm petrels (*Oceanites oceanicus*) breed within the Larsemann Hills. While approximate numbers and locations of breeding pairs are documented for Broknes, and particularly eastern Broknes, their distribution throughout the remainder of the area is uncertain.

South polar skuas are present between mid-late October and early April, with approximately 17 breeding pairs nesting on Broknes, and similar numbers of non-breeding birds. Snow petrel and Wilson's storm petrel nests are found in sheltered bedrock fragments, crevices, boulder slopes and rock falls, and are generally occupied from October until February. Approximately 850–900 pairs of snow petrels and 40–50 pairs of Wilson's storm petrels are found on Broknes, with concentrations of snow petrels at Base Ridge and on rocky outcrops adjacent to the Dålk Glacier in the east and the plateau in the south.

Despite the apparent suitable exposed nesting habitat, no Adelie penguin (*Pygoscelis adeliae)* breeding colonies are found at the Larsemann Hills, possibly due to the persistence of sea ice past the hatching period. However birds from colonies on nearby island groups between the Svenner Islands and Bolingen Islands visit during summer to moult. Emperor penguins (*Aptenodytes forsteri*) also occasionally visit.

4.3.6 Seals

Weddell seals (*Leptonychotes weddelli*) are numerous on the Larsemann Hills coast, using the local sea ice to pup from October, and to moult from late December until March. Pupping has been observed on the sea ice adjacent to the small islands north-east of eastern Broknes, and groups of moulting seals have been observed hauled out near the Broknes shore adjacent to the stations and in tide cracks in the fjords to the west. Aerial surveys during the moulting period have noted more than 1000 seals, with multiple large groups (50–100 seals) hauled out in Thala Fjord and on rafted ice immediately to the west of Stornes, and numerous smaller groups amongst offshore islands and ice to the north-east of Broknes. Crabeater seals (*Lobodon carcinophagus*) and leopard seals (*Hydrurga leptonyx*) are also occasional visitors.

4.3.7 Micro fauna

Five genera of terrestrial tardigrade (*Hypsibius*, *Minibiotus*, *Diphascon*, *Milnesium* and *Pseudechiniscus*), which include six species, are known to be present in localities associated with vegetation. The lakes and streams provide a series of habitats that contain a rich and varied fauna. Seventeen species of rotifer, three tardigrades, two arthropods, protozoans, a platyhelminth and nematodes have been reported. The cladoceran Daphniopsis studeri, one of few species of freshwater crustacea known to occur in the lakes of continental Antarctica has been identified in most Larsemann Hills lakes, is the largest animal in these systems, and is currently restricted to the Prydz Bay region and the sub-Antarctic islands in the South Indian Ocean Province. It has been continuously present on eastern Broknes through the Last Glacial Maximum, providing evidence that Broknes has acted as an important glacial refuge for the Antarctic biota through one or more full glacial cycles.

4.3.8 Terrestrial vegetation

Sampling of the coastal areas from the Vestfold Hills to the Larsemann Hills indicates that the flora of the Ingrid Christensen Coast is relatively uniform, and restricted to a similar distribution of bryophytes, lichens and terrestrial algae. The nature of the basement rock and the prevailing wind direction in the greater Prydz Bay area likely contribute to the fact that less than 1% of the Larsemann Hills has vegetative cover.

Most terrestrial life, including mosses, lichens and accompanying invertebrates are found inland from the coast. Nevertheless, large moss beds are known to occur in sheltered sites on Stornes and on the larger islands (particularly Kolløy and Sigdøy) where they are associated with Adelie penguin moulting sites, and on nunataks in the southwest. There are seven positively identified moss species in the region: *Bryum pseudotriquetum* which is most abundant, *Grimmia antarctici, Grimmia lawiana, Ceratodon pupureus, Sarconeurum glaciale, Bryum algens* and *Bryum argentum*.

The bryophyte flora also comprises one species of liverwort (*Cephaloziella exiliflora)* found on an unnamed outcrop south of Stornes and known from only four other Antarctic localities. Lichen coverage is considerable on north-eastern Stornes and Law Ridge on Broknes; the lichen flora of the region comprises at least 25 positively identified species. Studies conducted in nearby locations on the Ingrid Christensen Coast suggest that it would not be unreasonable to expect the Larsemann Hills to exhibit close to 200 non-marine algal taxa and 100–120 fungal taxa.

4.4 Human impacts

Intensive human activity in the region since 1986 has resulted in notable localised alteration of the environment, concentrated on eastern Broknes and the peninsula between Thala Fjord and Quilty Bay. The construction of station buildings and associated facilities and roads has caused physical degradation of the ice-free surface. Breakdown of rocks and exposure of the permafrost layer through repeated vehicle use has caused surface erosion and altered drainage patterns. Chemical contamination of some lakes and soils has occurred through the collection of water, accidental spillage of hydrocarbons, and the local disposal of wastewater. Water withdrawals for station use have depleted lake water volumes on Broknes.

Introduced floral species have been detected (and removed), and there is historical evidence of ingestion of human-derived food by wildlife. Wind-blown litter and surface disturbance through repeated pedestrian access remains an issue.

Stornes, and the minor peninsulas and near shore islands, have been less frequently visited and are less disturbed. Maintaining this well-preserved state, and minimising impacts elsewhere, is a major priority for management of the Larsemann Hills.

4.5 Access to the Area

4.5.1 Land access

Fifteen kilometres of unsealed roads, formed from local material, have been established on eastern Broknes. They include a 6.7 km road linking each of the stations on Broknes and the continental plateau in the south. This road follows the only practical route with regard to avoiding lake catchments and steep slopes. There are four particularly steeps sections – a ridge approximately 0.5 km south of Zhongshan; a series of steep slopes between Progress and Law Base; a section traversing the slope to the west of Lake Sibthorpe; and the ascent to the plateau near the Dålk Glacier. The final kilometre of the route before entering the plateau proper is marked by canes at 50–100 m intervals. There are also vehicle routes within the immediate station areas of Zhongshan and Progress and a short access route connecting Law Base to the main road. Vehicle access over ice-free surfaces within the Area is restricted to these existing roads.

Most of Stornes, the western-most peninsula in the Larsemann Hills, is within the boundary of ASPA 174. Vehicular travel within the ASPA is prohibited.

Sea ice usually persists in the fjords and between the shore and numerous near-shore islands until late in the summer season. Ice conditions are variable at the eastern and western margins of the ASMA due to the presence of glaciers. Sea ice travel must take account of these conditions. In winter, sea ice access to Zhongshan and Progress may be feasible via the beach west of Zhongshan (69º22’30”S, 76º21’33”E) and the beach adjacent to Progress (69º22’44”S, 76º23’36”E), depending on highly variable ice conditions. From the sea ice, it may then be possible to access the main road south of the steep section south of Progress via either the easternmost bay of Nella Fjord (69º22’58”S, 76º22’44”E) or via Seal Cove (69º23’6”S, 76º23’49”E).

The Larsemann Hills can be approached via the plateau from Davis in the north-east (approximately 330 km) and Mawson in the west following the Lambert Glacier traverse route (approximately 2200 km). This comprises a caned route which turns north from a marker at 69º55’23”S, 76º29’49”E and then follows series of canes and drum beacons north to connect with the major access route on eastern Broknes.

4.5.2 Sea access

No anchorages or barge landings are designated for the Area due to the variable sea ice conditions. Vessels usually anchor approximately 5 nm offshore, depending on ice conditions, however vessels chartered by India have reached as close as 50 m away from the site of Bharati.

Access from ships to the eastern shore of Broknes by small boat is difficult and sometimes impossible due to ice debris up to hundreds of metres off shore, blown by the prevailing north-easterly winds. Helicopters are therefore the only reliable means by which persons and supplies can be transported ashore quickly.

Due to the difficult ice and iceberg conditions and access to Broknes Peninsula, since 2010, increasing focus has been on Thala Fjord as the most convenient and safest place for unloading ships. In recent years, Russia has used the unloading site on the Stornes Peninsula to deliver cargo to Progress and Vostok stations. During 2021-2025 a large amount of cargo associated with building works at Vostok station will be transported from this unloading point.

The main sites used are:

- the bay ~250 m NNE of Zhongshan at 69º22’12”S, 76º22’15”E which consists of a ~15 m opening between rock outcrops, and a large flat area on shore for vehicle operations;
- the beach adjacent to Progress (69º22’44”S, 76º23’53”E);
- the beach west of Zhongshan opening into Nella Fjord (69º22’30”S, 76º21’25”E);
- Thala Fjord, 50 m away from the site of Bharati;
- Thala Fjord, the beach, Stornes (69º25’454’’S, 76º08’880’’E).

In accordance with the management plan for ASPA 174, a permit is required to make landings on all but the south-eastern corner of Stornes.

4.5.3 Air access

Designated helicopter landing and refuelling sites are to be used preferentially for general helicopter operations.

In accordance with the management plan for ASPA 174, a permit is required to overfly or make landings on all but the south-eastern corner of Stornes.

There are two cement helicopter-landing sites (69°22’44”S, 76°21’32”E) at Zhongshan. The southerly pad is 15 m in diameter and displays a painted map of Antarctica. The other pad is about 25 m to its north and is 20 m in diameter. Usually heavy helicopters (e.g. Ka-32) land at the larger pad and lighter aircraft (Dolphins and Squirrels) land at the pad to the south. Landings are usually made from the western side of Zhongshan travelling towards the main building from the direction of the lake and descending gradually above the lake. Pilots should avoid reducing altitude on the southern side of the lake where there is a 58 m hill with radars used for upper atmospheric physics studies.

Progress has a 25 m x 25 m concrete helicopter-landing site at 69°22′38″S, 76°23′11″E, 90 m to the north-west of the largest building in the station area (Map E).

Bharati has a concrete helicopter landing pad at 69°24.40'S, 76°11.59'E – west of the main station building at an elevation of 38.5 m.

The Law Base helicopter-landing site (69°23'20"S, 76°22'55"E) is approximately 60 m east of the base. Helicopters would normally land facing into the north-east prevailing winds.

Small ski/wheeled fixed-wing aircraft operations have previously been conducted infrequently in the region and may be possible on the sea ice adjacent to the stations, though ice conditions vary annually, and the proximity to wildlife colonies make operations on the plateau preferable. Landings have been conducted near the site of the previous Russian runway and existing snow airstrip (centred on 69°26'00"S, 76°19'58"E). Prevailing winds from the north-east and a slight rise in the surface suggest that landing and taking off towards the north-east is preferable.

4.5.4 Pedestrian access

Pedestrian access within the ASMA is not restricted (other than the requirement for a permit to enter ASPA 174 Stornes), but is to be conducted in accordance with the Environmental Code of Conduct at Appendix 1. Established routes should be used to minimise physical disturbance of the land surface and to prevent further track formation. Where surface modification is not apparent, the most direct route between points should be taken, with consideration given to avoiding repetitive use of the same route and avoiding vegetation and other sensitive features such as the margins of lakes and wet seepage areas.

4.6 Location of structures in or near the Area

4.6.1 Zhongshan (People’s Republic of China)

Zhongshan is located on the north-eastern tip of eastern Broknes at 69°22'24"S, 76°22'40"E and approximately 11 m above sea level. The station was established in the 1988/89 summer season and has since been operated continuously to facilitate the conduct of year-round scientific research activity by the Chinese Antarctic program. As noted earlier, Zhongshan also acts as the logistical support base for Kunlun station and for scientific research in other inland areas such as Grove Mountains and Amery Ice Shelf. As such, Zhongshan is an important supporting centre for China’s inland research in Antarctica.

Station infrastructure

The station supports approximately 60 personnel in summer and 20–25 in winter, with a maximum capacity of 76. The station consists of seven main and several smaller buildings (Map D). Vehicle access to Zhongshan is via the main road from the plateau, and a network of routes link the main buildings within the station area. Two concrete helicopter-landing pads are located west of the main station building (see Section 4.5.3).

Power, fuel delivery and storage

Electrical power is provided by diesel generators. Fuel is transferred from the ship by barge or pipeline, depending on sea ice conditions, and stored in bulk tanks at the southern end of the station area. Between 200 and 300 m^3 of fuel are delivered to the station each year.

To avoid activities associated with oil storage and transport damaging the Antarctic environment, a new oil storage facility was built at Zhongshan in 2011. It is located on the eastern side of the station, on the border area with Progress. The facility can store about 500 t of fuel and also houses oil spill prevention equipment. The old oil storage system is routinely checked and maintained. It will be relocated to the new oil storage area to reducing crowding in the station and to improve the safety of its operation.

Water and waste water

Water for generator cooling and shower facilities is drawn from a large tarn immediately west of the station area. Grey water is used to flush toilets after treatment in the powerhouse. Black water is collected and treated in the sewage station and discharged to the ocean after passing through a series of gravity-driven settlement tanks.

Solid waste management

Combustible wastes are separated and burnt in a high temperature, diesel-fuelled incinerator. The quantity of combustible wastes produced requires an incinerator burn every three to four days on average. The ash is collected and stored for return to China. Non-combustible wastes are sorted into waste categories and stored south of the powerhouse for removal by ship.

Vehicles

Vehicles are used in the immediate station area and to transport materials to other sites on eastern Broknes. Maintenance of vehicles, generators and instruments is undertaken in the powerhouse or vehicle workshop. Waste oil is returned to China.

Resupply

Resupply is generally undertaken once a year in summer. Cargo is brought to shore using either barges or sleds towed behind traverse vehicles.

Communications

Verbal communication with China is largely by short-wave radio, INMARSAT and, increasingly, Broadband Global Area Network (BGAN). BGAN has become the main communication equipment for sending and receiving telephone calls, faxes, emails and scientific data. HF radio is used for communications in the Prydz Bay area and VHF radio is used for local communications. A radio-telephone link also provides contact with Davis (and via Davis to anywhere in the world), and this is used for conveying meteorological data on a daily basis. A Very Small Aperture Terminal (VSAT) satellite communication system has also been installed. It establishes 24-hour uninterrupted communication between the station and China and provides communication services in voice, words and data. Iridium communication is retained for emergencies.

Science

Science programs conducted from Zhongshan are largely of a station-based nature and include meteorology, ozone monitoring, upper atmosphere physics, auroral observations, geomagnetic observations (some in cooperation with the Australian Antarctic program), gravimetric observations, seismology, NOAA polar orbiting satellite image processing, atmospheric chemistry, remote sensing, GPS measurement and human physiology. Activities away from the immediate station area during seasons with summer research programs include environmental evaluation and monitoring of snow and ice, soil, seawater, freshwater, mosses, lichen, wildlife, geology, glaciology and sea ice ecosystems. Inland traverses have also been undertaken to conduct geological, geodetic, glaciological and meteorite studies.

4.6.2 Progress (Russia)

Progress is located on eastern Broknes at 69°23′S, 76°23'E, approximately 1 km south of Zhongshan. The original station was established in 1988 on a plateau 300 m from the western shoreline of Dålk Bay, and from where it was moved in February 1989. The station was occupied sporadically and shut down during the 1993/94 summer and reopened in the 1997/98 summer season for operation as a year-round research facility. The construction of a new wintering complex was completed in 2013. It includes an office/living building, energy complex, garage and new fuel storage infrastructure (Map E). The station is suited to accommodating up to 100 personnel during summer.

Station infrastructure

The main station complex includes:

- an office/living three-storey building intended for accommodation of 50 people (25 people during winter when each person is provided with a single living room), five scientific laboratories (meteorological, 'wet' and dry oceanographic, and for satellite imagery, geophysical and hydrobiological studies), living rooms, a station office, radio-information hub, medical unit, galley, food supply storage, dining/mess room, gym, sauna, toilets and shower cubicles;
- a two-story building of the energy complex ('ZEM') housing a diesel power station, repair shop for up to eight transport vehicles, an automated boiler plant for heating the station (using waste oil products), a desalination plant, the station's sewage treatment systems, and repair shops;
- an observation post for monitoring the satellite constellation orbits of the GLONASS navigation system and geodetic monitoring of the tectonic Earth's crust movements from GPS and GLONASS satellite systems, a geomagnetic pavilion, and radar for monitoring the state of coastal ice and icebergs and for air traffic control of helicopters and low-flying airplanes; and
- a hangar/garage for winter storage of traverse vehicles used to supply Vostok station with continental sledge-caterpillar convoys. (The building was converted into a garage from the old power station complex.)

In addition, the station has four small residential modules (used mainly during the seasonal period) and a number of service buildings for various purposes.

Progress is also equipped with a GPS safety system to track movements of personnel and vehicles within 20 km of the station, displaying them on a monitor in the radio room.

Vehicle access to Progress is via the main road from the plateau and the network of routes linking the main buildings within the station area. The station's helicopter pad is described at Section 4.5.3.

Power, fuel delivery and storage

The station has a power supply complex consisting of a diesel-electric power station with a total capacity of 800 kW, and an automatic boiler for station heating that uses fuel-lubricant waste.

Progress' diesel and aviation fuel storage infrastructure includes fifteen double-walled tanks with a capacity of 75 m^3. The tanks have a common pipeline system that provides fuel supply to the consumable tanks of a diesel power station and a system for measuring the level, temperature, density, volume and mass of fuel. There is also a metal rack for the storage of drummed fuel and lubricants, specially provided for the delivery of fuel to the helipad. Expedition ship – shore fuel transfer is through a flexible pipeline.

Water supply

Drinking water and water for household needs is drawn from Stepped Lake which is located to the north-west of the station area. Water is piped to the water treatment plant in the energy complex where reverse osmosis purifies it to drinking water quality.

Waste management

Small, non-combustible wastes are separated and compacted for removal. Kitchen wastes and combustibles are burnt in a high temperature incinerator. Sewage water from the main building is treated by a biological unit and discharged into the bay. The garage/workshop/power plant building is also equipped with a sewage treatment unit. The smaller, old buildings do not have sewage treatment units; human waste is drummed and returned to Russia.

Metal scrap is stockpiled on the beach adjacent to the station, for return to Russia.

Vehicles

Progress is the major transportation base for supporting inland convoys, including convoys to Vostok station. Eight to twelve Kässbohrer Pisten Bully Polar 300 transporters are used for this purpose.

Other vehicles are also used in the vicinity of Progress for scientific and operational acitivites, including fuel and waste transfer, and transporting personnel and equipment to remote areas and the plateau for runway preparation and cargo operations. Such vehicles include cars, wheeled and tracked all-terrain vehicles (ATVs) and snowmobiles. There is also trailer equipment for tractor-sledge convoys. In winter, most of the equipment is located at Progress 1station; in summer, some of the vehicles can be temporarily located on snowfields in the area of the old station (see subsection 4.6.6). During seasonal work, field equipment may be located near the runway at a distance that ensures flight safety.

Larger transport convoys of up to 38 Kässbohrer Pisten Bully Polar 300 and Challenger MT 850 vehicles are planned to deliver construction materials from temporary storage on the plateau to Vostok station from 2021-2025.

Resupply

Resupply is carried out in the summer period (November - March) using the scientific expedition vessels "Akademik Fedorov" and "Akademik Tryoshnikov". Since unloading cargo directly to Broknes is not feasible, heavy cargo delivered by the vessel is transported across fast ice to the site on the Stornes peninsula (see subsection 4.6.6) for further transportation to Progress station. Other cargo is transported by Ka-32 helicopters. Unloading of fuel and lubricants needed to support Progress and Vostok station activities and tractor-sledge convoys is carried out by a flexible pipeline system, through a temporary base on the eastern coast of the Thala Bay (see subsection 4.6.6).

Communications

The basic system for the transmission of regular information is satellite earth stations for communication with the RAE office and between Antarctic stations (voice telephony channel, information transfer via FTP, e-mail). The transfer of operational scientific and service information is also carried out through the satellite communication system Inmarsat-C, Inmarsat-B and Iridium. If necessary, the communication time in the short-wave range between stations is established. Communication in the VHF band is carried out with scientific and expeditionary aircraft, sledge-caterpillar transportation, employees on field routes, etc.

Science

Progress station is a large scientific base that ensures the operation of year-round (meteorological, oceanological, geophysical) observations and the implementation of many seasonal research programs. During the summer season, scientific research on glaciology, land hydrology, biology, geology, and meteorology is carried out in the vicinity of Progress station. In addition, the station serves as a support base for inland geological and glaciological research.

4.6.3 Bharati (India)

Bharati is located between Thala Fjord and Quilty Bay, east of Stornes, at 69°24.41' S, 76°11.72' E, approximately 35 m above sea level. The station was established in the 2012/13 summer to facilitate year-round scientific research activity by the Indian Antarctic program. It is accessible by ship through Quilty Bay but does not have direct access to the mainland by vehicle during summer. During winters the plateau can be accessed through fast ice passages.

Station infrastructure

Bharati consists of one multi-purpose building, a satellite camp and a number of smaller containerised modules (Map F). It can support 47 personnel in the main building. A network of routes links the buildings within the station area. A concrete helicopter-landing pad is located west of the main building (see Section 4.5.3).

Power, fuel delivery and storage

Electrical power is provided by three diesel-fired combined heat and power generating units that are housed within the main building. Fuel to the units is supplied from a day tank adjacent to the power station, which in turn draws fuel automatically from the fuel farm through leak resistant pipelines over a distance of about 300 m.

Jet-A1 fuel is supplied annually from the ship to the fuel farm using leak resistant reinforced rubber hose. The fuel farm comprises13 double-hulled tank containers each of 24 000 L capacity and is located by the shore at 69°24.31'S, 76°11.84' E, at an elevation of 20 m. It is equipped with oil spill sensors and prevention equipment.

Delivery of fuel to the heat and power generating units, and at the helipad for helicopters and vehicles, is through a network of pipelines, and is automatically controlled through a microprocessor-based centralised building management system. Bharati uses LPG for cooking which is supplied in 10 to 14 kg gas bottles.

Water and waste management

Seawater is drawn from Quilty Bay (east coast) at a depth of about 12 m using submersible pumps, and is lifted to the main building through a network of insulated pipeline over a distance of about 300 m. Seawater is fed into a reverse osmosis plant; the filtered water is re-mineralised and used for drinking, bathing etc.

Wastewater is recycled and used for flushing the toilets. Water from the kitchen is passed through oil traps, and along with the wastewater from the toilets, is filtered and biologically treated. Water of bathing quality as per European standards is put back in Quilty Bay about 100 m downstream of the water intake point. All liquid waste, including from the kitchen, is passed through an oil trap and a slush trap, the products of which are collected in 200 L drums.

Solid waste is separated into biodegradable and non-degradable and collected in 200 L drums for removal.

Logistics

Tracked vehicles – Pisten Bullies and snow scooters – are used for transportation of personnel and materials around the station. The maintenance of vehicles, generators and instruments is undertaken in the vehicle workshop. Waste oil is collected in drums and returned to India.

Resupply is generally undertaken once a year in summer. Until mid-December, cargo is transported ashore using Pisten Bullies and trailers over fast ice. Voyages after the melting of the fast ice use flat bottom barges for carrying cargo.

Communications

HF communications are used to contact neighbouring stations. VHF communications are used for local aircraft, ship and field operations. Iridium open port system provides connectivity to the rest of the world through phone and fax.

Science

Although the station first became operational in March 2012, scientific studies began in 2005 and include environmental evaluation, monitoring of snow and ice, soil, seawater, freshwater, mosses, lichen, wildlife, geology, glaciology and sea ice ecosystems. Geomagnetic/ GPS observations started in 2007.

4.6.4 Law Base (Australia)

Law Base is located towards the southern end of eastern Broknes, approximately 1 km south of Progress and 2 km south of Zhongshan at 69°23'16"S, 76°22'47"E. The Base was established in the 1986/87 summer season.

Station infrastructure

Law Base consists of a prefabricated multi-purpose building, five fibre-glass huts and a small shed for ablutions. All wastes generated are removed.

Power, fuel delivery and storage

A small petrol generator is used to provide electrical power and operated only when required to charge batteries etc. A small solar panel mounted on the roof of the main hut charges batteries to power the HF and VHF radios. Gas is used for cooking and heating the main hut.

Water

Drinking and washing water is generally obtained during summer by collecting and melting snow from a nearby snow bank. Drinking water is also sometimes collected from a small tarn adjacent to the section of road connecting Law Base with the main route between north-eastern Broknes and the plateau.

Logistics

Law Base is variously supported by helicopter from Davis, by stations in the immediate area and from ships resupplying any of these facilities. Quad bikes are occasionally stationed at Law Base. They are used on designated access routes to support summer science programs.

Communications

Law Base is equipped with HF and VHF radios.

Science

Summer research projects have included studies of the area's glacial history, geology, geomorphology, hydrology, limnology and biology, and studies of human impacts.

4.6.5 Compacted snow runway site and associated facilities (Russia)

A snow runway is located 7 km south-west of Progress (Map A). The runway is 1500 m long and 60 m wide and is suitable for ski-equipped aircraft.

Coordinates of the runway control point are: 69 ° 26'00.32 ″ S; 76 ° 19′56.36 ″ E. The runway is accessed via a route along the ice-free plateau, as well as along the initial section of the inland tractor-sledge convoy route.

The runway complex includes four sledge-based container modules, namely a diesel electric power station; an air traffic control station, including meteorological, radio and Internet access facilities; living accommodate for six people; and, at the distant end, an automatic weather station.

4.6.6 Minor structures

Infrastructure including that which is related to Progress station is as follows:

Several caboose, a fuel drums depot and a parking site

Site for some of the vehicles used to prepare the runway at the station's original location (69 ° 24'02 "S, 76 ° 24'07" E); this is located on the route from Progress station to the runway and serves as a place for the formation of inland sledge-caterpillar trains.

Caboose on the bank of the Nella Fjord

Located at 69 ° 23'01 "S, 76 ° 22'26" E, this is used to support seasonal oceanographic and hydrobiological sresearch.

Several caboose at the site of the former geocamp

Located at 69 ° 24'25 "S, 76 ° 24'14" E, this site currently contains several caboose. The site was previously intended for airborne geophysical research, which included a runway for An-2 aircraft on ski landing gear, residential buildings for the crew, aviation personnel and members of geophysical research groups; and fuel tanks.

A site with a shelter-caboose on the eastern edge of Stornes

Located at 69 ° 25'27 "S, 76 ° 08'25" E, used for unloading heavy cargo delivered from ships to the shore on fixed ice. This location also provides access to the plateau and the airfield.

Temporary fuel storage on the East coast of Thala Fjord
A seasonal fuel depot of bladders (600 cubic m) on the east coast of Thala Bay, where flexible pipelines are used to unload fuel to support Progress and Vostok stations and tractor-sledge convoys.

Temporary open storage of cargoes for Vostok station (2.2 km south outside the ASMA)

A site of 1580 × 440 m for storage of building modules for the new wintering complex at Vostok station, located on the plateau and bounded by corner points with the following coordinates: 69 ° 28'55.303 "S, 76 ° 16'50.459" E.; 69 ° 29'09.384 "S, 76 ° 16'56.067" E ; 69 ° 29′16.427 "S, 76 ° 14′31.970" E.; 69 ° 29′02.345 "S, 76 ° 14′26.388" E . A temporary camp consisting of containers to accommodate the personnel involved in logistics operations will be located at the same place. The distance between the northern edge centre of the site and the convoy arrangement/preparation area is 8.2 km along the route. The distance from the ship unloading point in Thala Bay is 13.8 km.

Monitoring site

A long-term monitoring site approximately 250 m north-east of Law Base, which was established in 1990 to measure the rate of surface lowering caused by wind abrasion and salt weathering. The site is situated on exposed coarse-grained yellow gneiss, and consists of 24 micro-erosion sites marked by painted yellow rings. The site should not be crossed on foot as this will affect the measurements of natural erosion. (The practice of using paint or other such permanent means of marking sites is discouraged, and collection of GPS locations is preferable.)

Monuments

A rock cairn laid on 8 February 1958 to mark the first Australian National Antarctic Research Expeditions (ANARE) visit to the Larsemann Hills is located at the highest point on Knuckey Island (69°23'12"S, 76°3'55"E) approximately 1.1 km north-west of Stornes. The cairn contains a note listing the names of the landing party. A memorial to a vice president of the Chinese Arctic and Antarctic Administration is located on the northern side of the hill at the northernmost tip of the eastern Broknes coast, north of Zhongshan. The cement monument contains some of the vice president’s ashes.

‘Kharkovchanka’, an oversnow heavy tractor used in Antarctica from 1959 to 2010, is on a 23 m hill at 69°22'41"S, 76°22'59"E, 183 m from the main office and residential building of Progress and 87 m from the shore of Stepped Lake. Under Measure 19 (2015) it was added to the list of Historic Sites and Monuments as HSM Number 92.

On a hill overlooking the northern shore of Seal Bay at 69°23'01"S, 76°23'38"E, there is a cemetery containing the graves of three members of the Russian Antarctic Expedition:

- Andrey Skurikhin, who died in 1998 (the grave is a metal coffin with a tombstone next to it);
- Yuri Pasko, who died in 2007 (the grave is a metal coffin with a tombstone and a cross next to it); and
- Yuri Dostovalov, who died in 2008 (the grave is a mound of stones with a tombstone).

Each grave is surrounded by a low metal fence. The area of the cemetery is about 30 m^2.

Cache

A very small emergency food cache is contained within a plastic box at the summit of Blundell Peak on Stornes (69°6'14"S, 76°6'14"E), the highest peak in the Larsemann Hills.

4.7 Location of other protected areas in the vicinity

ASPA174, Stornes (69°25’S, 76°6’E) is contained within the ASMA. Entry to the ASPA and activities within it require a permit and must be carried out in accordance with the ASPA management plan.

ASPA 169, Amanda Bay (69º15’S, 76º49’59.9”E), lies 22 km north-east of the Larsemann Hills. Similarly, entry to the ASPA and activities within it require a permit and must be carried out in accordance with the ASPA management plan.

HSM 92, the oversnow heavy tractor ‘Kharkovchanka’ that was used in Antarctica from 1959 to 2010 (69°22'41"S, 76°22'59"E), is located within the ASMA, in the vicinity of Progress.

5. Zones within the Area

All activities within the ASMA are to comply with the provisions of the Protocol on Environmental Protection to the Antarctic Treaty and the Environmental Code of Conduct appended to this management plan. In addition, two zones assist in meeting the objectives for managing the area.

5.1 Facilities Zone

The construction of station buildings and associated infrastructure has caused the greatest impact on the Larsemann Hills environment. However, these impacts have been mostly restricted to the immediate station areas and their connecting access routes. As the lakes are recognised as the most important ecological feature of the area, and are susceptible to the impact of human activities undertaken within their catchment limits, a catchment-based approach is the most appropriate means of managing activities in the ASMA. The stations on Broknes are relatively well clustered; most station infrastructure is located in drainage basins that discharge into the sea.

To ensure that this situation is maintained, a Facilities Zone is defined within the ASMA boundary (Map B), and encompasses most of eastern Broknes. The boundary of the Facilities Zone is defined by the Dålk Glacier in the east, the sea in the north, the coast or western margin of impacted catchments in the west, and the ice plateau including the airstrip and access route in the south. The installation of infrastructure within the ASMA will generally be restricted to already impacted areas in the Facilities Zone. The building of new infrastructure elsewhere may be considered based on adequate scientific and/or logistic justification.

5.2 Magnetic Quiet Zone

Several magnetometers are operated at Zhongshan. A circular zone of 80 m radius is defined surrounding the induction magnetometer sensors located in the gully north of the station at 69°22'12"S, 76°22'8"E. A further zone is defined to a radius of 80 m from the magnetometer array centred at 69°22'22"S, 76°21'46"E (Map D), west of the water supply lakes. All ferrous materials are to be excluded from these zones to avoid contamination of magnetic field measurements. Permission to enter must also be obtained. A magnetic quiet zone in Grovnes is planned by India.

6. Management activities

Communication between Parties, between on-ground personnel, and between on-ground personnel and national offices is needed to successfully implement the ASMA management plan. Accordingly, Parties with research programs in the area commit to ensuring appropriate communication at both a national program and on-ground level. Annual discussions to review the implementation of the management plan will be held in conjunction with the annual meetings of the Council of Managers of National Antarctic Programs.

The relevant station and field base leaders will also meet on an annual basis (logistics permitting) and maintain verbal communications throughout the year on issues relevant to the management of the Larsemann Hills region.

6.1 Logistics, including facilities

- Any further track and infrastructure development in ice-free areas will be restricted to that part of eastern Broknes already modified by human activities and delimited by the Facilities Zone (see Section 5.1), unless a location outside the Zone is justified for adequate scientific and/or logistical reasons. This restriction shall not apply to facilities to be set up for ensuring the safety of field workers.

- Environmental impact assessment will proceed as required by Article 8 of the Madrid Protocol before constructing or modifying structures. The Parties proposing to conduct such activities will inform other Parties with active research programs in the area.
- The cooperative use of infrastructure will be promoted in preference to the construction of new facilities.
- The potential impacts of man-made structures on wilderness and aesthetics values will be considered and minimised by restricting new structures to already impacted areas wherever possible, and by locating structures so as to minimise their visibility from surrounding areas. Research may be needed to assist in the full evaluation of such impacts prior to construction activities.
- New fuel storage areas will be bunded and located outside lake catchment boundaries wherever possible. The appropriateness of the current location of fuel storage areas will be examined prior to the plan's next scheduled review.
- Vehicle routes that do not serve the aims of this management plan will be closed and the impacted area rehabilitated wherever possible.
- Options for cooperation in the transfer of personnel, supplies and fuel will be explored.
- As a minimum, waste disposal and management activities will comply with the provisions laid down in Annex II to the Madrid Protocol.
- Wastes and disused equipment will be removed from the Antarctic Treaty Area at the earliest opportunity.
- The Parties with active research programs in the area will jointly develop contingency plans for incidents with the potential to adversely impact on the environment.
- Regular and opportunistic collection of wind-dispersed litter will be undertaken.
- All equipment left in the field will be periodically reviewed for potential removal and its interim protection from wind dispersal and the like will be assessed.
- The rehabilitation of modified and disused sites will be investigated and progressed as appropriate.

6.2 Introduced species

- Parties active in the Larsemann Hills will:
  - Educate program personnel, including contractors, about the potential risks to the environment through the introduction of non-native species.
  - Ensure that personnel entering the ASMA have clean footwear – through, for example, boot cleaning procedures (preferably before departure for Antarctica) or the issue of new footwear.
  - Avoid shipping untreated sand, aggregate and gravel to the ASMA.
  - Collect and incinerate or remove from the region any soil or other organic matter found on cargo.
  - Remove from the region or contain within station buildings, any non-sterile soil previously shipped to the ASMA.
  - Remind program personnel of the Madrid Protocol obligation not to take non-sterile soil to Antarctica, or grow new plants or import plants for decorative purposes.
  - Contain within station buildings, any plants grown for food.
  - Give priority to incinerating or repatriating food waste.
  - Prevent station food, and food waste, from access by wildlife.
  - Develop protocols to avoid the biological contamination, or cross-contamination, of the Area's lakes, in particular those outside the Facilities Zone.
  - Undertake surveillance for introduced species.
  - Share information on the finding of any non-native species introduced through program operations and persisting in the Area – in order to obtain scientific and operational advice, if required, on appropriate eradication or containment actions.

- Jointly implement these measures, where appropriate.

6.3 Wildlife disturbance

- The need to maintain appropriate separation distances from wildlife will be taken into account in the planning and conduct of activities in the area.

6.4 Data management

- The Parties with active research programs in the area will jointly develop, and provide input to, a database for recording relevant management information and metadata records to assist the planning and coordination of activities. Such data sharing will include geographic information, and involve the addition of regional place names to the SCAR *Composite Gazetteer of Antarctica.*
- Efforts will be made to increase knowledge of the environmental values of the ASMA and the impacts of human activities upon those values, and to apply this knowledge to the environmental management of the ASMA.

6.5 Science

- Cooperation with, and coordination of, scientific research will be undertaken wherever possible.

6.6 Monitoring

- The Parties with active research programs in the area will jointly undertake monitoring activities to evaluate the effectiveness of this management plan.

6.7 Monuments

- Activities will be managed to ensure the preservation of existing monuments where such action is considered desirable.
- The placement of further cairns or monuments outside the Facilities Zone is prohibited.

6.8 Exchange of information

- To enhance cooperation and the coordination of activities in the ASMA, to avoid duplication of activities and to facilitate the consideration of cumulative impacts, Parties active in the area will:
  - distribute to other such Parties details of activities that may have a bearing on the operation of this management plan (that is, proposals to withdraw from or establish new research activities, proposals to construct new facilities, information obtained regarding non-governmental visits etc.); and
  - provide reports to the Committee for Environmental Protection on significant developments in the implementation of this management plan.
- Other Parties proposing to conduct activities in the region, including non-governmental groups, will inform at least one of the Parties active in the ASMA of their intentions – in the spirit of the aims and objectives of this management plan.

Appendix 1. Environmental Code of Conduct

This Code of Conduct is intended to provide general guidelines to help minimise environmental impacts when in the Larsemann Hills, particularly for activities undertaken away from station areas.

General principles

- The Antarctic environment is highly susceptible to the impacts of human activities, and as a general rule has much less natural ability to recover from disturbance than the environments of other continents; consider this when undertaking activities in the field.
- Everything taken into the field must be removed. This includes human wastes and also means avoiding the use or dispersal of foreign materials that are difficult to collect and remove. Strip down excess packaging before going off-station.
- The collection or disturbance of any biological or geological specimen or man-made artefact may only be undertaken with prior approval and, if required, in accordance with a permit.
- Details of all field activities (such as sample sites, field camps, depots, oil spills, markers, equipment etc.) including the national program contact should be accurately recorded for transfer to a management database.

Travel

- Some biological communities and geological formations are especially fragile, even when concealed by snow. Be alert and avoid such features when travelling.
- Restrict your vehicle and helicopter usage to essential tasks to minimise atmospheric emissions; track formation and physical disturbance of the land surface; impacts on biological communities; wildlife disturbance; and the potential for fuel spills. Over-flying lakes should be avoided.
- Restrict your vehicle use to designated ice-free routes and to the sea ice and plateau ice. Only access facilities using existing routes.
- Plan and undertake vehicle use with reference to the wildlife distances identified in this Code.
- Fully refuel vehicles and other equipment on station before departure, to reduce the need for refuelling in the field.
- Plan activities to avoid the need to refuel or change oil in windy conditions or in areas that might direct accidental spillage into lakes and on vegetation and other sensitive areas. Use fuel cans with nozzles/funnels.
- When travelling on foot, use established tracks and designated crossing points wherever possible.
- Avoid making new tracks. Where established tracks do not exist, use the most direct route that avoids vegetated areas and delicate geological formations (such as screes, sediments, streambeds and lake margins).

Wildlife

- Do not feed wildlife.
- Maintain appropriate distances from wildlife (see table).
- When moving on foot around wildlife, keep quiet, move slowly, and stay low to the ground – increase your distance if disturbance is evident.

Distances at which disturbance may be expected to occur
when approaching wildlife on foot

Species	Distance (metres)
Giant petrels and albatrosses, breeding / nesting	100 m
Emperor penguins (in colonies, huddling, moulting, with eggs or with chicks)	50 m
All other penguins (in colonies, moulting, with eggs or chicks)	30 m
Prions, petrels, skuas, on nests Seals with pups and seal pups on their own	20 m
Non breeding penguins and adult seals	5 m

Distance at which disturbance may be expected to occur
when approaching wildlife using small vehicles (e.g. quads and skidoos)

All wildlife	150 m

Distance at which disturbance may be expected to occur
when approaching wildlife using tracked vehicles

All wildlife	250 m

Distances at which disturbance may be expected to occur
when approaching wildlife using aircraft

Birds	**Vertical** *Single-engine helicopters* 2500 ft (~ 750 m) *Twin-engine helicopters* 5000 ft (~1500 m) **Horizontal** ½ nm (~930 m)
Seals	**Vertical and horizontal** Single-engine helicopters 2500 ft (~ 750 m) Twin-engine helicopters

	5000 ft (~1500 m) Twin-engine, fixed-wing aircraft 2500 ft (~750 m)

Field camps

- Use existing accommodation where possible.
- Locate campsites as far away as practicable from lake shores, streambeds, vegetated sites and wildlife, to avoid contamination and/or disturbance.
- Ensure that equipment and stores are properly secured at all times to prevent foraging by wildlife and dispersion by high winds.
- Collect all wastes produced at field camps, including human wastes and grey water, for return to station and subsequent treatment or disposal.
- Where possible utilise solar or wind powered generators to minimise fuel usage.

Fieldwork

- Meticulously clean all clothing and equipment before bringing it to Antarctica and before moving between sampling locations, to prevent contamination, cross-contamination and the introduction and spread of foreign organisms.
- Do not build cairns, and minimise the use of other objects to mark sites. Remove markers on completion of the related task.
- When permitted to collect samples, adhere to the sample size specified in your permit and take samples from the least conspicuous location possible.
- Use a drop sheet when sampling soils and backfill soil pits to prevent wind erosion and dispersal of deeper sediments.
- Take great care when handling chemicals and fuels, and ensure you have appropriate materials with you to catch and absorb spills.
- Minimise the use of liquid water and chemicals that could contaminate the isotopic and chemical record within lake and glacier ice.
- Meticulously clean all water and sediment sampling equipment to avoid cross-contamination between lakes.
- Avoid reintroducing large volumes of water obtained from lower in the water column, to prevent lake contamination, or toxic effects on the biota at the surface. Excess water or sediment should be returned to station for appropriate disposal or treatment.
- Ensure that sampling equipment is securely tethered, and leave nothing frozen into the ice that may cause later contamination.
- Do not wash, swim or dive in lakes. These activities contaminate the water body and physically disturb the water column, delicate microbial communities and sediments.

Note: The guidelines laid down in this Environmental Code of Conduct need not apply in cases of emergency.

Appendix 2: National program contact details

Australia
Australian Antarctic Division
Channel Highway
Kingston
Tasmania 7050
Australia

Phone: +61 (03) 6232 3209
Fax: +61 (03) 6232 3357
E-mail: director@aad.gov.au

People's Republic of China
Chinese Arctic and Antarctic Administration
1 Fuxingmenwai Street
Beijing 100860
People's Republic of China

Phone: +86 10 6803 6469
Fax: +86 10 6801 2776
Email: longway71@163.com

India
National Centre for Polar & Ocean Research
Headland Sada, Vasco-da-Gama
Goa 403 804
India

Phone: +91 832 2525 501
Fax: +91 832 2525 502
+91 832 2520 877
Email : mravi@ncpor.res.in

Russian Federation
Russian Antarctic Expedition
Arctic and Antarctic Research Institute
38 Bering Street
199397 St Petersburg
Russia

Phone: +7 812 337 3205
Fax: +7 812 337 3205
Email: klep@aari.ru
pom@aari.ru

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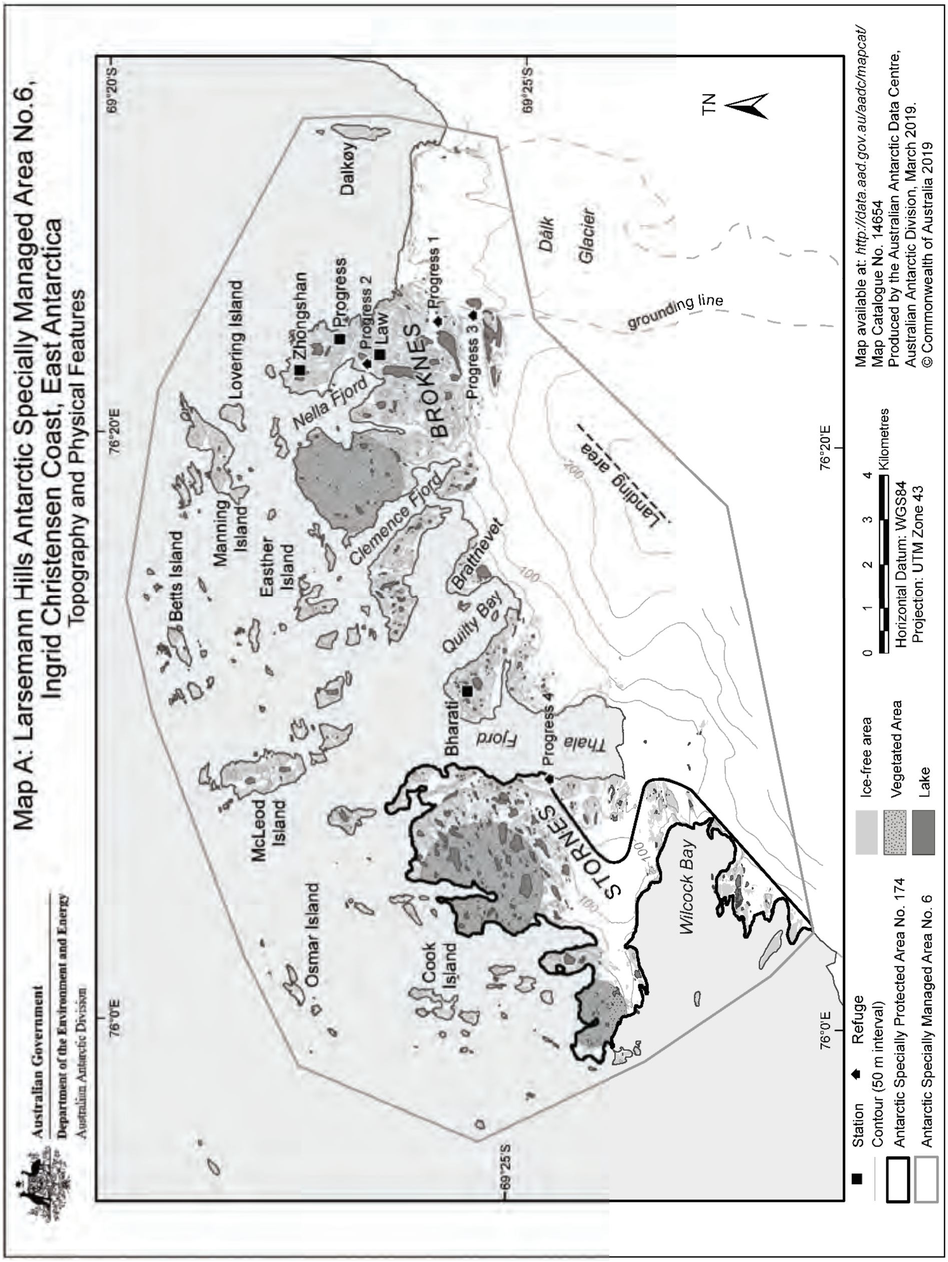
Appendix 4: Larsemann Hills maps

Map A. Topography and physical features
Map B. Management zones and ice free areas
Map C. Detail of northern Broknes
Map D. Zhongshan station
Map E. Progress station
Map F. Bharati station

Detailed maps of the region are available via the Australian Antarctic Data Centre website at:
http://aadc-maps.aad.gov.au/aadc/mapcat/search_mapcat.cfm
(Map References # 13130 and 13135)


Map A: Larsemann Hills Antarctic Specially Managed Area No.6,
Ingrid Christensen Coast, East Antarctica
Topography and Physical Features
Australian Government
Department of the Environment and Energy
Australian Antarctic Division
69°20'S
69°25'S
76°0'E
76°20'E
Dalkøy
Lovering Island
Zhongshan
Progress
Progress 2
Law
Progress 1
Progress 3
BROKNES
Nella Fjord
Dålk
Glacier
grounding line
Betts Island
Manning Island
Easther Island
Clemence Fjord
Brattnevet
Quilty Bay
Landing area
200
100
McLeod Island
Bharati
Progress 4
Fjord
Thala
STORNES
Wilcock Bay
Osmar Island
Cook Island
TN
Station
Refuge
Contour (50 m interval)
Antarctic Specially Protected Area No. 174
Antarctic Specially Managed Area No. 6
Ice-free area
Vegetated Area
Lake
0 1 2 3 4 Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 43
Map available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 14654
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, March 2019.
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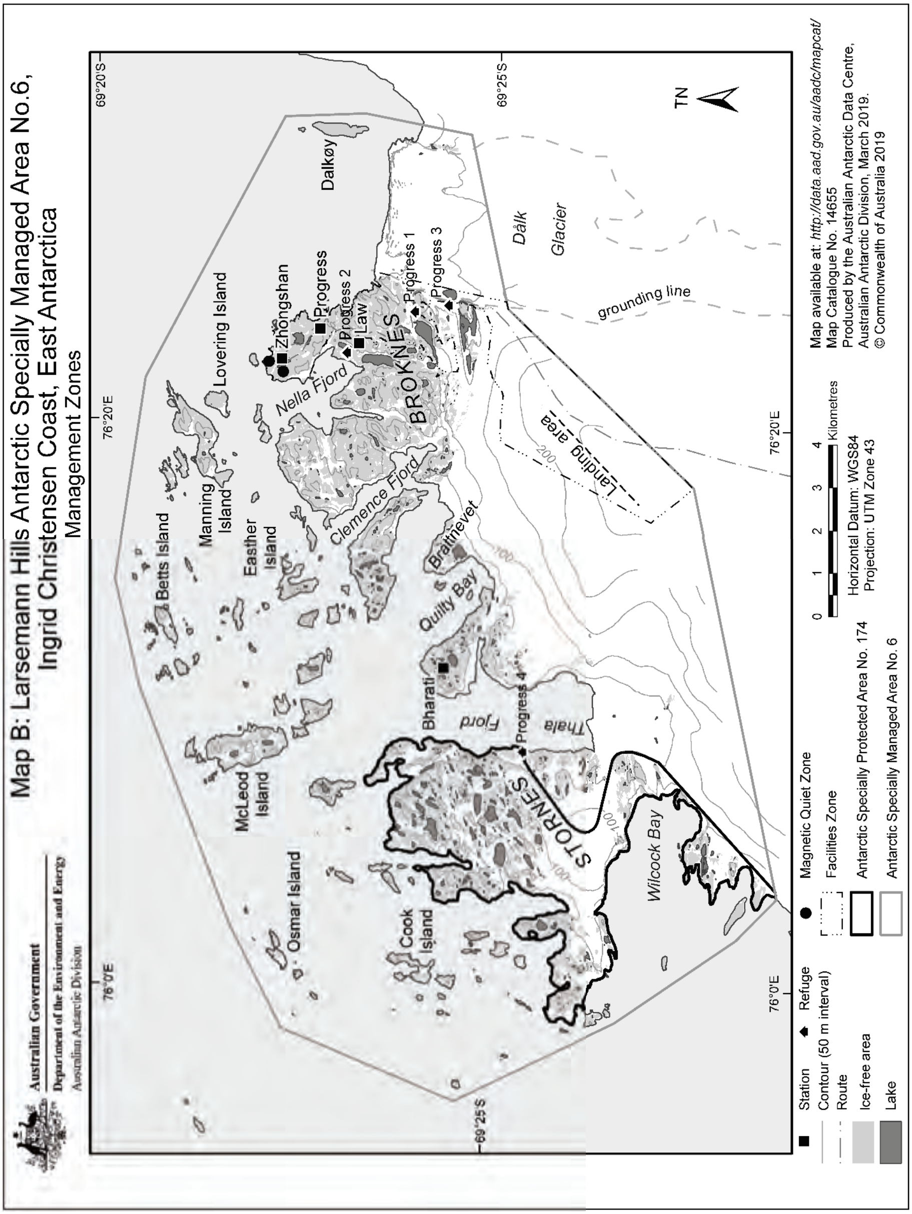
Map B: Larsemann Hills Antarctic Specially Managed Area No.6,
Ingrid Christensen Coast, East Antarctica
Management Zones
Australian Government
Department of the Environment and Energy
Australian Antarctic Division
69°20'S
69°25'S
76°0'E
76°20'E
TN
Lovering Island
Zhongshan
Progress
Progress 2
Law
Progress 1
Progress 3
Dalkøy
Nella Fjord
BROKNES
Dålk
Glacier
grounding line
Landing area
Manning Island
Easther Island
Betts Island
Clemence Fjord
Braitnevet
Quilty Bay
Bharati
Progress 4
Fjord
Thala
McLeod Island
Osmar Island
Cook Island
STORNES
Wilcock Bay
Station
Contour (50 m interval)
Route
Ice-free area
Lake
Refuge
Magnetic Quiet Zone
Facilities Zone
Antarctic Specially Protected Area No. 174
Antarctic Specially Managed Area No. 6
0 1 2 3 4 Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 43
Map available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 14655
Produced by the Australian Antarctic Data Centre,
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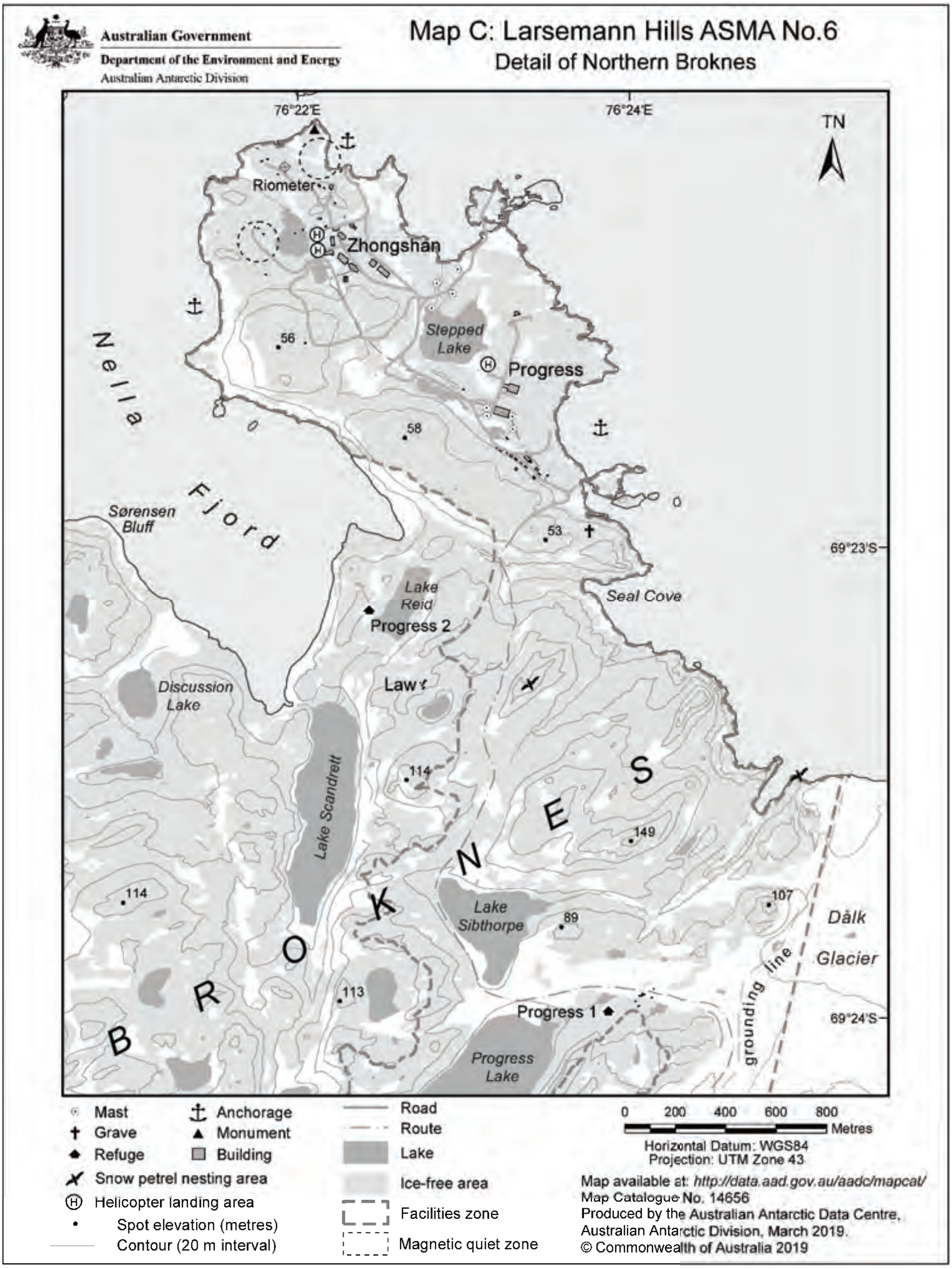
Australian Government
Department of the Environment and Energy
Australian Antarctic Division
Map C: Larsemann Hills ASMA No.6
Detail of Northern Broknes
76°22'E
76°24'E
TN
Riometer
Zhongshan
Stepped Lake
Progress
56
58
53
Nella Fjord
Sørensen Bluff
69°23'S
Seal Cove
Lake Reid
Progress 2
Discussion Lake
Law
Lake Scandrett
114
S
E
N
K
O
R
B
149
Lake Sibthorpe
89
107
Dålk Glacier
grounding line
113
Progress 1
69°24'S
Progress Lake
Mast
Grave
Refuge
Anchorage
Monument
Building
Snow petrel nesting area
Helicopter landing area
Spot elevation (metres)
Contour (20 m interval)
Road
Route
Lake
Ice-free area
Facilities zone
Magnetic quiet zone
0 200 400 600 800 Metres
Horizontal Datum: WGS84
Projection: UTM Zone 43
Map available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 14656
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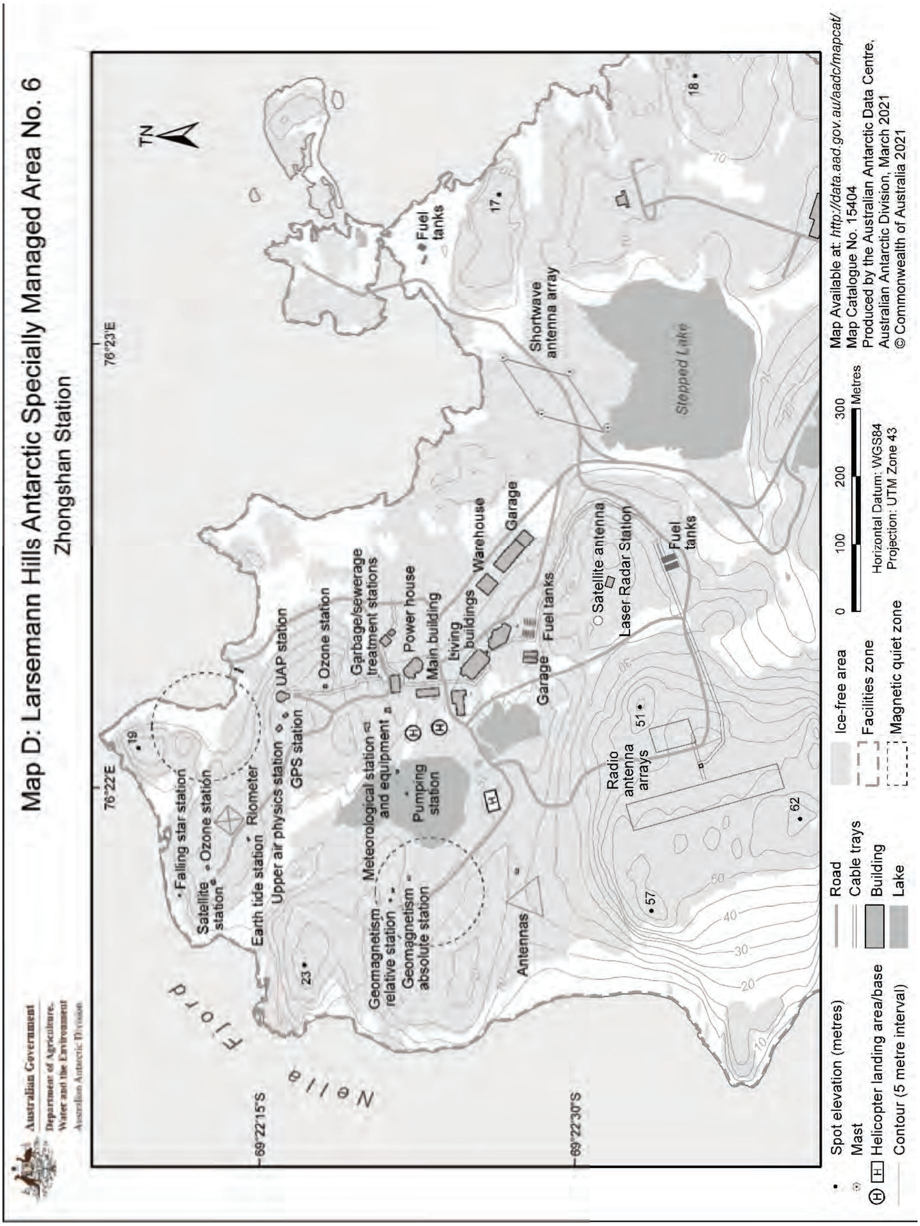

Map D: Larsemann Hills Antarctic Specially Managed Area No. 6
Zhongshan Station
Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
TN
76°22'E
76°23'E
69°22'15"S
69°22'30"S
Nella Fiord
Falling star station
Satellite station
Ozone station
Earth tide station
Riometer
Upper air physics station
GPS station
UAP station
Ozone station
Garbage/sewerage treatment stations
Power house
Main building
Living buildings
Warehouse
Garage
Fuel tanks
Garage
Meteorological station and equipment
Pumping station
Geomagnetism relative station
Geomagnetism absolute station
Antennas
Radio antenna arrays
Satellite antenna
Laser Radar Station
Fuel tanks
Shortwave antenna array
Stepped Lake
Fuel tanks
Spot elevation (metres)
Mast
Helicopter landing area/base
Contour (5 metre interval)
Road
Cable trays
Building
Lake
Ice-free area
Facilities zone
Magnetic quiet zone
0 100 200 300 Metres
Horizontal Datum: WGS84
Projection: UTM Zone 43
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15404
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2021
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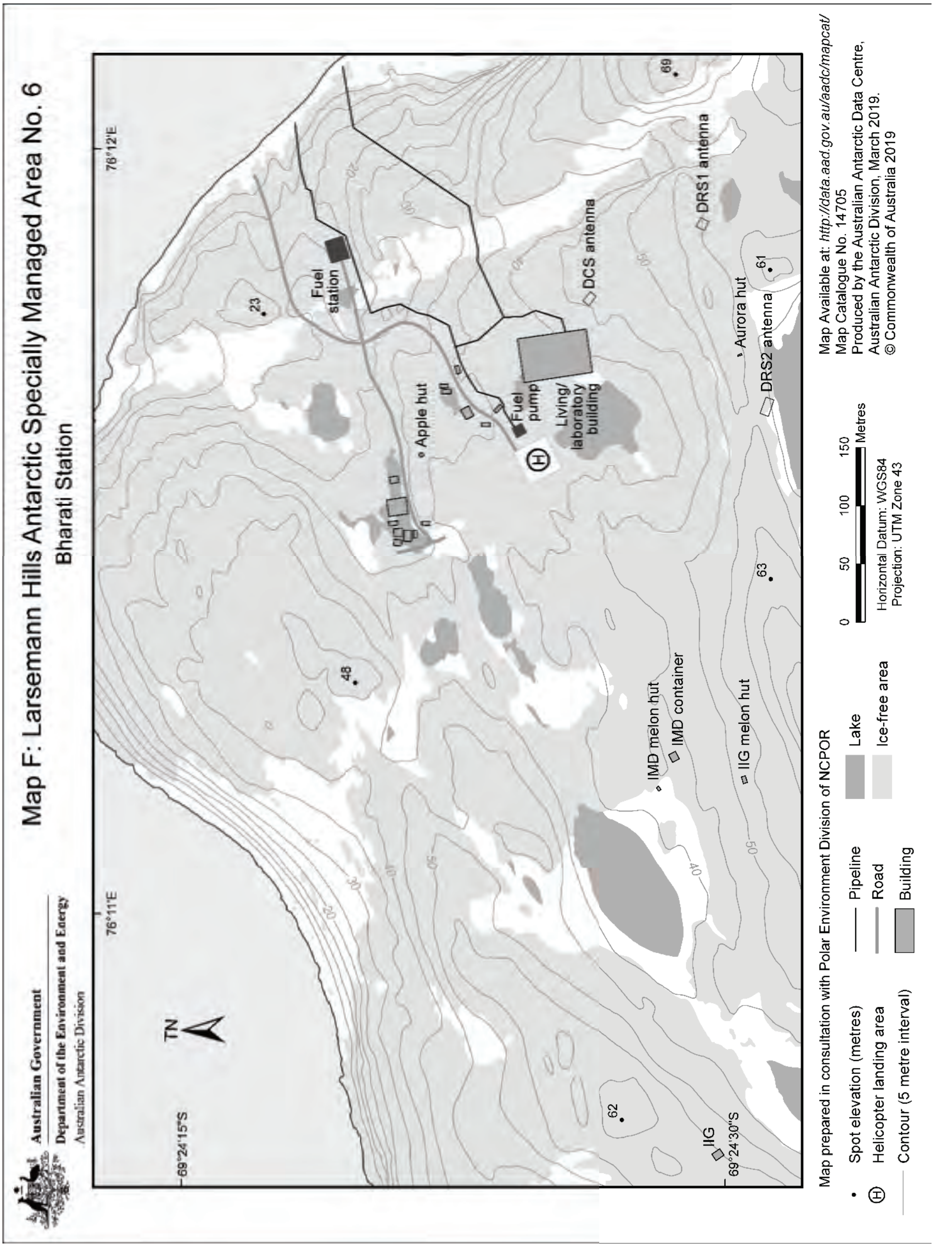
Map F: Larsemann Hills Antarctic Specially Managed Area No. 6
Bharati Station
Australian Government
Department of the Environment and Energy
Australian Antarctic Division
TN
76°11'E
76°12'E
69°24'15"S
69°24'30"S
Fuel station
Fuel pump
Apple hut
Living/ laboratory building
DCS antenna
DRS1 antenna
DRS2 antenna
Aurora hut
IMD melon hut
IMD container
IIG melon hut
IIG
23
48
61
62
63
69
20
30
40
50
Map prepared in consultation with Polar Environment Division of NCPOR
Spot elevation (metres)
Helicopter landing area
Contour (5 metre interval)
Pipeline
Road
Building
Lake
Ice-free area
0
50
100
150
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 43
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 14705
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, March 2019.
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Management Plan for

Antarctic Specially Protected Area No. 101

TAYLOR ROOKERY, MAC.ROBERTSON LAND

Introduction

Taylor Rookery is an emperor penguin (*Aptenodytes forsteri*) colony located on the east side of Taylor Glacier, Mac.Robertson Land (67°27'S; 60°51'E, Map A). The site was originally designated as Specially Protected Area No. 1, through Recommendation IV-I (1966), after a proposal by Australia. A management plan for the Area was adopted under Recommendation XVII-2 (1992). In accordance with Decision 1 (2002) the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 101. Revised ASPA management plans were adopted under Measure 2 (2005), Measure 1 (2010) and Measure 1 (2015). Taylor Rookery is designated as an ASPA to protect the largest known colony of emperor penguins located entirely on land.

1. Description of values to be protected

There are now 61 known emperor penguin colonies around Antarctica. The first land-based colony was discovered at Emperor Island, Dion Islands, Antarctic Peninsula (67°52'S, 68°43'W) in 1948. About 150 breeding pairs occupied the island, but since the 1970s the population decreased and comprised only 22 pairs in 1999. No emperor penguins have been sighted at the Dion Islands since 2009 and the colony is likely to have become extinct. Another land-based colony was discovered at Taylor Glacier in October 1954. This colony is situated entirely on land throughout the breeding season. Because of this uncommon characteristic, the colony was designated as a Specially Protected Area in 1966, as was Emperor Island. In 1999, a third land-based colony with about 250 pairs was discovered in Amundsen Bay, East Antarctica.

The emperor penguin colony at Taylor Glacier is the largest known land-based colony (Map B), and as such of outstanding scientific importance. The Australian Antarctic Program has monitored the population at the Taylor Glacier colony intermittently from 1957 to 1987 and annually since 1988. Photographic censuses provide counts with high levels of accuracy. The number of adults at the colony averaged about 3680 breeding pairs in the early years. In the 1988–2010 period, the population averaged 2930 pairs or 20.5% less than earlier years. In the period 2011–2019 the population averaged 2700, representing a further drop of 9% (unpublished data) (see Figure 1). The reasons for this decrease are still being investigated. Similar long-term records are available only for two other emperor penguin colonies, at Pointe Géologie Archipelago (ASPA 120, 66º40'S, 140º01'E), and at Haswell Island (ASPA 127, 66º31'S, 93º00'E), where both colonies decreased by about 43% in the 1970s. Population data are also available for a number of colonies in the Ross Sea region. However, the records of the latter are not continuous and do not include counts of the colonies in winter.

Each year the Australian Antarctic Program makes no more than three visits to Taylor Glacier. Small rocky hills surrounding the colony make it ideal for census work and enable observation of the penguins without entering the breeding area. Thus, since about 1988, human disturbance to the colony has been very low, and direct human interference can be excluded as a potential factor influencing the health of this population.

2. Aims and Objectives

Management of Taylor Rookery aims to:

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

- allow research on the ecosystem and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- allow for the gathering of data on the population status of the emperor penguin colony on a regular basis and in a sustainable manner; and
- allow visits for management purposes in support of the aims of the management plan.

3. Management Activities

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

- visits shall be made to the Area as necessary (preferably not 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 management activities are adequate: and
- the Management Plan shall be reviewed at least every five years and updated as required.

4. Period of Designation

Designated for an indefinite period.

5. Maps

- Map A: Antarctic Specially Protected Area No. 101, Taylor Rookery, Mawson Coast, Mac.Robertson Land, East Antarctica. The inset map indicates the location in relation to the Antarctic continent.
- Map B: Antarctic Specially Protected Area No. 101, Taylor Rookery: Topography and Emperor Penguin Colony.
- Map C: Antarctic Specially Protected Area No. 101, Taylor Rookery: Vehicle and Helicopter Approach and Landing Site.
- Map D: Antarctic Specially Protected Area No. 101, Taylor Rookery: ASPA Boundary Points

All map specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level

6. Description of the Area

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

The Taylor Rookery ASPA is located approximately 90 kilometres west of Australia’s Mawson research station and comprises the whole of the northernmost rock exposure on the east side of Taylor Glacier, Mac.Robertson Land (67°27' 14”S, 60°53' 0”E, Map B). Appendix 1 and Map D show the boundary coordinates for the Area. The Area boundary follows the coastline (at the low tide mark) from a point at the north-western corner of the Area at 67°27’4.9”S, 60°52’58.2”E (boundary point 1), in a roughly south-easterly direction to boundary point 6 (67°27’27.8”S, 60°53’7.7”E). The boundary then continues in a westerly and then northerly direction (roughly following the limit of the ice-free area) to boundary point 22 (67°27’18”S, 60°52’50.2”E) then follows the ice cliff north to boundary point 23 (67°27’5.3”S, 60°52’57.1”E) and then joins back to boundary point 1. The Area covers approximately 0.27 km^2. There are no boundary markers delimiting the site.

The emperor penguin colony is located on a low-lying rock outcrop in the south-west corner of a bay formed by Taylor Glacier to the west, the polar ice cap to the south and the islands of the Colbeck Archipelago to the east. Fast ice surrounds the Area to the north and east. There is ice-free terrain adjacent to the glacier on the western boundary, and to the south the rock rises steeply to meet the ice of the plateau. The rounded ridges of rock form a horseshoe around a central flat area of exposed rock and moraine. The average height of the ridges is about 30 metres. The central area is covered with snow in winter and is occupied by the emperor penguins. A couple of small melt lakes form in late spring and a small stream exits to the north-east.

The Area also has a raised beach typical of several found along the coast of Mac.Robertson Land. The beach comprises locally derived pebbles, cobbles and boulders ranging in size from 1 cm to 1 m. From the shoreline, the beach slopes upwards to a well-defined platform several metres wide and 3–6 m above sea level. The Area is readily defined by its natural features.

Climate

Limited data exist for the meteorology of the Area. Conditions are probably similar to those of the Mawson station area, where the mean monthly temperatures range from +0.1°C in January to -18.8°C in August, with extreme temperatures ranging from +10.6°C to -36.0°C. The mean annual wind speed is 10.9 m per second; frequent prolonged strong south-easterly katabatic winds blow from the ice cap with mean wind speeds over 25 m per second and gusts often exceed 50 m per second. Other characteristics of the weather are high cloudiness throughout the year, very low humidity, low precipitation and frequent periods of strong winds, drifting snow and low visibility associated with the passage of major low-pressure systems.

Environmental Domains, Antarctic Conservation Biogeographic Regions and Important Bird Areas

Based on the Environmental Domains Analysis for Antarctica (Resolution 3(2008)), Taylor Rookery is located within Environment D East Antarctic coastal geologic. Based on the Antarctic Conservation Biogeographic Regions (Resolution 3 (2017)), Taylor Rookery is located within Biogeographic Region 16 Prince Charles Mountains. Taylor Rookery is identified as Antarctic Important Bird Area 119 Taylor Rookery on the basis of the emperor penguin colony (Resolution 5 (2015)).

Geology and Soils

The garnet-biotite-quartz-felspar gneiss, granite and migmatite rocks at Taylor Rookery are metamorphic and probably formed from ancient metamorphic sedimentary rocks. . The metamorphic rocks are intruded by Mawson charnockite with an isotopic age of 100 million years, thus defining a minimum age for the metamorphic rocks. Numerous shear zones intersect the banded metamorphic rocks and there are recognised traces of an old erosion surface at about 60 m altitude.

Vegetation

The flora of Taylor Rookery comprises at least ten species of lichen (Table 1) and an unknown number of terrestrial and freshwater algae. Mosses have not been recorded in the Area. Twenty-six species of lichen and three species of moss are found in the region, 20 of which occur on nearby Chapman Ridge, and 16 at Cape Bruce on the western side of Taylor Glacier. The rock types are not conducive to colonization by lichens. Most of the lichens occurring in the Area grow on the higher outcrops at the southern end where weathering is least.

Lichens	Common name	Characteristics
Buellia frigida		Endemic, epilithic
Caloplaca citrina	Firedot lichen	Crustose
Candelariella flava		Common, orange coloured
Lecanora expectans		Epibryophytic usually occupying mosses
Lecidea phillipsiana		Endolithic, common
Pseudephebe minuscula	Black-curly lichen	Crustose, dark brown
Physcia caesia	Blue-grey rosette lichen	Foliose lichenised fungus
Rhizoplaca melanophthalma	Rimmed navel lichen	Subcrustose, light grey
Xanthoria elegans	Elegant sunburst lichen	Lichenised fungus, circumpolar
Xanthoria mawsonii		Ornithocorprophilic

Table 1. Plants recorded from Taylor Rookery.

Birds

Emperor penguins

The breeding site of the emperor penguins is a north-facing amphitheatre formed by the tongue of the Taylor Glacier to the west and rocky hills to the east. The penguins occupy the areas that are level and covered with snow for most of the breeding season.

First hatchlings have been observed in mid-July indicating the onset of laying in mid-May. Fledglings depart the colony from mid-December to mid-January, usually leaving during the day when the weather is the warmest and the katabatic wind has subsided. Adult birds and fledglings generally head in N–NE towards a polynya 60–70 km from the colony. The fast ice extent reduces to approximately 25 km by mid-January but varies on an annual basis. The polynya appears to be a permanent feature of the Mawson Coast.

Following the commencement of the ongoing monitoring program in 1988, the penguins occupied the southern part of the Area until about 2010. In recent years, they have moved to the northern part where they now spend the winter. The colony still occupies the northern part of the Area during winter but chicks sometimes return to the southern part in November/December.

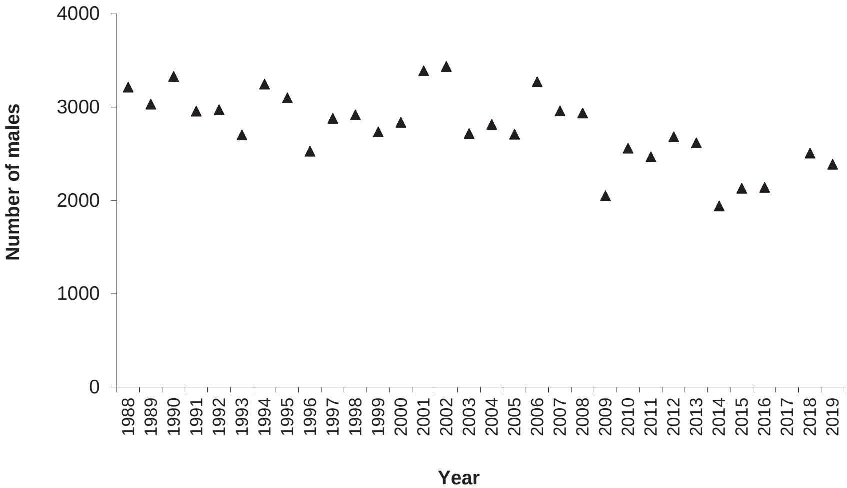

Figure 1. Numbers of adult male emperor penguins present in the colony during winter at Taylor Glacier, 1988–2019. Source: Robertson et al. (2014) and unpublished data.

Skuas

Skuas often appear in the penguin colony. It is unknown whether they breed in this location.

6(ii) Access to the Area

Travel to the Area by vehicle over sea ice has become increasingly difficult in recent years. It was generally possible from early May to mid-December. Since 2005, access has been possible only in the period from mid-June until early November. In 2017, poor sea ice conditions made a winter visit impossible. Access by aircraft may be possible in accordance with section 7(ii) of this plan.

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

Two automated cameras were set up within the Area in 2011 on the rocky ridges surrounding the breeding area of the penguins (see Map B for camera locations; 67°27’24”S, 60°52’55”E and 67°27’12”S, 60°53’06”E). A four-berth refuge is located in the Colbeck Archipelago, approximately five kilometres to the north-east of the Area (see Map A – 67°26’17.9”S, 60°59’23.6”E). Mawson station (67°36’S, 62°53’E) is approximately 90 kilometres to the east.

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

ASPA No. 102 Rookery Islands, Mac.Robertson Land (67°36'36" S and 62°32'01" E) is located approximately 80 kilometres east of Taylor Rookery (see Map A).

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 only for compelling scientific reasons that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or for essential management purposes consistent with plan objectives, such as inspection, management or review;
- the actions permitted will not jeopardise the values of the Area;
- 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;
- the permit shall be issued for a finite period; and
- the appropriate national authority shall be notified of any activities or measures undertaken that were not included in the authorised permit.

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

Whenever possible, vehicle access to the Area should be from sea ice on the eastern side, west of Colbeck Archipelago to avoid crossing the penguins’ pathways from the colony to the sea (see Map B). Vehicle entry to the Area is prohibited. Vehicles used for transport to the Area are to be left outside the Area, to the east, and entry to the Area must be by foot. The approach route for vehicles is marked on Map C.

The following conditions apply to the use of aircraft:

- disturbance of the colony by aircraft shall be avoided at all times;
- overflights of the colony 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;
- fixed wing aircraft are not permitted to land inside the Area;
- fixed-wing aircraft used to approach the Area shall not land or take off within 930 m (3050 ft) or fly within 750 m (2500 ft) of the colony;
- helicopters shall approach the Area from the east over the sea ice and preferably, where sea ice conditions permit, land outside the Area at the point marked “H” on Map C (60°53’32.5”E, 67°27’6.1”S), with access to the Area being by foot;
- when landing outside the Area, single-engine helicopters should not land or take off within 930 m (3050 ft) or fly within 750 m of the colony, and twin-engine helicopters should not land, take off or fly within 1500 m (5000 ft) of the colony;
- if landing inside the Area is essential due to unsuitable sea ice conditions, only singled-engine helicopters may land in the north-east of the Area at the point marked "H" on Map C (60°53’17.8”E, 67°27’6.8”S), where a headland to the south obscures the colony from view and noise;
- single-engine helicopters approaching to land in the Area should fly at the lowest safe height over the sea ice to avoid disturbing the colony; and
- refuelling of aircraft is not permitted within the Area.

Overflights of bird colonies within the Area by remotely piloted aircraft systems (RPAS) are prohibited, except where essential for compelling scientific or management purposes. Such overflights shall be undertaken in accordance with the *Environmental guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica*.

There are no marked pedestrian routes within the Area. Unless disturbance is authorised by permit, pedestrians should keep well away from the colony area (at least 50 m) and give way to departing and arriving penguins. Pedestrians moving in and around the Area should avoid crossing the access routes of the birds if possible, or cross quickly without obstructing penguin traffic.

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

Penguins may be in the Area in most months, and are particularly sensitive to disturbance during the following periods:

- from mid-May to mid-July, when they are incubating eggs; and
- from mid-July to mid-September, when adults are brooding chicks.

The Area may be accessed to conduct censuses of the emperor penguin colony. The colony is ideal for census work because it is possible without disturbing the birds. The best vantage point for viewing and photographing the penguins in winter are the rocky headlands that run adjacent to Taylor Glacier, on the western side of the colony, and on the eastern side of the Area. The ideal time for a census of adults is from 22 June to 5 July, since during this time most birds present are incubating males, each representing one breeding pair.

Other activities which may be conducted in the Area:

- compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the avifauna or the ecosystem of the Area;
- essential management activities, including monitoring; and
- sampling which should be the minimum required for the approved research programs.

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. Scientific markers and equipment must be secured and maintained in good condition, clearly identifying the permitting country, name of principal investigator and year of installation. All such items should be made of materials that pose minimum risk of harm to fauna and flora or of contamination of the Area.

A condition of the permit shall be that equipment associated with the approved activity shall be removed on or before completion of the activity. Details of markers and equipment temporarily left in situ (GPS locations, description, tags, etc. and expected removal date) shall be reported to the permitting authority.

Temporary field huts, if permitted, should be placed well away from the penguin colony at the point to the north-east of the Area, where a headland to the south obscures the colony from view.

7(v) Location of field camps

A four-berth refuge is located in the Colbeck Archipelago, approximately 5 kilometres to the north-east of the Area (67°26’17.9”S, 60°59’23.6”E,).

Camping is permitted within the Area and should be well away from the penguin colony, preferably at the point to the north-east of the Area where a headland to the south obscures the colony from view (as indicated on Map B).

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.
- Deliberate introduction of animals, plant material, microorganisms and non-sterile soil into the Area is prohibited. The highest level of precautions shall be taken to prevent the accidental introduction of animals, plant material, microorganisms and non-sterile soil from other biologically distinct regions (within or beyond the Antarctic Treaty area) into the Area.
- To the maximum extent practicable, clothing, footwear and other equipment used or brought into the Area (including backpacks, carry-bags and other equipment) shall be thoroughly cleaned before entering and after leaving the Area.

- Boots and sampling/research equipment and markers that come into contact with the ground shall be disinfected or cleaned with hot water and bleach before entering and after visiting the Area to help prevent accidental introductions of animals, plant material, micro-organisms and non-sterile soil into the Area. Cleaning should be undertaken either at the refuge hut or on station.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-Native Species Manual, and in the Scientific Committee on Antarctic Research (SCAR) Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica.
- 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 a 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 such fuel shall be removed at the conclusion of the permitted activity. Permanent fuel depots are not permitted.
- All material 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 as to minimise the risk of environment impacts.

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. 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.

Ornithological research on the breeding birds present within the Area shall be limited to activities that are non-invasive and non-disruptive. If the capture of individuals is required, capture should occur outside the Area if at all possible to reduce disturbance to the colony.

7(viii) 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 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 unless the impact of the removal is likely to be greater than leaving the material in situ. If such material is found, the permit issuing authority shall be notified, if possible while the field party is still within the Area.

7(ix) Disposal of waste

All wastes, including all human wastes, shall be removed from the Area. Wastes from field parties shall be stored in such a manner to prevent scavenging by wildlife (e.g. skuas) until such time as the wastes can be disposed of or removed. Wastes are to be removed no later than the departure of the field party. Human wastes and grey water may be disposed into the sea well outside 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 samples for analysis or review;
- erect or maintain scientific equipment and structures, and signposts; or
- carry out other protective measures.

Any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Data Directory System through the appropriate national authority.

Visitors shall take special precautions against the introduction of alien organisms to the Area. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora or fauna at other

Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area visitors shall thoroughly clean footwear and any equipment to be used in the Area, particularly sampling equipment and markers.

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 visit reports should include, as applicable, the information identified in the visit report form contained in the *Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas*. 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.

A copy of the report should be forwarded to the Party responsible for development of the Management Plan (Australia) to assist in management of the Area, and the monitoring of bird populations.

8. Supporting Documentation

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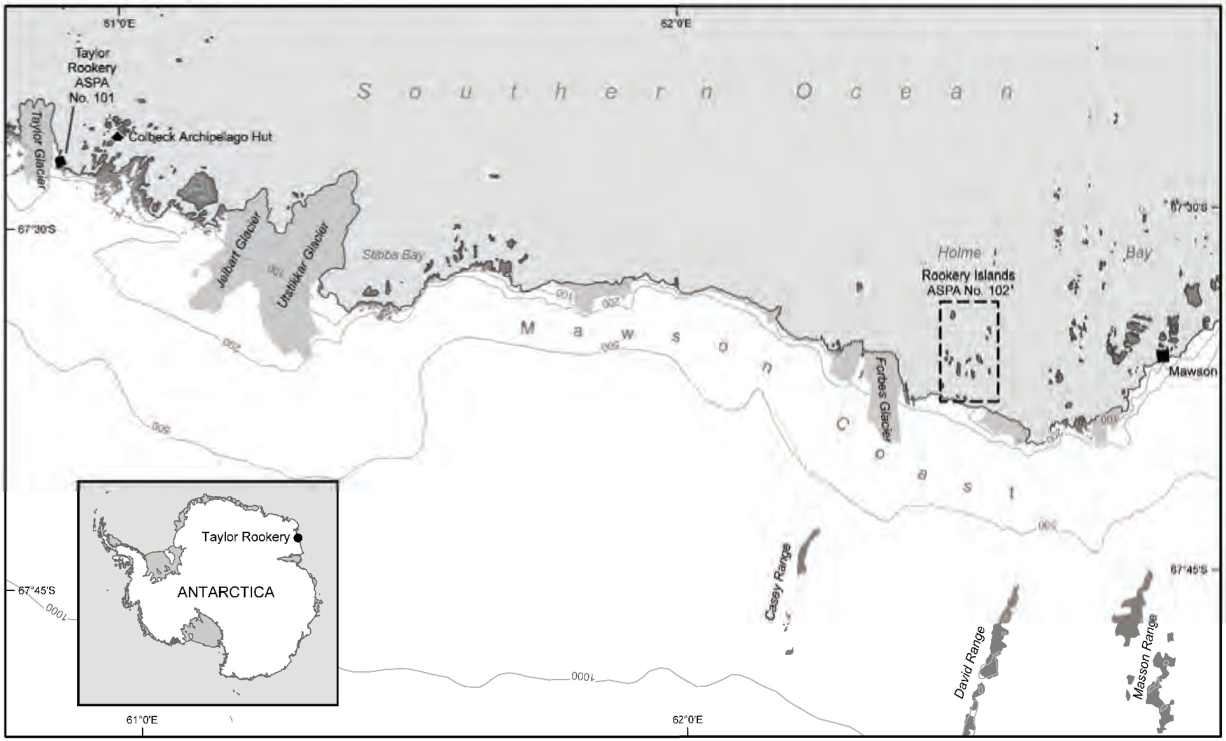
Appendix 1: Taylor Rookery, Antarctic Specially Protected Area No 101, boundary coordinates

Boundary Point	Latitude (S)	Longitude (E)	Boundary Point	Latitude (S)	Longitude (E)
1	67°27'4.9"	60°52’58.2"	14	67°27’27.9"	60°52’49.3"
2	67°27’17.1"	60°53’29.5"	15	67°27’28.7"	60°52’48.8"
3	67°27’17.7"	60°53’31.0"	16	67°27’28.9"	60°52’47.7"
4	67°27’21.6"	60°53’27.5"	17	67°27’28.9"	60°52’46.5"
5	67°27’22.4"	60°53’19.3"	18	67°27’28.3"	60°52’46.0"
6	67°27’27.8"	60°53’7.7"	19	67°27’24.9"	60°52’45.4"
7	67°27’29.1"	60°53’4.9"	20	67°27’20.7"	60°52’50.1"
8	67°27’29.8"	60°53’2.6"	21	67°27’19.3"	60°52’49.9"
9	67°27’30.1"	60°53’0.5"	22	67°27’18.0"	60°52’50.2"
10	67°27’29.8"	60°52’57.1"	Follows ice cliff north		
11	67°27’29.3"	60°52’55.5"	23	67°27’5.3"	60°52’57.1"
12	67°27’28.0"	60°52’54.6"			
13	67°27’27.4"	60°52’51.5"			

Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division

Map A: Antarctic Specially Protected Area No 101, Taylor Rookery, Mawson Coast, Mac.Robertson Land, East Antarctica

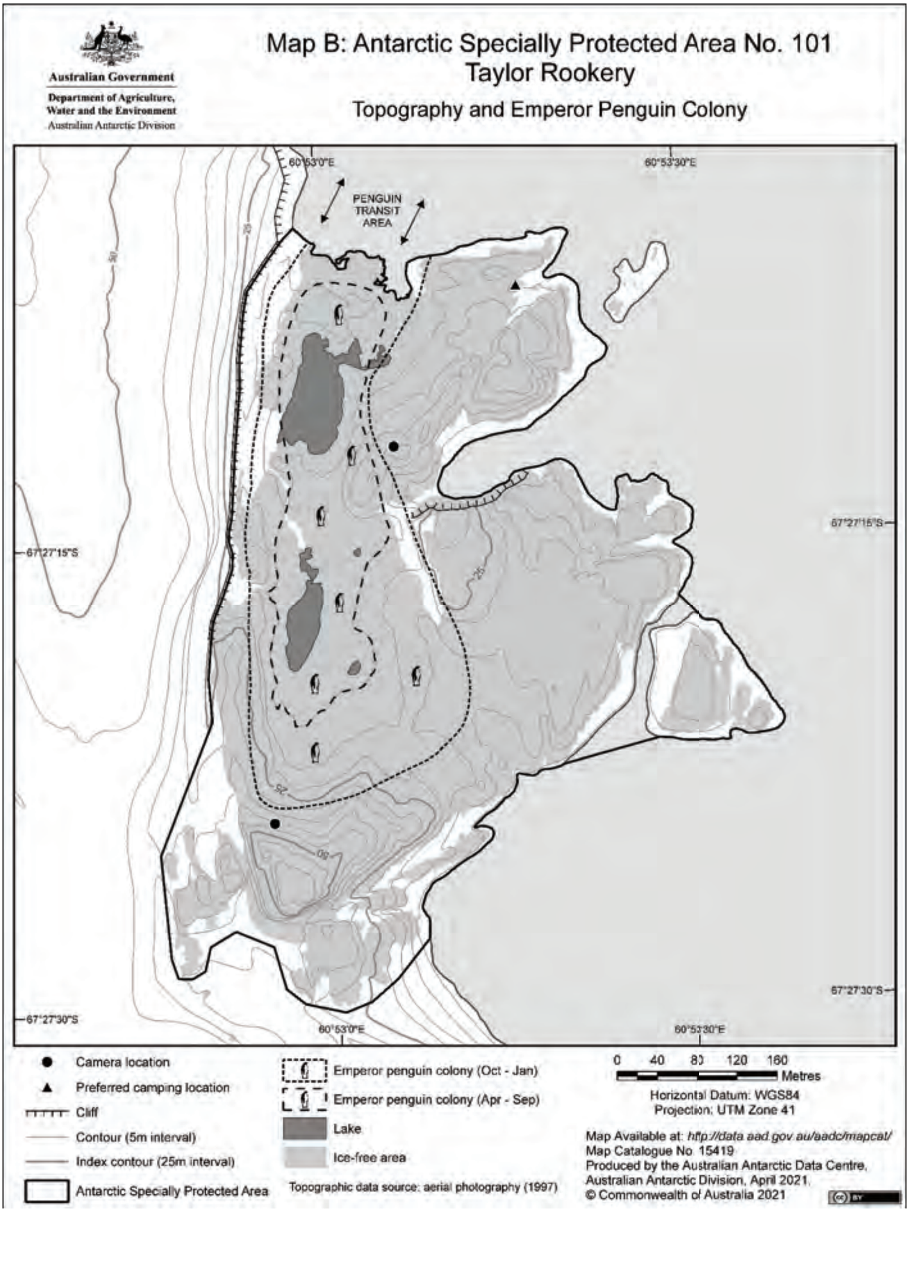


■ Station
Contour (metres)
Ice-free area
Ice shelf, ice tongue
Rookery Islands ASPA No. 102 The islands within this area
Taylor Rookery ASPA No. 101

0 5 10 15 20 Kilometres

Horizontal Datum: WGS84
Projection: UTM Zone 41

Map Available at: *http://data.aad.gov.au/aadc/mapcat/*
Map Catalogue No. 15420
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, April 2021.


Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No. 101
Taylor Rookery
Topography and Emperor Penguin Colony
60°53'0"E
60°53'30"E
PENGUIN TRANSIT AREA
67°27'15"S
67°27'30"S
Camera location
Preferred camping location
Cliff
Contour (5m interval)
Index contour (25m interval)
Antarctic Specially Protected Area
Emperor penguin colony (Oct - Jan)
Emperor penguin colony (Apr - Sep)
Lake
Ice-free area
Topographic data source: aerial photography (1997)
0 40 80 120 160
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15419
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, April 2021.
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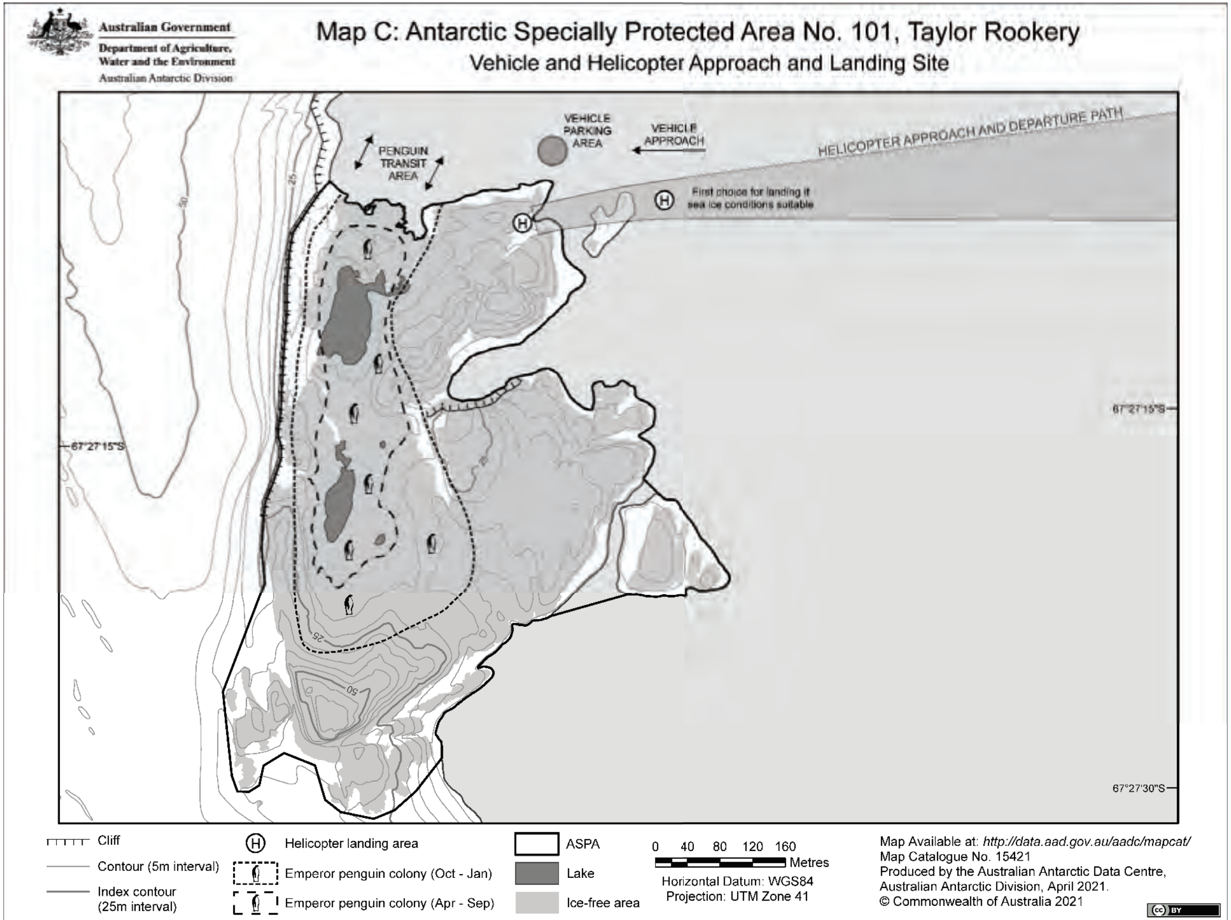
Map C: Antarctic Specially Protected Area No. 101, Taylor Rookery

Vehicle and Helicopter Approach and Landing Site



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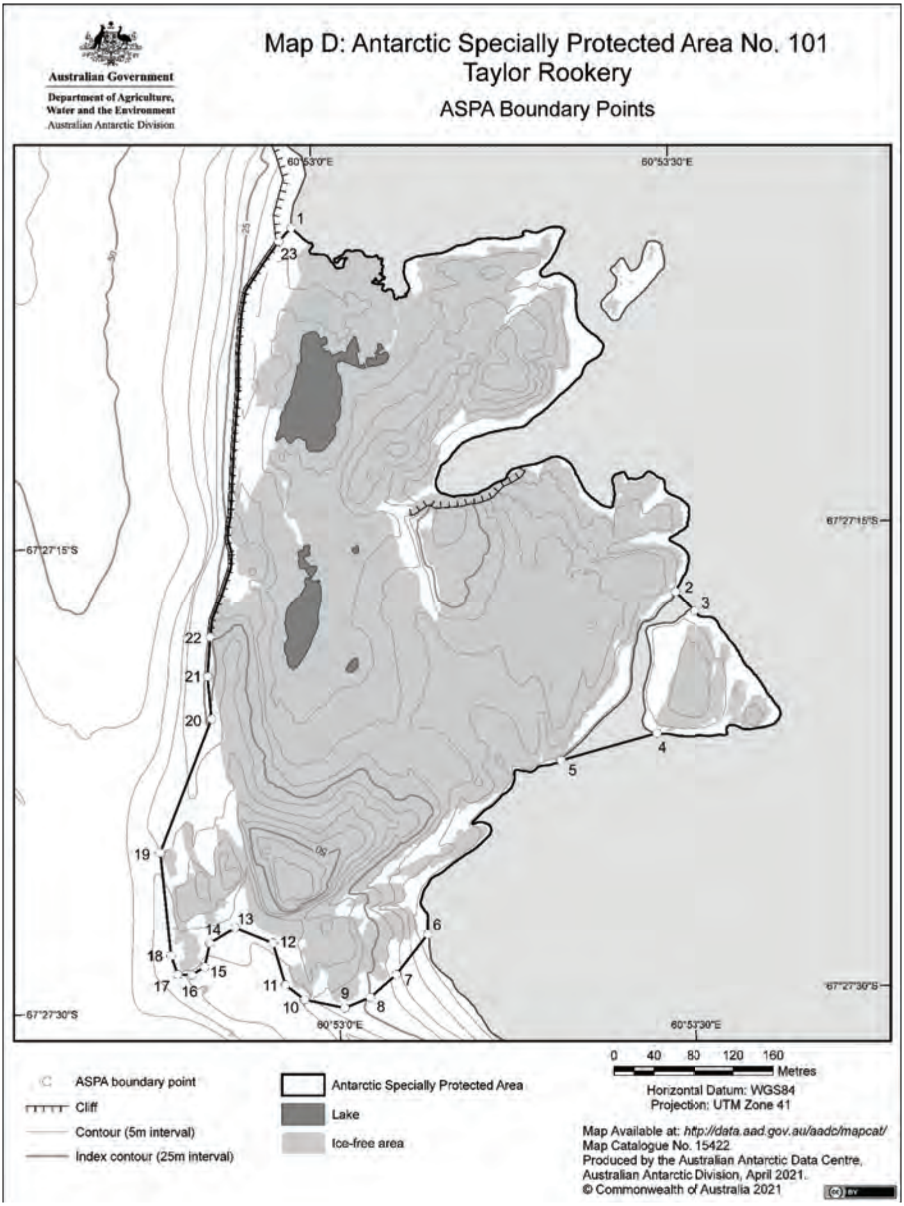
Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map D: Antarctic Specially Protected Area No. 101
Taylor Rookery
ASPA Boundary Points
60°53'0"E
60°53'30"E
67°27'15"S
67°27'30"S
ASPA boundary point
Cliff
Contour (5m interval)
Index contour (25m interval)
Antarctic Specially Protected Area
Lake
Ice-free area
0 40 80 120 160
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15422
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Management Plan for

Antarctic Specially Protected Area No. 102

ROOKERY ISLANDS, HOLME BAY, MAC.ROBERTSON LAND

Introduction

The Rookery Islands are a group of small islands and rocks in the western part of Holme Bay, north of the Masson and David ranges in Mac.Robertson Land, East Antarctica (67°36'36" S, 62°32'01" E, Map A and Map B). The Rookery Islands were originally designated as Specially Protected Area No. 2 through Recommendation IV-II (1966), after a proposal by Australia. A management plan for the Area was adopted under Recommendation XVII-2 (1992). In accordance with Decision 1 (2002), the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 102. Revised ASPA management plans were adopted under Measure 2 (2005), Measure 2 (2010) and Measure 2 (2015). The Area is designated to protect breeding colonies of the six bird species known to breed in the region, including the southern giant petrel (*Macronectes giganteus*) and the Cape petrel (*Daption capense*); these species are not known to occur elsewhere in the region. The Area is one of only four known breeding colonies of southern giant petrels in East Antarctica**.**

1. Description of values to be protected

The Rookery Islands contain breeding colonies of six bird species: Adélie penguin (*Pygoscelis adeliae*), Cape petrel, snow petrel (*Pagodroma nivea*), Wilson's storm petrel (*Oceanites oceanicus*), southern giant petrel, and south polar skua (*Catharacta maccormicki*). The Area is primarily designated to safeguard this unusual assemblage of bird species. The Rookery Islands also provide a representative sample of the near-shore island habitats occurring along the coast of Mac.Robertson Land.

A small colony of about four pairs of southern giant petrels is located on Giganteus Island, the third largest island in the Rookery Islands group. However, 80+ southern giant petrels are occasionally observed feeding on seal carcasses in the Holme Bay region. The species is not known to breed elsewhere in the Holme. Bay region. This colony is one of only four known breeding sites in East Antarctica. The other three East.

Antarctic colonies are located near the Australian stations of Casey (Frazier Islands, ASPA 160, 66°14’ S, 110°10’E, 250 pairs approx.), and Davis (Hawker Island, ASPA 167, 68º35’ S, 77º50’ E, 35 pairs approx.), and near the French station Dumont d’Urville (Pointe-Géologie Archipelago, ASPA 120, 66º40’ S, 140º01’ E, 12 15 pairs). These four breeding colonies represent less than one per cent of the global breeding population that comprises approximately 50,000 breeding pairs, approximately 11,000 of which are found south of 60º S, mostly in the Antarctic Peninsula region.

Currently, few published data are available that allow robust analyses of southern giant petrel population trends globally. In East Antarctica, the colonies at Giganteus and Hawker (ASPA 167) appear to have remained unchanged while there was a possible increase at the Frazier Islands (ASPA 160).

The seabird assemblage occupying the Area comprises breeding populations of six of the eight flying seabirds and one penguin species. This offers a unique opportunity to study population dynamics of different species. In addition, it is important to protect southern giant petrels at the southern limit of their breeding range. The Parties to the Antarctic Treaty have committed to minimise human disturbance to southern giant petrels, and to encourage regular population counts at all breeding sites in the Antarctic Treaty area.

2. Aims and Objectives

Management of the Rookery Islands 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 and monitoring on the ecosystem, particularly on the avifauna, and physical environment, provided it is for compelling reasons which cannot be served elsewhere
- minimise the possibility of introducing pathogens, which may cause disease in bird populations within the Area
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- minimise human disturbance to southern giant petrels on Giganteus Island;
- allow Giganteus Island to be used as a reference area for future comparative studies with other breeding populations of southern giant petrels;
- preserve Giganteus Island, henceforth, as a highly restricted area by limiting human visitation to the island during the southern giant petrel breeding season;
- allow for the gathering of data on the population status and related demography of the bird species on a regular basis; 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:

- information on the Area (stating special restrictions that apply), and a copy of this Management Plan, shall be kept available at adjacent operational research/field stations and will be made available to ships visiting the vicinity
- where practicable 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 activities are adequate
- where practicable, at least one research visit should be conducted to census the southern giant petrels at Giganteus Island and other seabird populations in each five-year period, to enable assessment of breeding populations
- the Management Plan shall be reviewed at least every five years.

4. Period of Designation

Designation is for an indefinite period.

5. Maps

- Map A: Antarctic Specially Protected Area No 102, Rookery Islands, Mawson Coast, Mac.Robertson Land, East Antarctica. The inset map indicates the location in relation to the Antarctic continent.
- Map B: Antarctic Specially Protected Area No 102, Rookery Islands. Bird distribution.
- Map C: Antarctic Specially Protected Area No 102, Giganteus Island (Restricted Zone). Topography and bird distribution.

Specifications for all Maps:

- Horizontal Datum: WGS84.   Projection: UTM Zone 49.

6. Description of the Area

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

The Rookery Islands comprise a small group of approximately 75 small islands and rocks in the southwest part of Holme Bay, Mac.Robertson Land, about 10 km to the west of the Australian station Mawson. The Area comprises those rocks and islands lying within a rectangle enclosed by the following coordinates (62°28'01" E, 67°33'45" S; 62°34'37" E, 67°33'47" S; 62°28'02" E, 67°38'10" S; and 62°34'39" E, 67°38'11" S (Map B)) and excludes the marine environment below the low water mark. The Area covers approximately 0.85 km^2.

There are no boundary markers delimiting the site.

The Rookery Islands range in size from small rocks which barely remain above water at high tide to the larger islands which include Rookery Island (approximately 1000 m long, 230 m wide and with an altitude of 62 m the highest of the group), and Giganteus Island (approximately 600 m long, 280 m wide and 30 m high). Raised beaches are evident on Giganteus Island.

Climate

The Area is about 15 km east of Mawson Station; Meteorological conditions are probably similar to those of the Mawson station where the mean maximum and minimum temperatures (1991 to 2020) range from +2.2°C to -3°C in January and -14.7°C to -21.3°C in August, with extreme temperatures (1961 to 2020) ranging from +10.6°C to -36.0°C. The mean annual wind speed is 10.9 m per second with frequent prolonged periods of strong south-easterly katabatic winds from the ice cap. Mean wind speed is 43 kilometres per hour and gusts often exceed 180 kilometres per hour. Mean wind speed decreases seaward with distance from the icecap, but is unlikely to be much lower at the Rookery Islands that lie only up to 7 kilometres from the coast. Other general characteristics of the coastal Antarctic climate to which these islands are subjected are high cloudiness throughout the year, very low absolute humidity, low precipitation and frequent periods of intensified winds, drifting snow and low visibility associated with the passage of major low pressure systems.

Environmental Domains, Antarctic Conservation Biogeographic Regions and Important Bird Areas

Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) the Rookery Islands are located within Environment D East Antarctic coastal geologic. Based on the Antarctic Conservation Biogeographic Regions (Resolution 3 (2017)) the Rookery Islands are located in Biogeographic Region 16 Prince Charles Mountains. The Rookery Islands are identified as Antarctic Important Bird Area 121 Rookery Islands on the basis of the Adélie penguin colony (Resolution 5 (2015)).

Geology and soils

The Rookery Islands are outcrops of the Mawson charnockite, a rock type that occurs over at least 2000 square kilometres along the coast of Mac.Robertson Land. The charnockites of the Rookery Islands are the fine-grained variant and are comparatively poor in the mineral hypersthene but rich in garnet and biotite. The charnockites enclose abundant bands and lenses of hornfels, garnetiferous quartz and felsparrich gneisses. Various pegmatic dykes cut across the charnockite rocks.

Vegetation

No mosses or lichens have been recorded from any of the Rookery Islands. There are some terrestrial algae but no taxonomic identifications have been made. Sea spray covers most of the smaller islands and rocks in summer, and in winter and spring they are sometimes scoured by rafted sea ice. It is unlikely that species of moss or lichen could become established.

Inland waters

There are no freshwater bodies on the Rookery Islands.

Birds

Six species of birds are known to breed on the Rookery Islands: Adélie penguin (*Pygoscelis adeliae*), Cape petrel (*Daption capense*), snow petrel (*Pagodroma nivea*), Wilson’s storm petrel (*Oceanites oceanicus*), southern giant petrel (*Macronectes giganteus*), and the south polar skua (*Catharacta maccormicki*).

A few southern giant petrels occupy a small area on Giganteus Island (Map C). The colony has been very small at 2–4 breeding pairs since the mid-1960s. During 2007 counts, four nests were counted on two separate occasions, with two pairs and two lone birds at first count (27 November) and three pairs and one lone bird on an egg (therefore assumed to have an absent partner) at second count (10 December). The nests are shallow mounds of stones and built on broad gravel patches on the raised beaches. The area has many old nest sites but there is no evidence that they are used.

Cape petrels are known to breed on two islands in the Area: Rookery Island and Pintado Island a small island located 300 m north-west of Rookery Island. The most recent surveys of Cape petrel populations on these islands found 110 occupied nests on Pintado Island on 13 December 2018 and 10 occupied nests on Rookery Island on 24 December 2007. The nearest known breeding colonies of Cape petrels to the Area occur at four rock outcrops near Forbes Glacier 8 km to the west, and on Scullin and Murray Monoliths (ASPA 164) approximately 200 km to the east. An automatically operating camera on the un-named island 420 m north west of Rookery Island (Map B) is monitoring annual breeding success of approximately 15 Cape petrel nests.

Adélie penguins breed on 14 of the islands. The most recent population survey across the Area in the 2007/08 breeding season estimated the breeding population at all 14 islands was approximately 91,000 occupied nests, which is more than double the population present in 1988/89. The largest populations occur on Rookery Island (31,000 occupied nests in 2007/08) and Giganteus Island (11,000 occupied nests in 2007/08). Although the Area-wide survey has not been repeated since 2007/08, surveys of individual islands are being undertaken at regular intervals and will contribute to an updated Area-wide estimate. These survey results will indicate whether Adélie population trends in the Area are consistent with elsewhere along the Mawson coastline where some populations have plateaued or possibly decreased since the early 2000s after a previous long-term increase. Four remotely operating cameras on three islands within the Area (Map B) are also monitoring the annual breeding success at approximately 30 Adélie penguin nests at each camera site.

Snow petrels nest throughout the Rookery Islands and are in greatest concentration on Rookery Island. Wilson’s storm petrels are frequently seen flying around the islands and nests have been observed at some locations.

6(ii) Access to the Area

Travel to the Area may be by oversnow vehicles or boats (depending on sea ice conditions) and aircraft. There are no designated landing sites (also see Section 7(ii)).

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

Five remotely operating time lapse cameras are located at

- 67º37’55.5”S, 62º30’47.9”E,
- 67º36’12.6”S, 62º 29’ 17.0”E
- 67º36’19.6”S, 62º 32’ 20.9”E
- 67º36’43.8”S, 62º 30’ 4.4”E, and
- 67º36’45.7”S, 62º 30’ 3.1”E.

The cameras support long term monitoring of Adélie penguin and Cape petrel breeding success and phenology, with minimal disturbance. While not permanent the cameras are expected to remain in place beyond the term of this plan. There are no other structures within or adjacent to the Area.

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

ASPA 101 Taylor Rookery, Mac.Robertson Land (67°27'14” S, 60°53’0” E) is located approximately 80 km to the west.

6(v) Special zones within the Area

Giganteus Island is designated as a Restricted Zone to afford a high level of protection to southern giant petrels (Map B, Map C). Entry is restricted and may only be permitted in accordance with the purposes and conditions detailed elsewhere in this management plan.

7. Terms and conditions for entry permits

7(i) General 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 compelling scientific reasons that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or 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
- 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
- the appropriate national authority shall be notified of any activities/measures undertaken that were not included in the authorised permit.

Entry to the Giganteus Island Restricted Zone is only permitted in accordance with conditions outlined below:

- Permits to enter the Giganteus Island Restricted Zone during the breeding period of southern giant petrel (1 October to 30 April) may only be issued for the purpose of conducting censuses. Other research may be conducted outside the breeding period in accordance with a permit.
- Where practicable, censuses should be conducted from outside the southern giant petrel colony using vantage points from which the attending birds may be counted.
- Access to the Restricted Zone should be limited to the minimum amount of time reasonably required to undertake the census.
- Visits to conduct censuses should be made by a team including someone from a national Antarctic program with relevant scientific or technical skills and experience. Other personnel should remain at the shoreline.
- For permitted activities associated with obtaining census data or biological data, persons shall not approach closer than is necessary to count the southern giant petrels, and in no case closer than 20 m, so long as no birds are disturbed (showing no change in behaviour).
- Overflights of Giganteus Island are prohibited.

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

Travel to the Area may be by boat, by vehicle over sea ice, or by aircraft.

Vehicles are prohibited on the islands, and vehicles and boats must be left at the shoreline. Movement on the islands must be by foot only. Vehicles used to access the islands over sea ice must be no closer than 250 m from concentrations of birds.

Access to Giganteus Island is prohibited except in accordance with the provisions elsewhere in this plan.

If access to the islands is not possible by boat or by vehicle over sea ice, then fixed wing aircraft or helicopters may be used subject to the following conditions:

- disturbance of the bird colonies by aircraft shall be avoided at all times
- sea ice landings shall be encouraged (where practicable)
- aircraft landings on Giganteus Island during the breeding season are prohibited
- as aircraft may provide the only viable access to the other islands when sea and sea ice access is not possible, single-engine helicopters may land on the islands during the breeding season where it is possible to maintain a distance of at least 500 m from bird colonies. Permission to land an aircraft may be granted for essential scientific or management purposes only if it can be demonstrated that

disturbance will be minimal. Only personnel who are required to carry out work in the Area should leave the helicopter

- when accessing Giganteus Island by aircraft outside the breeding season sea ice landings are preferred, following separation distances mentioned below
- at all other times, single-engine helicopters and fixed wing aircraft must not land or take off within 930 m (3050 ft) or fly within 750 m of bird colonies, and twin-engine helicopters must not land, take off or fly within 1500 m of bird colonies
- overflights of the islands during the breeding season is 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
- refuelling of aircraft is prohibited within the Area.

Overflights of bird colonies in the Area by remotely piloted aircraft systems (RPAS) are prohibited, except where essential for compelling scientific or management purposes. Such overflights shall be undertaken in accordance with the *Environmental guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica*.

There are no marked pedestrian routes within the Area. Unless disturbance is authorised by permit, pedestrians should keep at least 100 m from concentrations of birds, and give way to departing and arriving penguins. Pedestrians moving in or around the Area should avoid crossing the access routes of birds if possible, or cross quickly without disturbing penguin traffic.

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

The following activities may be conducted within the Area as authorised in a permit:

- scientific research consistent with the Management Plan for the Area which cannot be undertaken elsewhere and which will not jeopardise the values for which the Area has been designated or the ecosystems of the Area
- essential management activities, including monitoring
- sampling, which should be the minimum required for approved research programs.

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

The following requirements will apply to the installation, modification, or removal of structures:

- Permanent structures or installations are prohibited.
- Other structures or installations shall not be erected within the Area except as specified in a permit.
- Small temporary refuges, hides, blinds or screens may be constructed for the purpose of scientific study of the avifauna.
- Installation (including site selection), removal, modification or maintenance of structures shall be undertaken in a manner that minimises disturbance to breeding birds.
- All scientific equipment or markers installed within the Area must be clearly identified by country, name of the principal investigator, year of installation and date of expected removal.
- 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. All such items should be made of materials that pose minimal risk of harm to bird populations or of contamination of the Area.
- Permits will require the removal of specific structures, equipment or markers before the permit expiry date.

7(v) Location of field camps

Camping is prohibited within the Area except in an emergency.

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

Materials and organisms that may be brought into the Area are subject to the following restrictions:

- No poultry products are to be taken into the Area, including dried food containing egg powder.
- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.
- Deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. The highest level 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) into the Area.
- To the maximum extent practicable, clothing, footwear and other equipment used or brought into the Area (including backpacks, carry-bags and other equipment) shall be thoroughly cleaned before entering and after leaving the Area.
- Boots and sampling/research equipment and markers that come into contact with the ground shall be disinfected or cleaned with hot water and bleach before entering and after visiting the Area to help prevent accidental introductions of animals, plant material, micro-organisms and non-sterile soil into the Area. Cleaning should be undertaken at station.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection *Non-native Species Manual, and in the Scientific Committee on Antarctic Research* (SCAR) *Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica*;
- 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 a permit, shall be removed from the Area, if feasible, 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. Permanent fuel depots are not permitted.
- All material 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 as to minimise the risk of environmental impact.

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. 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*.
- Ornithological research shall be limited to activities that are non-invasive and non-disruptive to the breeding seabirds present within the Area. Surveys shall have a high priority, including aerial photographs for the purposes of population census.
- Disturbance of southern giant petrels shall be avoided at all times.

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

- Material may only be collected or removed from the Area as authorised in a permit, and shall be limited to the minimum necessary to meet scientific or management needs.
- 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, then the permit issuing authority shall be notified if possible while the field party is present within the Area.

7(ix) Disposal of waste

- All wastes, including human wastes, shall be removed from the Area. Wastes from field parties shall be stored in such a manner to prevent scavenging by wildlife (e.g. skuas) until such time as the wastes can be disposed or removed. Wastes are to be removed no later than the departure of the field party. Human wastes and grey water may be disposed into the sea outside 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 samples for analysis or review
- erect or maintain scientific equipment and structures, and signposts
- carry out other protective measures.

Any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Data Directory System through the appropriate national authority.

Visitors shall take special precautions against introductions of non-indigenous organisms to help maintain the ecological and scientific values of the Area. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora and fauna at other Antarctic sites, including research stations, and from regions outside Antarctica. Before entering the Area visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area to minimise the risk of introductions.

Where practical, a census of southern giant petrels on Giganteus Island shall be conducted at least once every five-years. Censuses of other species may be undertaken during this visit provided no additional disturbance is caused to southern giant petrels.

To reduce disturbance to wildlife, noise levels including verbal communication is 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 (1 October to 30 April).

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 visit reports should include, as applicable, the information identified in the visit report form contained in the *Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas*. 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. Where possible, Parties should deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of use, for the purpose of any review of the Management Plan and in organising the scientific use of the Area.

A copy of the report should be forwarded to the Party responsible for development of the Management Plan (Australia) to assist in management of the Area, and the monitoring of bird populations. Visit reports shall provide detailed information about 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.

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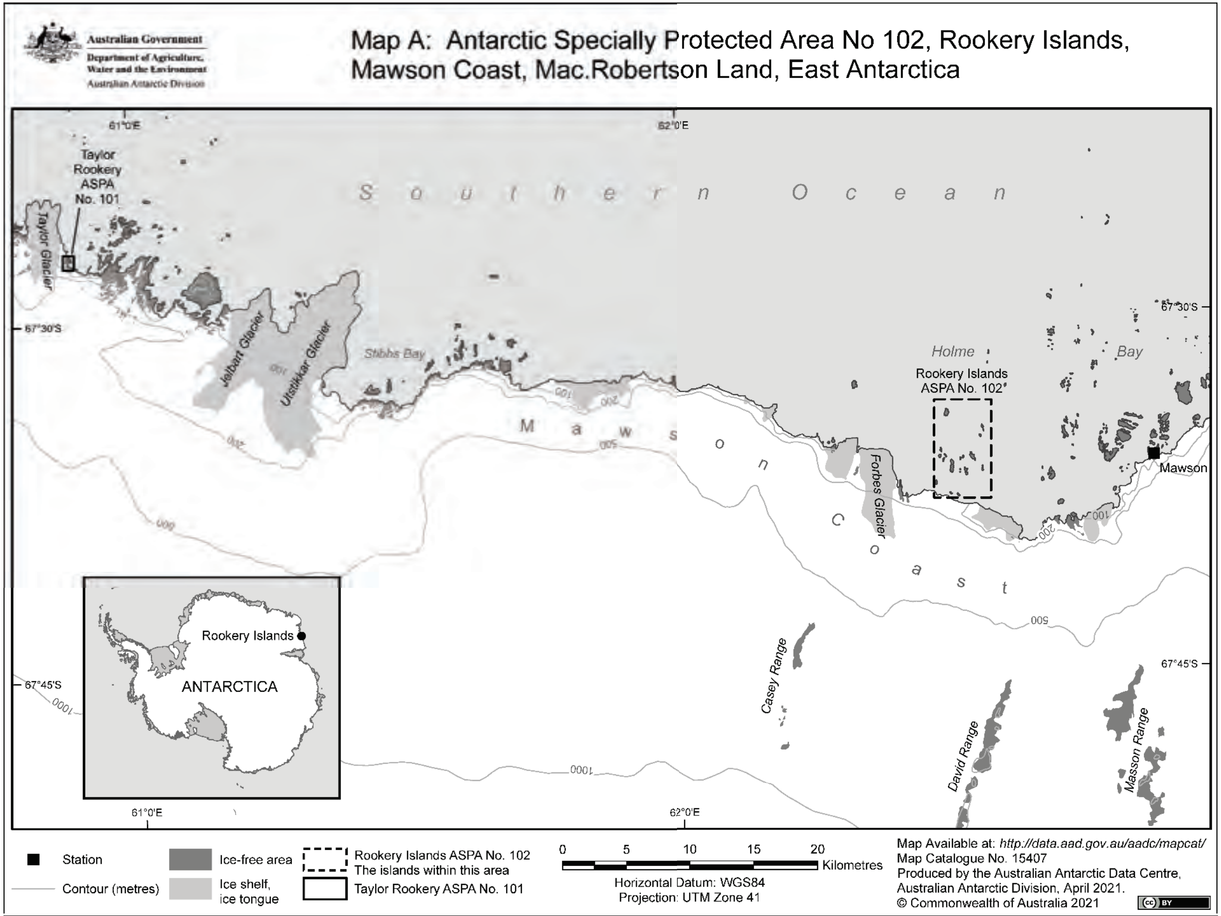

Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map A: Antarctic Specially Protected Area No 102, Rookery Islands, Mawson Coast, Mac.Robertson Land, East Antarctica
61°0'E
62°0'E
67°30'S
67°45'S
Southern Ocean
Taylor Rookery ASPA No. 101
Taylor Glacier
Jelbart Glacier
Utstikkar Glacier
Stibbs Bay
Holme Bay
Rookery Islands ASPA No. 102
Forbes Glacier
Mawson
Mawson Coast
Casey Range
David Range
Masson Range
100
200
500
600
1000
Rookery Islands
ANTARCTICA
Station
Contour (metres)
Ice-free area
Ice shelf, ice tongue
Rookery Islands ASPA No. 102
The islands within this area
Taylor Rookery ASPA No. 101
0
5
10
15
20
Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15407
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, April 2021.
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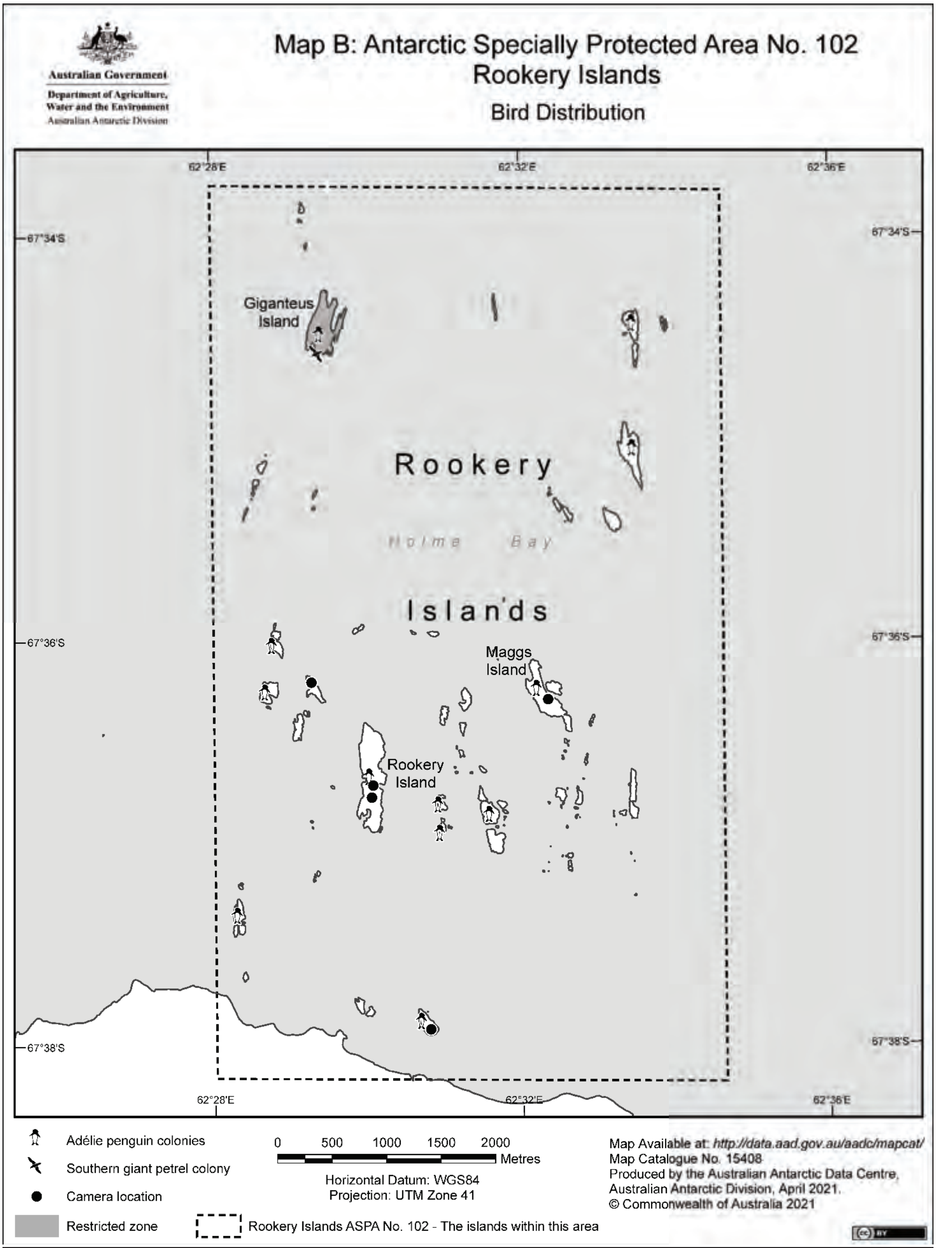
Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No. 102
Rookery Islands
Bird Distribution
62°28'E
62°32'E
62°36'E
67°34'S
67°36'S
67°38'S
Giganteus Island
Rookery
Holme Bay
Islands
Maggs Island
Rookery Island
Adélie penguin colonies
Southern giant petrel colony
Camera location
Restricted zone
0 500 1000 1500 2000
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Rookery Islands ASPA No. 102 - The islands within this area
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15408
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, April 2021.
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Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map C: Antarctic Specially Protected Area No. 102
Giganteus Island
(Restricted Zone)
Topography and Bird Distribution
62°29'0"E
62°29'20"E
62°29'40"E
67°34'20"S
67°34'30"S
Giganteus Island
0 50 100 150 200
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Contour (5m interval)
Ice-free area
Restricted zone
Adélie penguin colony
Southern giant petrel colony
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15409
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, April 2021.
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Management Plan for Antarctic Specially Protected Area No. 103

ARDERY ISLAND AND ODBERT ISLAND, BUDD COAST, WILKES LAND, EAST ANTARCTICA

Introduction

Ardery Island and Odbert Island (66°22'20"S; 110°29'10"E, Map A) were originally designated as Specially Protected Area No. 3, through Recommendation IV-III (1966), after a proposal by Australia. A management plan for the Area was adopted under Recommendation XVII-2 (1992). In accordance with Decision 1 (2002), the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 103. Revised management plans for the ASPA were adopted under Measure 2 (2005), Measure 3 (2010) and Measure 3 (2015). The Area is primarily designated to protect the unusual assemblage of breeding colonies of several species of petrel. The Antarctic petrel (*Thalassoica antarctica*) and the southern fulmar (*Fulmarus glacialoides*) are of particular scientific interest.

1. Description of values to be protected

The Area is designated primarily to protect the assemblage of four fulmarine petrels at Ardery Island and Odbert Island (Map B and C). The four species of fulmarine petrels, all belonging to different genera, are Antarctic petrels, southern fulmars, Cape petrels (*Daption capense*), and snow petrels (*Pagodroma nivea*). All breed in the Area in sufficient numbers to allow comparative study. Study of these four genera at one location is of high ecological importance in understanding their responses to changes in the Southern Ocean ecosystem.

The Antarctic petrel is the only species in the genus *Thalassoica*; they occur most commonly in the Ross and Weddell seas and are much less abundant in East Antarctica. Similarly, the southern fulmar inhabits islands mainly near the Antarctic Peninsula and the islands of the Scotia Arc where about a quarter of its global population resides. Since southern fulmars require steeper slopes as breeding habitat (to allow falling away from the colony when becoming airborne) than Antarctic petrels, this species is more prone to suffer reductions in breeding success in poor weather conditions.

Both islands are also occupied by breeding populations of Wilson's storm petrels (*Oceanites oceanicus*) and Antarctic skuas (*Catharacta maccormicki*). Odbert Island also supports a breeding population of Adélie penguins (*Pygoscelis adeliae*).

2. Aims and Objectives

Management of Ardery Island and Odbert Island 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 and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- allow for the gathering of data on the population status of the bird species on a regular basis; 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:

- a copy of this Management Plan shall be made available at Casey station and to ships visiting the vicinity;
- 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 activities are adequate: and
- the Management Plan shall be reviewed at least every five years.

4. Period of designation

Designation is for an indefinite period.

5. Maps

- Map A: Antarctic Specially Protected Area No 103, Ardery Island and Odbert Island, Budd Coast, Wilkes Land, East Antarctica. The inset map indicates the location in relation to the Antarctic continent.
- Map B: Antarctic Specially Protected Area No 103, Ardery Island: Topography and Bird Distribution.
- Map C: Antarctic Specially Protected Area No 103, Odbert Island: Topography and Bird Distribution.
- Map D: Antarctic Specially Protected Area No 103: Ardery Island and Odbert Island: Helicopter approach and landing sites.

Specifications for all maps: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level

6. Description of the Area

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

Ardery Island (66°22’15”S, 110°27’0”E) and Odbert Island (66°22’24”S, 110°32’28”E) are among the southernmost of the Windmill Islands in the south of Vincennes Bay, off the Budd Coast of Wilkes Land, Eastern Antarctica. The Area comprises both islands down to low water mark. The Area covers approximately 3.12 km^2.

Topography

Ardery Island and Odbert Island are located 5 km and 0.6 km, respectively, to the west of Robinson Ridge, south of Casey station.

Odbert Island is approximately 2.7 km long and 0.8 km wide. It has a rocky coast which rises steeply from the sea to a plateau. The highest point is 90 m altitude. The plateau is dissected by a series of valleys which run to the south from the high flat rim on the northern side. These valleys are snow covered in winter. The hill tops remain essentially ice and snow free. In some years, the island remains joined to Robinson Ridge on the mainland by sea ice.

Ardery Island is a steep, ice free island approximately 1.2 km long and 0.8 km wide, with an east-west orientation. The highest point is 117 m above sea level.

The terrain on both islands is rugged and dissected by fissures. The cliffs are fractured and have narrow exposed ledges which in summer are occupied by nesting sea birds. On the hillsides and plateau region, the exposed rock is ice-smoothed and the valley floors are covered with moraine. The islands have undergone isostatic rebound. Moraine and solifluction debris is abundant at heights in excess of 30 metres above mean sea level but considerably less at lower altitudes.

Geology

The Windmill Islands region represents one of the eastern most outcrops of a Mesoproterozoic low-pressure granulite facies terrain that extends west to the Bunger Hills and further to the Archaean complexes in Princess Elizabeth Land, to minor exposures in the east in the Dumont d'Urville area and in Commonwealth Bay. The total outcrop areas do not exceed more than a few square kilometres. The Mesoproterozoic outcrop of the Windmill Islands and the Archaean complexes of Princess Elizabeth Land are two of the few major areas in East Antarctica that can be directly correlated with an Australian equivalent in a Gondwana reconstruction. The Mesoproterozoic facies terrain 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 cut by easterly-trending late dolerite dykes.

Ardery Island and Odbert Island are part of the southern 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 biotitecordierite-almandine granulite, to hornblende-orthopyroxene granulite at Browning Peninsula in the south.

Ardery Island and Odbert Island together with Robinson Ridge, Holl Island, Peterson Island and the Browning Peninsula are similar geologically and are composed of Ardery charnockite. Charnockites are of granitic composition but were formed under anhydrous conditions. The Ardery Charnockite of Ardery Island and Odbert Island intrudes the Windmill metamorphics and consists of a modal assemblage of quartz + plagioclase + microcline + orthopyroxene + biotite + clinopyroxene hornblende with opaques and minor zircon and apatite. An isotopic age of about 1,200 million years for the Ardery charnockite has been established. The charnockite 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.

Soils on the islands are poorly developed and consist of little more than rock flour, moraine and eroded material. Some soils contain small amounts of organic matter derived from excreta and feathers from the seabirds.

Glaciation

The Windmill Islands region was glaciated during the Late Pleistocene. The southern region of the Windmill Islands was deglaciated by 8,000 corr. yr B.P., and the northern region, including the Bailey Peninsula deglaciated by 5,500 corr. yr B.P. Isostatic uplift has occurred at a rate of 0.5 to 0.6 m/100 yr, with the upper mean marine limit, featured as ice-pushed ridges, being observed at nearby Robinson Ridge at approximately 28.5 metres.

Climate

The climate of the Windmill Islands region is frigid-Antarctic. Conditions at Ardery Island and Odbert Island are probably similar to those of the Casey station area approximately 12 km to the north. Meteorological data for the period 1989 to 2021 from Casey station (altitude 32 m) on the Bailey Peninsula show mean temperatures across all months (in °C) ranging from -2.5 to -18.7 (minimums) and 2.3 to -10.8 (maximums). Extreme temperatures ranged from 9.2 to -37.5.

The climate is dry with a mean annual snowfall of 218.1 mm year (rainfall equivalent) for the period 1989 to 2021. Extreme annual snowfall across the same period ranged from 126.8 mm to 362.4 mm.

On average the area experiences 96 days with gale-force winds, which are predominantly easterly in direction, off the polar ice cap. Blizzards are frequent, especially during winter. Snowfall is common during the winter, but the extremely strong winds scour the exposed areas. On most hill crests in the area snow gathers in the lee of rock outcrops and in depressions in the substratum. Further down the slopes snow forms deeper drifts.

Environmental Domains, Antarctic Conservation Biogeographic Regions and Important Bird Areas

Based on the Environmental Domains Analysis for Antarctica (Resolution 3(2008)) Ardery Island and Odbert Island are located within Environment L Continental coastal-zone ice sheet. Based on the Antarctic

Conservation Biogeographic Regions (Resolution 3 (2017)) the Area is located within Biogeographic Region 7 East Antarctica. Ardery Island and Odbert Island are identified as Antarctic Important Bird Area 145 Ardery Island / Odbert Island.

Biological features

Terrestrial

The flora of Odbert Island consists of three moss species, eleven lichen species (Table 1), and an unknown number of terrestrial and freshwater algae. The most extensive development of lichens is towards the highest elevations of the southern parts of the island in an area of ice-fractured bedrock. The algae occur in tarns, soil seepage areas and soil. Stands of *Prasiola spp* and other green algae and cyanobacteria occur below snow drifts down slope from penguin colonies towards the western part of the island.

The flora of Ardery Island comprises several species of lichen similar to those found on Odbert Island.

The only recorded invertebrates are ectoparasites of birds. Ardery Island is the type locality for the Antarctic flea *Glaciopsyllus antarcticus*, associated with southern fulmars.

MOSSES
Bryum pseudotriquetrum Hedw.) Gaertn., Meyer & Scherb.
Ceratodon purpureus (Hedw.) Brid.
Schistidium antarcticum (= Grimmia antarctici) (Card.) L.I.Savicz & Smirnova
LICHENS
Buellia frigida (Darb.) *Buellia*
soredians Filson Buellia sp.
Caloplaca athallina Darb.
Caloplaca citrina (Hoffm.) Th. Fr.
Candelariella flava (C.W.Dodge & Baker) Castello & Nimis
Rhizoplaca melanophthalma (Ram.) Leuck. et Poelt
Rinodina olivaceobrunnea Dodge & Baker
Umbilicaria decussata (Vill.) Zahlbr.
Xanthoria mawsonii Dodge.
Usnea antarctica Du Rietz
ALGAE
Prasiola crispa (Lightfoot) *Kützing Prasiococcus sp.*

Table 1. List of mosses, lichens and algae recorded from Odbert Island.

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 extant or abandoned penguin colonies. Sterile lakes are located further inland and are fed by melt water and local precipitation. On Ardery Island and Odbert Island, there are a number of small tarns which are frozen in winter and filled with melt water in summer. Many of the tarns are ephemeral, drying out towards the end of summer. Other tarns located below snow banks are fed continuously by melt water.

Birds and seals

Odbert Island has breeding populations of Adélie penguins, Cape petrels, snow petrels, southern fulmars, Wilson’s storm petrels, and south polar skuas. Ardery Island supports a similar species composition as well as Antarctic petrels, but does not have any breeding Adélie penguins. The southern giant petrel (*Macronectes giganteus*), which breeds on the Frazier Islands approximately 23 km to the north-west, is the only species breeding in the Windmill Islands that breeds neither at Ardery Island nor at Odbert Island.

No seals inhabit Ardery Island and Odbert Island although Weddell seals (*Leptonychotes weddellii*) are frequently observed on the sea ice around them. The main pupping area is about 3 km to the south-east between Herring Island and the Antarctic mainland. In this area, disturbance of the sea ice caused by movement of the Peterson Glacier ensures open water and easy access to food. About 100 pups are born annually in the region. Elephant seals (*Mirounga leonina*) haul out a little farther to the south on Petersen Island and on the Browning Peninsula. Up to 100 of these seals are seen annually; most are mature males and only a few females have also been observed.

Adélie penguin

Adélie penguins breed on Odbert Island, and although they regularly come ashore on Ardery Island, none breed there. The most recent estimates for Adélie penguins on Odbert Island is 22,000 occupied nests in 2016/17. Egg laying usually commences before the middle of November, the first chicks hatch around mid-December, and juveniles start leaving the colony in early February.

Southern fulmar

The total population of southern fulmars (*Fulmarus glacialoides*) in the Area is about 5,000 breeding pairs. There are approximately 3,000 occupied southern fulmar sites on Ardery Island; the largest colonies are located on the northern cliffs and around the eastern tip of the island. At Odbert Island, most of the 2,000 sites are concentrated in two large colonies on Haun Bluff and in the central north.

Southern fulmars breed colonially on or near the cliffs and ravines. Nests are situated on small cliff ledges but also on large nearly flat terraces, some birds nest in the open, others in deep crevices or between loose rocks. First eggs appear in early December and most are laid within 10 days. Hatching commences in the third week of January and chicks fledge by mid-March.

Antarctic petrel

The total population of Antarctic petrels in the Area has been estimated at just over 300 breeding pairs. The largest colony, on the Northern Plateau at Ardery Island, contains at least 150 sites in the main area and some 25 sites in smaller groups nearby. At Odbert Island, some 30 nests are located in a small area off the central northern cliffs

Most nests of Antarctic petrels are situated on plateau-like areas or gently sloping sections of steep cliffs on the Northern Plateau, and smaller colonies around Soucek Ravine. Nests are very close together; isolated nesting on small ledges appears to be avoided. In late November, the first Antarctic petrels return from their pre-laying exodus and a week later most birds have returned to lay their eggs. First hatchlings appear in the second week of January, fledging commences in late February to early March, and all chicks have left before the middle of March.

Cape petrel

Approximately 750 breeding pairs of Cape petrel (*Daption capense*) utilise the Area, with most breeding at Ardery Island in small colonies on the northern cliffs. Scattered nests are present on both sides of Snowie Mountain. There are approximately 100 to 200 nesting sites on Odbert Island, mostly located around the fulmar colonies.

Cape petrels prefer nesting sites sheltered by slightly overhanging rocks and substantial cover from the back and if possible the sides. Most nests are in less steep parts of cliffs or along the top edges of cliffs both in colonies and small scattered groups. After returning from the pre-laying exodus, eggs are laid in late November, and hatching commences in the second week of January. Most chicks have fledged by the first week of March.

Snow petrel

The number of snow petrels (*Pagodroma nivea*) in the Area is estimated at over 1,100 breeding pairs. Approximately 1,000 snow petrel nesting sites were located on Ardery Island in 1990, mostly on the slopes of Snowie Mountain. Snow petrels appear to be less abundant on Odbert Island than on Ardery with 100 – 1000 nesting sites. In 2003, 752 active nests were estimated to be on Ardery Island and 824 on Odbert Island.

The snow petrels breed in crevices or in holes between loose rocks in loose, low density aggregations. Isolated nests are common, as are nests within colonies of other species. Suitable snow petrel habitat also harbours Wilson’s storm petrels. The onset of egg laying varies between concentrations of nests, with laying occurring within the first three weeks of December, and chicks hatching from the middle of January onwards. All are fledged in the first two weeks of March.

Wilson's storm petrel

Wilson’s storm petrels (*Oceanites oceanicus*) are widely distributed, and nest in all suitable rocky areas within the Area. Approximately 1,000 nesting sites have been documented for Ardery Island. Odbert Island has 1,000 – 2,000 nesting sites, at a lower density than that of Ardery Island because of the general spread of suitable rock areas. Wilson's storm petrels breed in deep, narrow holes. As the nests can be extremely difficult to detect the population estimates are likely to be considerable under-estimates.

South polar skua

In 1984/85, ten pairs of south polar skua (*Catharacta maccormicki*) bred on Ardery Island, and another three more pairs may have held territories. A similar number was present in 1986/87, although only seven pairs produced eggs. Odbert Island had 10 - 20 pairs. The distribution of south polar skua nests on Ardery Island reflects their dependence on petrels. Most pairs have observation points close to petrel nests, from which they can observe their food territory on the bird cliffs. At Odbert Island, most nests were near the penguin colonies.

Nests are shallow hollows in gravel, either fully in the open on flat ground or slightly protected by surrounding rocks. Territories and nest locations appear to be stable from year to year; near a nest there are usually several depressions of previous nests. Egg laying dates vary considerably, though most are concentrated around late November to early December. The first chicks are observed in the last days of December, and juveniles begin to fly by mid February.

Non-breeding bird species

Southern giant petrels, both adults and immatures, are regular visitors to Ardery Island. In favourable winds they fly along the bird cliffs in search of food.

6(ii) Access to the Area

Travel to the Area may be by vehicle over sea ice, by boat or by aircraft, in accordance with section 7(ii) of this plan.

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

Four remotely operating time lapse cameras are located on Ardery Island and two on Odbert Island (locations on Ardery Island: 66°22’6.3”S, 110°26’42.9”E; 66°22’13.4”S, 110°27’46.2”E; 66°22’6.2”S, 110°26’56.3”E; 66°22’7.7”S, 110°26’57.7”E (Map B), locations on Odbert Island: 66°22’37.8”S, 110°33’55.3”E 66°22’37.7”S, 110°33’47.6”E (Map C)). Deployed in 2010/11 (former five) and 2018/19 (latter one), the cameras have been located for long term monitoring of southern fulmar, Cape petrel and Adélie penguin breeding success and phenology with minimal disturbance. While the cameras are not permanent, they are expected to remain in place beyond the term of this plan.

6(iv) Location of other protected areas within close proximity

The following Protected Areas are located in the vicinity of Ardery Island and Odbert Island (see Map A):

- North-east Bailey Peninsula (66°17'S, 110°32'E) (ASPA No 135) approximately 12 km north of Ardery Island and Odbert Island;
- Clark Peninsula (66°15'S, 110°36'E) (ASPA No 136), approximately 16 km north of Ardery Island and Odbert Island;
- Frazier Islands (66°13’S 110°11’E) (ASPA No 160), approximately 23 km north-east of Ardery Island and Odbert Island.

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 only for compelling scientific reasons that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or 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;
- 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;
- the appropriate national authority shall 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

Vehicles and boats used to visit the islands must be left at the shoreline. Movement within the Area is by foot only.

Defined landing sites for access by sea and helicopter to Ardery Island and Odbert Island are shown on Map D. At Ardery Island, the preferred boat landing site is at Robertson Landing where there are three rock anchors to tie down a boat or other equipment. The boat landing site marked for Ardery Island on Map D is within 200 metres of seabird colonies. However, it represents the preferred safe landing site on the island. All landings must be undertaken carefully to avoid disturbance to the birds. There are no defined pedestrian routes within the Area, however, pedestrians should keep their distance from and avoid disturbance of the birds at all times.

If access to the islands is not possible by boat or by vehicle over sea ice, then fixed wing aircraft or helicopters may be used subject to the following conditions:

- disturbance of the colonies by aircraft shall be avoided at all times;
- sea ice landings shall be encouraged (where practicable);
- overflight of the islands should be avoided at all times, except where it is considered essential for scientific or management purposes as authorised in a permit. In these instances, overflight must be at a vertical or horizontal distance of no less than 930 metres (3050 feet) for single-engine aircraft and 1500 metres (5000 feet) for twin-engine aircraft;
- during the breeding season of penguins and petrels, defined here as the period from 1 November to 1
- April, helicopter movement to the islands should be kept to the minimum;
- the use of twin-engine helicopters to land on Ardery Island or Odbert Island is prohibited;
- the single-engine helicopter approach to Ardery Island should be at a high altitude and from a southern direction as the lowest densities of birds are on the southern cliffs (see Maps B and D);
- the single-engine helicopter approach to Odbert Island should preferably be from the south, avoiding cliff areas because of the nesting petrels (see Maps C and D);
- single-engine helicopter landing sites marked on Map D are approximate and pilots shall ensure that disturbance of breeding colonies is avoided.
- only personnel who are required to carry out work in the Area should leave the helicopter;
- refuelling of aircraft is prohibited within the Area.

Overflights of bird colonies in the Area by remotely piloted aircraft systems (RPAS) are prohibited, except where essential for compelling scientific or management purposes. Such overflights shall be undertaken in accordance with the *Environmental guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica*.

7(iii) Activities which are, or may be conducted within the Area

The following activities may be conducted within the Area as authorised in a permit;

- compelling scientific research consistent with the Management Plan for the Area which cannot be undertaken elsewhere and will not jeopardise the values for which the Area has been designated or the ecosystems of the Area;
- essential management activities, including monitoring; and
- sampling, which should be the minimum required for approved research programs.

7(iv) Installation, modification, or removal of structures No permanent structures are to be erected in the Area.

- Any structures erected or installed within the Area are to be specified in a permit.
- Scientific markers and equipment must be secured and maintained in good condition, clearly identifying the permitting country, name of principal investigator and year of installation. All such items should be made of materials that pose minimum risk of contamination of the Area.
- A condition of the permit shall be the removal of equipment associated with scientific research before the permit for that research expires. Details of markers and equipment temporarily left in situ (GPS locations, description, tags, etc. and expected removal date) shall be reported to the permitting Authority.
- If permitted, the installation of a temporary field hut on Ardery Island must take place before 1 November when the breeding season commences, and removal after 1 April when fledglings have departed. Installation and removal should be supported by vehicle over sea ice unless sea ice conditions prevent this.

7(v) Location of field camps

- Camping is prohibited on Odbert Island except in emergency.
- If required for field work, a temporary hut may be erected on Ardery Island at the point specified on Map D. There are eight solid rock anchors available at this location. There is a refuge hut “Robinson Ridge Hut”, on the mainland, located outside the Area on Robinson Ridge (66°22.4’S 110°35.2’E), approximately 800 m west of Odbert Island (see Map A).

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.
- Deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. The highest level 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) into the Area;
- To the maximum extent practicable, clothing, footwear and other equipment used or brought into the Area (including backpacks, carry-bags and other equipment) shall be thoroughly cleaned before entering and after leaving the Area.
- Boots and sampling/research equipment and markers that comes into contact with the ground shall be disinfected or cleaned with hot water and bleach before entering and after visiting the Area to help prevent accidental introductions of animals, plant material, micro-organisms and non-sterile soil into the Area. Cleaning should be undertaken either at the refuge hut or at station.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for
- Environmental Protection *Non-native Species Manual*, and in the Scientific Committee on Antarctic Research (SCAR) *Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica*;
- 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 a 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. Permanent fuel depots are not permitted.
- All material 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 as to minimise the risk of environmental impact.

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.
- 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*.
- Ornithological research on the breeding birds present within the Area shall be limited to activities that are non-invasive and non-disruptive. Surveys shall have a high priority. If the capture of individuals is required, capture should occur at nests on the periphery of the Area if at all possible to reduce disturbance.

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

- Material may only be collected or removed from the Area as authorised in 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, 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 Authority must be notified and approval obtained prior to removal.

7(ix) Disposal of waste

- All wastes, including human wastes, shall be removed from the Area. Wastes from field parties shall be stored in such a manner to prevent scavenging by wildlife (e.g. skuas) until such time as the wastes can be disposed or removed. Wastes are to be removed no later than the departure of the field party. Human wastes and grey water may be disposed into the sea outside 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 samples for analysis or review;
- erect or maintain scientific equipment, structures, and signposts; or
- carry out other protective measures.

Any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Master Directory through the appropriate National Authority.

To help maintain the ecological and scientific values of the Area, visitors shall take special precautions against introductions. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora and fauna at other Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area, visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area.

7(xi) Requirement 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 visit reports should include, as applicable, the information identified in the visit report form contained in the *Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas*. 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.

A copy of the report should be forwarded to the Party responsible for development of the Management Plan (Australia) to assist in management of the Area, and monitoring of bird populations. 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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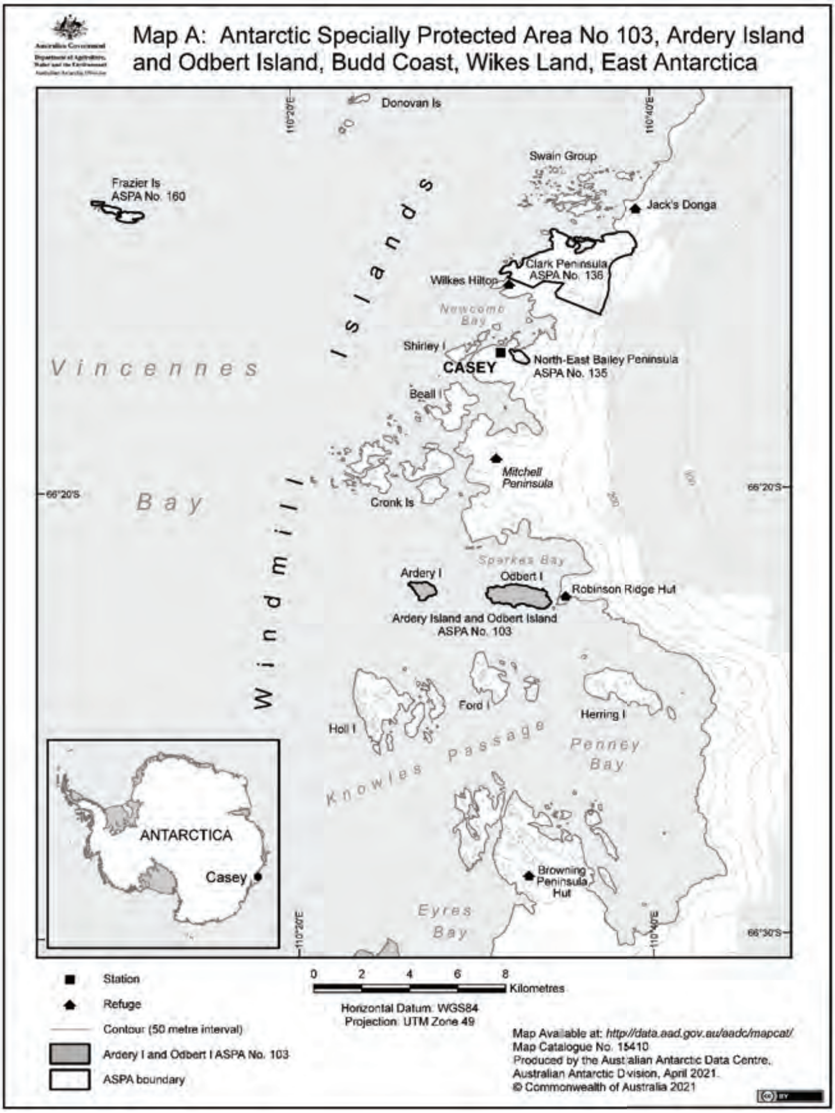
Map A: Antarctic Specially Protected Area No 103, Ardery Island and Odbert Island, Budd Coast, Wikes Land, East Antarctica
Donovan Is
Swain Group
Frazier Is
ASPA No. 160
Jack's Donga
Clark Peninsula
ASPA No. 136
Wilkes Hilton
Newcomb Bay
Shirley I
CASEY
North-East Bailey Peninsula
ASPA No. 135
Vincennes Bay
Windmill Islands
Beall I
Mitchell Peninsula
Cronk Is
Sparkes Bay
Ardery I
Odbert I
Robinson Ridge Hut
Ardery Island and Odbert Island
ASPA No. 103
Ford I
Herring I
Holt I
Knowles Passage
Penney Bay
Browning Peninsula Hut
Eyres Bay
ANTARCTICA
Casey
110°20'E
110°40'E
66°20'S
66°30'S
Station
Refuge
Contour (50 metre interval)
Ardery I and Odbert I ASPA No. 103
ASPA boundary
0 2 4 6 8 Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15410
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, April 2021.
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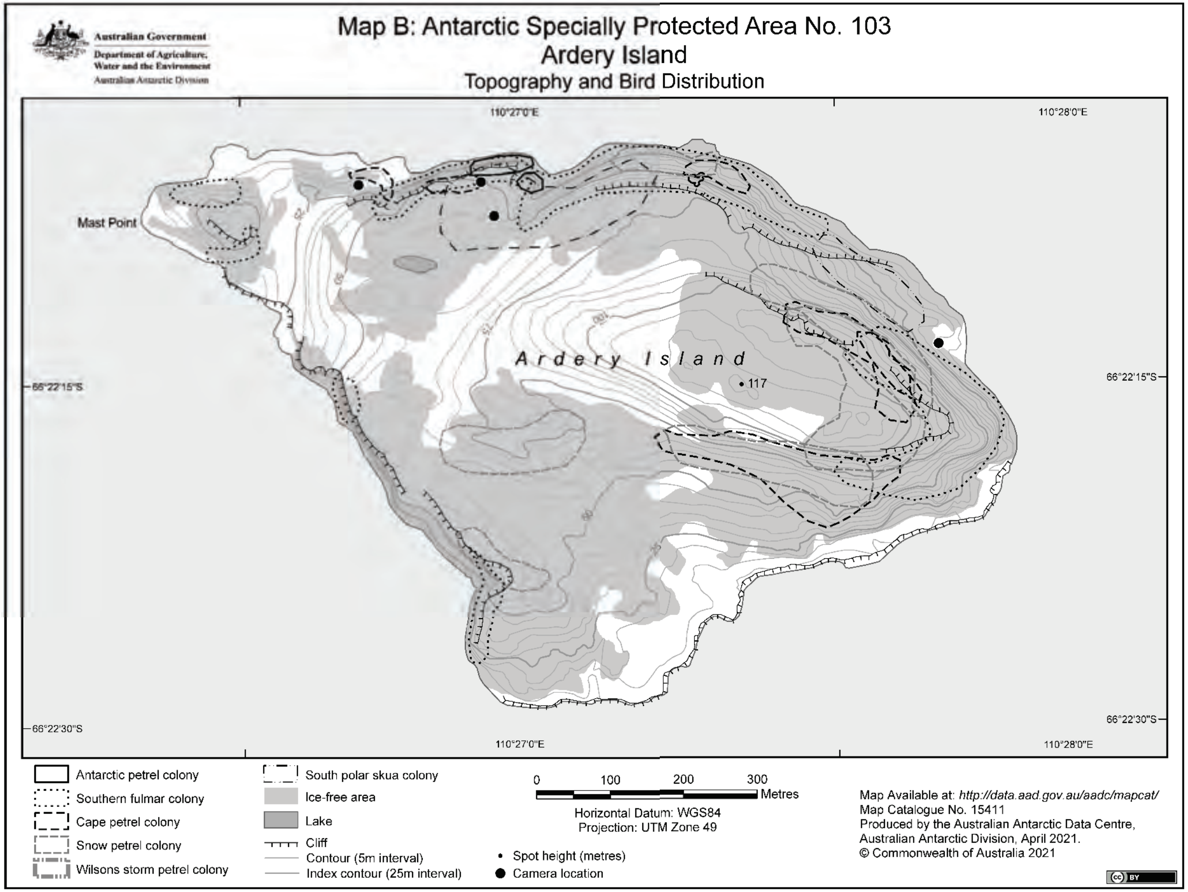
Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No. 103
Ardery Island
Topography and Bird Distribution
110°27'0"E
110°28'0"E
Mast Point
Ardery Island
117
66°22'15"S
66°22'30"S
Antarctic petrel colony
Southern fulmar colony
Cape petrel colony
Snow petrel colony
Wilsons storm petrel colony
South polar skua colony
Ice-free area
Lake
Cliff
Contour (5m interval)
Index contour (25m interval)
0 100 200 300 Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Spot height (metres)
Camera location
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15411
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, April 2021.
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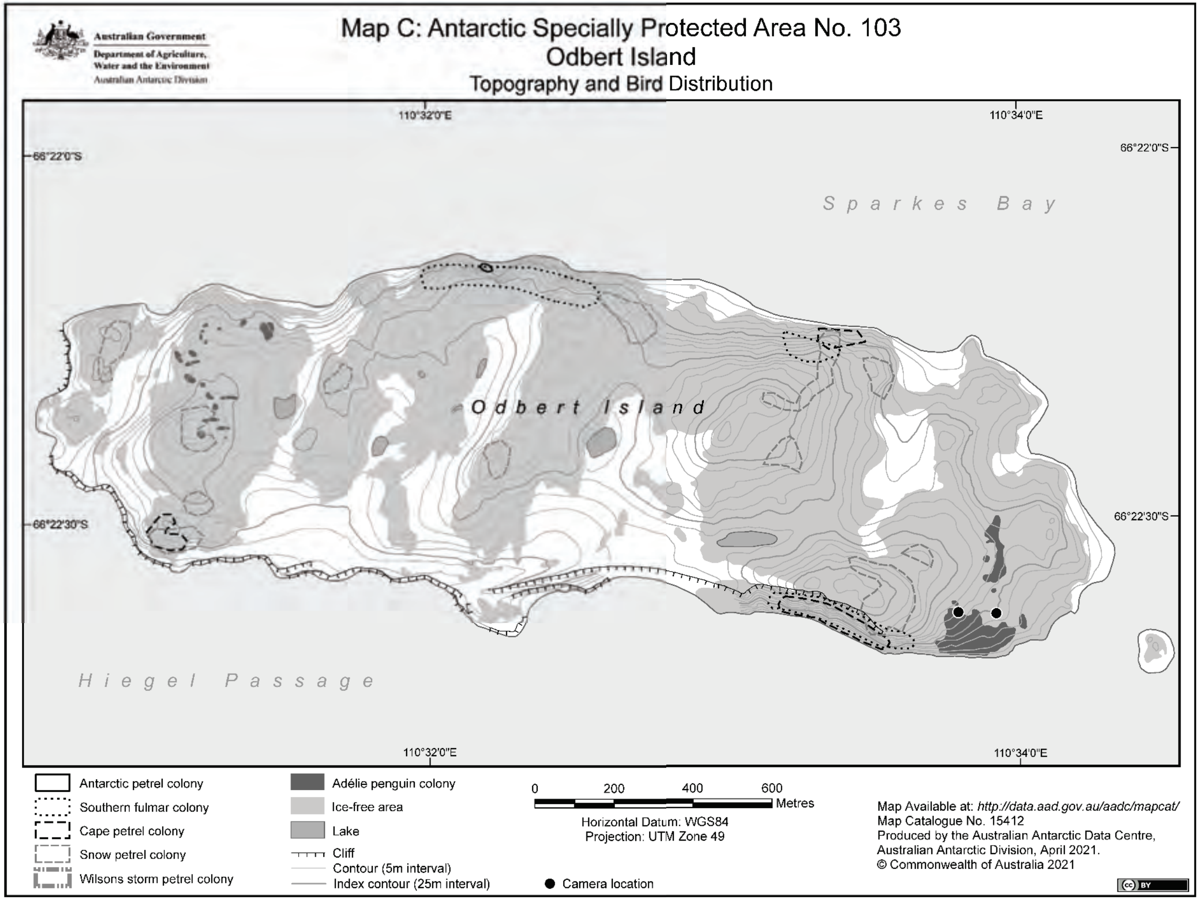
Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map C: Antarctic Specially Protected Area No. 103
Odbert Island
Topography and Bird Distribution
110°32'0"E
110°34'0"E
66°22'0"S
66°22'30"S
Sparkes Bay
Odbert Island
Hiegel Passage
Antarctic petrel colony
Southern fulmar colony
Cape petrel colony
Snow petrel colony
Wilsons storm petrel colony
Adélie penguin colony
Ice-free area
Lake
Cliff
Contour (5m interval)
Index contour (25m interval)
0
200
400
600
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Camera location
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15412
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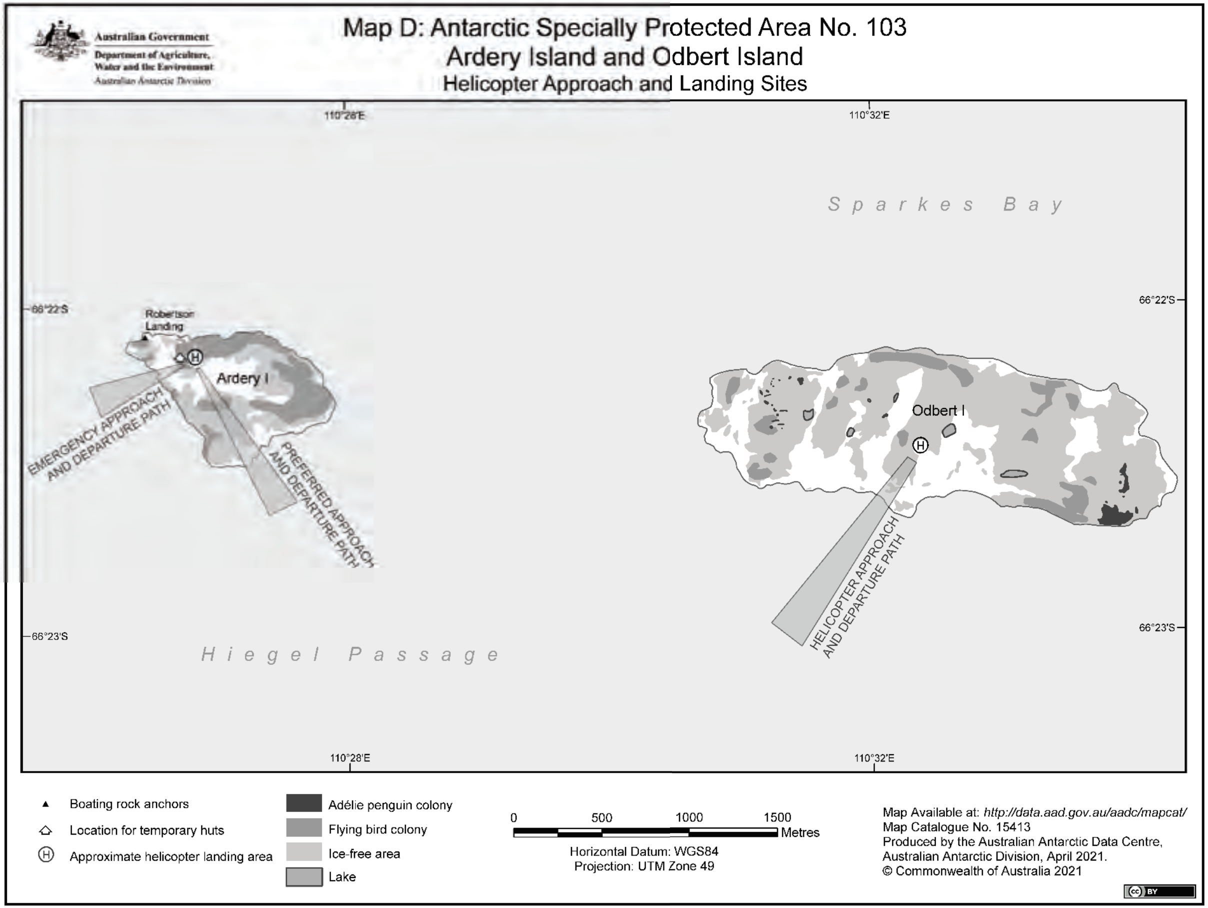
Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map D: Antarctic Specially Protected Area No. 103
Ardery Island and Odbert Island
Helicopter Approach and Landing Sites
110°28'E
110°32'E
Sparkes Bay
66°22'S
66°23'S
Robertson Landing
Ardery I
EMERGENCY APPROACH AND DEPARTURE PATH
PREFERRED APPROACH AND DEPARTURE PATH
Odbert I
HELICOPTER APPROACH AND DEPARTURE PATH
Hiegel Passage
Boating rock anchors
Location for temporary huts
Approximate helicopter landing area
Adélie penguin colony
Flying bird colony
Ice-free area
Lake
0
500
1000
1500
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15413
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Management Plan For

Antarctic Specially Protected Area No. 104

SABRINA ISLAND, BALLENY ISLANDS, ANTARCTICA

1. Description of values to be protected

Sabrina Island, in the Balleny Island archipelago, was originally designated as Specially Protected Area (SPA) No. 4 in Recommendation IV-4 (1966) on the grounds that "the Balleny Islands, as the most northerly Antarctic land in the Ross Sea region, supports a fauna and flora which reflects many circumpolar distributions at this latitude and that Sabrina Island in particular provides a representative sample of this fauna and flora." The site was re-designated Antarctic Specially Protected Area (ASPA) No. 104 in Decision 1 (2002). A Management Plan was prepared and adopted in Measure 3 (2009) and Measure 4 (2015) which included Sabrina Island, 'Chinstrap Islet' and The Monolith.

The primary reason for the designation of Sabrina Island as an Antarctic Specially Protected Area is to protect the outstanding ecological values, specifically the biological diversity which is unique for the Ross Sea region.

The Balleny Islands, discovered in February 1839 by John Balleny who was a British sealer, are located approximately 325 km north of the Pennell and Oates Coasts. They are composed of three main islands, Young, Buckle and Sturge Islands, and several smaller islets that form a northwest-southeast island archipelago about 160 kilometres between 66° 15'S to 67° 10'S and 162° 15'E and 164° 45'E (Map 1). The Balleny Islands are the only truly oceanic islands (rather than continental islands) on the Ross Sea side of Antarctica with the exception of Scott Island, which is approximately 505 kilometres northeast of Cape Adare. The archipelago is located within the main Antarctic Circumpolar Current. As such, they provide an important resting and breeding habitat for seabird and seal species and are significant in circumpolar distribution for a variety of species (see Tables 1 and 2, Appendix 1).

Sabrina Island, 'Chinstrap Islet' and The Monolith are located approximately 3 kilometres south south-east of Buckle Island. These islands are the only known breeding site for Chinstrap penguins (Pygoscelis antarctica) between Bouvetoya and Peter I Islands (a span of 264° longitude), with the majority of breeding pairs found on Sabrina Island. In addition, this population co-exists with a much larger Adelie penguin (P. adeliae) colony, similar to colonies near the tip of the Antarctic Peninsula on the South Shetland Islands, and further north on the South Orkney Islands. Typically the two species breeding ranges tend to be separate.

Sabrina Island's Adélie colony is of particular importance because it is the largest in the archipelago and has the majority of the Chinstrap breeding pairs. Being isolated and prone to difficult weather and ice conditions, the Balleny Islands have been subjected to very little human disturbance, with the exception of the Southern Ocean fisheries.

2. Aims and Objectives

Management of Sabrina Island aims to:

- Avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- Prevent or minimise the introduction to the Area of alien plants, animals and microbes;
- Preserve the natural ecosystem as a reference area largely undisturbed by direct human activities;
- Avoid disturbance to the Chinstrap penguin colony, which is anomalous in terms of species distribution;
- Allow 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;

- 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:

- Copies of this Management Plan shall be made available to vessels operating in the vicinity of the Area.
- National programs shall ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and marine charts for which they are responsible.
- To the extent practicable, the Area shall be visited as necessary to assess whether it continues to serve the purposes for which it was designated and to ensure that management activities are adequate.

4. Period of Designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA 104: Sabrina Island, Balleny Islands, Antarctica. Regional Map.

Datum: WGS84; Projection: Antarctica Polar Stereographic; Data Source Main Map and Inset: SCAR Antarctic Digital Database, Version 6, 2012.

Map 2: ASPA 104: Sabrina Island, Balleny Islands, Antarctica. Boundary, Access and Features. Datum: WGS84; Projection: UTM Zone 58 South; Data Source: Imagery from Digital Globe, WorldView – 1 Satellite, Acquired on 14 January, 2011, 50 cm resolution. Features captured by Land Information New Zealand.

Inset oblique photography obtained December 2014 by the Royal New Zealand Air Force (RNZAF).

6. Description of the Area

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

Location and general description:

The Balleny Islands are located around 325 km north of the Pennell and Oates Coasts (Map 1). The Islands are the exposed portion of a volcanic seamount chain. There are three main islands and a number of smaller islets and exposed rocks. Sabrina Island is located at 66°55 S, 163°19 E, three kilometres off the southern end of Buckle Island (the central of the main islands). It is less than 2 km across and reaches an estimated height of 180 m above sea level. A volcanic plug approximately 80 m high, named The Monolith, is attached to the southern end of Sabrina Island by a boulder spit. A small islet lies to the north east of Sabrina Island, commonly known as 'Chinstrap Islet'. Much of Sabrina Island is covered by a permanent snow/ice field.

Boundaries:

The ASPA comprises all of Sabrina Island, The Monolith, and 'Chinstrap Islet' above sea level, at low tide (Map 2). The marine area is not included with the ASPA.

Natural Features:

Approximately a quarter of Sabrina Island is covered in permanent snow and ice, and an ice foot meets the sea at the northern end. A steep ridge runs across the island, with scoria slopes to the east and south. Sheer cliffs form the majority of the island’s coast except for a cobble beach in the south west.

The scoria slopes to the east of the central ridge on Sabrina Island are occupied by Adélie and Chinstrap penguin nests. The birds access their nesting sites via the beach to the south west of the island. Sabrina Island has the largest penguin colony of the Balleny Island penguin colonies with approximately 3,770 Adélie breeding pairs recorded in 2000; and 202 Chinstrap adults and 109 chicks in 2006. 'Chinstrap Islet' had 2,298 penguin breeding pairs in 2000, with approximately 10 Chinstrap pairs recorded on the Islet in 1965 and 1984.

In 2014, observations from a small boat of the south-western side of Sabrina Island and north-western Chinstrap Islet reported sightings of individual Chinstrap penguins at both Sabrina Island (84) and Chinstrap Islet (40).

Cape petrels (Daption capense) were seen nesting on Sabrina Island in 2006 and also on the southern side of The Monolith in 1965 (although this has not been confirmed by more recent expeditions). Individual Macaroni penguins (Eudyptes chrysolophus) have been sighted on Sabrina Island (1964, possible sighting 1973). A single King penguin was recorded in 2014.

Various species of algae (including Myxopycophyta, Xanthophyceae (Tribonema spp.) and Chlorophycophyta (Prasiola spp.)) have been recorded on Sabrina Island. Chromogenic (bright yellow) bacteria, yeasts, 14 species of filamentous fungi, two species of thermophilous fungi (Aspergillus fumigatus and Chaetomium gracile), mites (Stereotydeus mollis, Nanorchestes antarcticus, Coccorhgidia spp.) and nematodes have also been reported. Rock encrusting lichens, mainly Caloplaca or Xanthoria species occur on top of the main ridge.

6(ii) Access to the Area

- The Area is difficult to access due to the steep cliffs and terrain of each island and ice conditions at different times of the year. There is no identified access route to 'Chinstrap Islet' but Sabrina Island and The Monolith are accessible by helicopter or small boat from the cobble beach on the south west side of Sabrina Island (Map 2).
- 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 known existing structures on or adjacent to the Area.

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

The nearest protected area to Sabrina Islands is ASPA 159: Cape Adare, Borchgrevink Coast located approximately 560 kilometres 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 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 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 actions permitted will not jeopardize the natural ecological system or the environmental or scientific values of the Area;
- The Permit is issued for a finite period; and
- The Permit, or a copy, shall be carried within the Area.

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

- Helicoper landings and overflights below 2,000ft are prohibited except in accordance with a Permit.
- Access to Sabrina Island and The Monolith is by small boat or helicopter on the gravel beach below the scoria slopes of the south west side of Sabrina Island, 66° 55.166’S, 163° 18.599’E (Map 2).
- There is no identified preferred access route to 'Chinstrap Islet'.
- 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).
- The operation of Remotely Piloted Aircraft Systems (RPAS) in the area should be carried out, as a minimum, in compliance with the ‘Environmental Guidelines for operation of Remotely Piloted Aircraft Systems (RPAS)1 in Antarctica’ contained in Resolution 4 (2018).
- All movement within the Area should be on foot. Pedestrian traffic should be kept to the minimum necessary to undertake permitted activities and every reasonable effort should be made to minimise trampling effects.

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 and will not jeopardise the natural ecological system or the environmental or scientific values of the Area; and
- Essential management activities, including monitoring and inspections.

7(iv) Installation, modification or removal of structures

- No new structures (i.e. signs or boundary markers) are to 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.
- 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.
- 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

Field camps may be established if necessary to support permitted scientific or management activity. The camp location should be selected to minimise disturbance to wildlife as much as possible and care should be taken to secure all equipment.

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

- The deliberate introduction of animals, plant material, microorganisms and non-sterile soil into the Area shall not be permitted. Precautions shall be taken to prevent the accidental introduction of animals, plant material, microorganisms and non-sterile soil from other biologically distinct region (within or beyond the Antarctic Treaty area).
- All sampling equipment, footwear, outer clothing, backpacks and other equipment used or brought into the Area shall be thoroughly cleaned before entering the Area. Scrubbing footwear in a disinfectant footbath before each landing is recommended.

- No poultry products, including food products containing uncooked dried eggs, shall be taken into the Area.
- No pesticides shall be brought into the Area. Any other chemicals, which may be introduced for compelling scientific, management or safety 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 are not to be deposited in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. All such materials introduced are to be removed when no longer required. Permanent depots are not permitted.
- Spill response materials appropriate to the volume of fuels or other hazardous liquids taken into the Area should be carried. Any spills should be immediately cleaned up, provided the response has less environmental impact than the spill itself.

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 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. 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 Areas, 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 a small number of samples or data for analysis or review;
- Erect or maintain signposts, structures or scientific equipment;
- Or for other management 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 as soon as practicable, and no later than six months after the visit has been completed. Such visit reports should include, as applicable, the information identified in the recommended visit report form, contained in Appendix 2 of the Revised Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas appended to Resolution 2 (2011) available from the website of the Secretariat of the Antarctic Treaty (www.ats.aq).

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.

Data currently available for the Area is very limited. New Zealand, as the Party responsible for review of this Management Plan, would therefore appreciate copies of data and images which could assist future management of the Area.

8. Supporting documentation

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Appendix A

Table A.1 - Bird species recorded from the Balleny Islands

The table lists sightings recorded in expedition reports and scientific publications. Species indicated as breeding have been confirmed in recent expeditions (i.e. since 2000), those marked with S breed on Sabrina Island itself.

Common Name	**Species**	**Breeding**
Adélie penguin	*Pygoscelis adeliae*	✓ S
Antarctic fulmar	*Fulmarus glacialoides*	✓
Antarctic petrel	*Thalassoica antarctica*	✓
Antarctic prion	*Pachyptila desolata*	
Arctic tern	*Sterna paradisaea*	
Black browed mollymawk	*Diomedea melanophrys*	
Campbell albatross	*Thalassarche impavida*	
Cape pigeon	*Daption capense*	✓ S
Chinstrap penguin	*Pygoscelis antarctica*	✓ S
Grey-headed mollymawk	*Diomedea chrysostoma*	
King penguin	*Aptenodytes patagonicus*	
Light-mantled sooty albatross	*Phoebetria palpebrata*	
Macaroni penguin	*Eudyptes chrysolphus*	
Mottled petrel	*Pterodroma inexpectata*	
Snow petrel	*Pagodroma nivea*	✓
Sooty shearwater	*Puffinus griseus*	
Southern giant petrel	*Macronectes giganteus*	
South polar skua	*Catharacta maccormicki*	
Brown skua	*Catharacta antarctica subsp lonnbergi*	
Wandering albatross	*Diomedea exulans*	
White chinned petrel	*Procellaria aequinoctialis*	
White headed petrel	*Pterodroma lessonii*	
Wilson's storm petrel	*Oceanites oceanicus*	

Table A.2 - Seal species recorded from the Balleny Islands

The table lists sightings recorded in expedition reports and scientific publications. Breeding has not been confirmed for any species.

Common Name	**Species**
Crabeater seal	*Lobodon carcinophagus*
Elephant seal	*Mirounga leonina*
Leopard seal	*Hydrurga leptonyx*
Weddell seal	*Leptyonychotes weddellii*

Figure A.1 – ASPA 104 Sabrina Island, Balleny Islands, Antarctica. Regional map

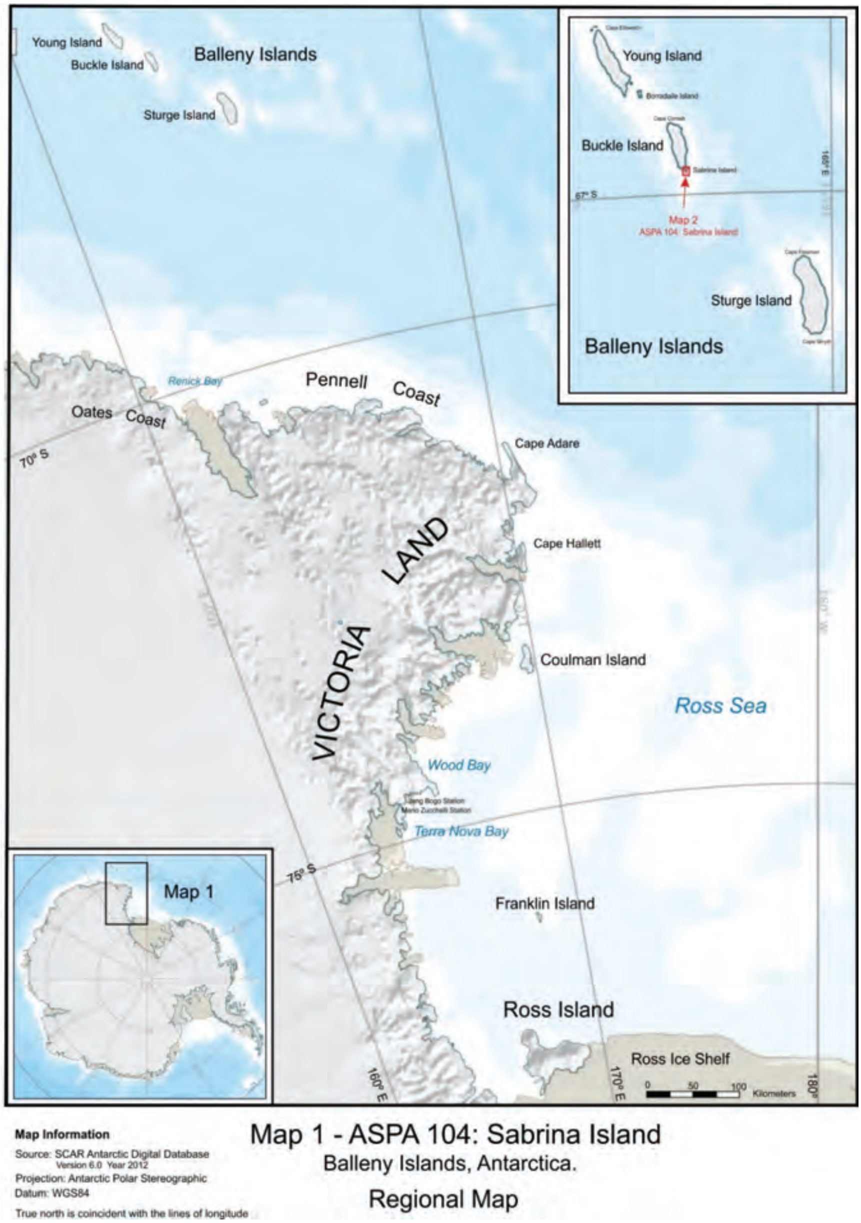
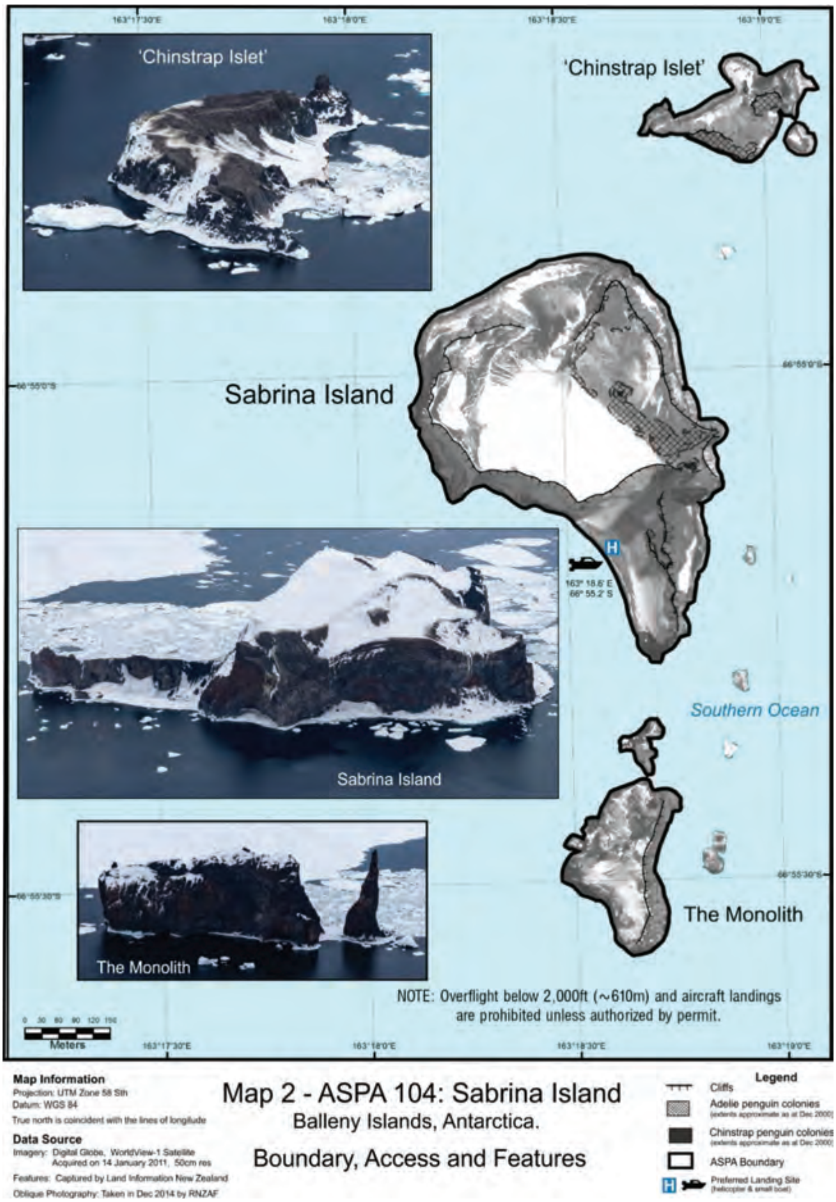


Figure A.2 - ASPA 104: Sabrina Island, Balleny Islands, Antarctica. Boundary, Access and Features



Management Plan For

Antarctic Specially Protected Area No. 105

BEAUFORT ISLAND, McMURDO SOUND, ROSS SEA

1. Description of Values to be Protected

Beaufort Island was originally designated as Specially Protected Area No. 5 in Recommendation IV-5 (1966) on the grounds that it "contains substantial and varied avifauna, that it is one of the most important breeding grounds in the region, and that it should be protected to preserve the natural ecological system as a reference area." The Area was re-designated by Decision 1 (2002) as Antarctic Specially Protected Area (ASPA) No. 105 and a revised Management Plan was adopted through Measure 2 (2003), Measure 4 (2010), and Measure 5 (2015)). The Area is an island relatively untouched by human activity, set aside primarily to protect the ecological values of the site from human interference.

Beaufort Island is the northern-most feature of the Ross Archipelago, lying approximately 30 kilometres north of Cape Bird, Ross Island. It is a portion of the rim of a volcanic cone, the remainder of which was eroded away and is now submerged to the east of the island. The island, and the remains of the submerged caldera, block the predominantly westward drift of pack ice and icebergs calving from the nearby Ross Ice Shelf. Icebergs ground on these peaks which in turn facilitate fast ice growth. Beaufort Island is predominantly rock but portions are ice and snow covered. On the south west side of the island there is a broad ice-free shelf with raised beaches behind which summer ponds form, fed by small meltwater streams draining to the coast. Sloping ice fields (about 12° to 15°) cover much of the west and north side of the island. An extensive flat area of less than 50 m elevation is at the north end of the island, where the ice cap of the island drains to a boulder beach, fringing that portion of the shore. Near vertical cliffs compose the eastern side of the island facing the centre of the caldera.

The avifauna is the most varied in the southern Ross Sea. There exists a large Adélie penguin (Pygoscelis adeliae) colony on the broad shelf of the southwest side of the island, and a smaller newly formed subcolony, established in 1995, on the beach along the northwest coast. The dating of Adélie penguin remains goes back 45,000 years. A breeding colony of Emperor penguins (Aptenodytes forsteri) exists in variable locations on the fast ice to the north and east of the island where grounded icebergs facilitate fast ice establishment. There is a colony of South polar skua (Catharacta maccormicki) on both the north and south coasts and Snow petrels (Pagodroma nivea) have been seen nesting in cavities on the cliffs at the south of the island. The boundaries of the Area, which previously excluded the Emperor colony, have been extended to include the fast-ice that could potentially be occupied by breeding birds. Weddell seals (Leptonychotes weddellii) haul out and pup on the fast ice adjacent to the various grounded icebergs and Leopard seals (Hydruga leptonyx) and Ross sea killer whales (Type C) but also the form known as Type B, occur in the vicinity. The Ross sea killer whales are attracted by fish, and the Leopard seals and Type B killer whales are attracted by the penguins and seals. Crabeater seals (Lobodon carcinophagus), Minke whales (Balaenoptera acutorostrata) and Arnoux's beaked whales (Berardius arnuxii) have also been seen in the surrounding waters.

Beaufort Island 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)).

Important Bird Area (IBA) 188, Beaufort Island, is found within the Area.

Open water and pack ice around the island early in the summer season make access difficult so most of the Area is known to have been visited only infrequently. Other than the penguins, Beaufort Island has not been comprehensively studied and is largely undisturbed by direct human activity. However, recent observations indicate that the snow and ice fields are receding. The ecological, scientific and aesthetic values derived from the isolation and relatively low levels of human impact are important reasons for special protection at Beaufort Island.

2. Aims and Objectives

The aim of the Management Plan is to provide protection for the Area and its features so that its values can be preserved. The objectives of the Management Plan are to:

- Avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- Preserve the natural ecosystem as a reference area largely undisturbed by direct human activities;
- Allow scientific research on the natural ecosystems, plant communities, avifauna, invertebrate communities and soils in the Area provided it is for compelling reasons which cannot be served elsewhere;
- Minimise human disturbance to these communities by preventing unnecessary sampling;
- Minimise the possibility of introduction of 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 will be undertaken to protect the values of the Area:

- Copies of this Management Plan (stating the special restrictions that apply), including maps of the Area, shall be made available at adjacent operational research/field stations.
- 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.
- Visits shall be made 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.
- National Antarctic Programmes operating in the region shall consult together with a view to ensuring these steps are carried out.

4. Period of Designation

Designated for an indefinite period.

5. Maps and Photographs

- Map 1: Beaufort Island topography and air access map. Specifications: Projection: Lambert Conformal Conic; Spheroid and horizontal datum: WGS8; Data sources: ASPA boundary, topography & infrastructure data supplied by Antarctica New Zealand (2019).
    - Inset 1: Ross Sea region showing the location of Beaufort Island near Ross Island
    - Inset 2: Beaufort Island in relation to Ross Island, showing the locations of McMurdo Station (USA) and Scott Base (NZ).

- Map 2: Beaufort Island wildlife and vegetation on northern coast. Specifications as for Map 1; ice-free ground from NZ Aerial Mapping imagery (22 Nov 1993).
- Map 3: Beaufort Island - Cadwalader Beach Adélie penguin colony. Specifications as for Map 1.
    - Photograph 1: Beaufort Island, Northern Coast, aerial, C.M. Harris January 1995
    - Photograph 2: Beaufort Island, North Coast, South polar Skua and Vegetation, C.M. Harris January 1995.
    - Photograph 3: Beaufort Island, Cadwalader Beach, aerial, C.M. Harris January 1995.

6. Description of the Area

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

The designated Area encompasses the whole of Beaufort Island (76° 56'S, 166° 56'E) above the mean high water mark, and includes adjacent fast-ice occupied by breeding Emperor penguins (Map 1). The coordinates include:

- From the northern coast of Beaufort Island at 76 ° 55' 44" S, 166° 52' 42" E north to 76° 55' 30" S, 166° 52' 49" E;
- From 76° 55' 30" S, 166° 52' 49" E east to 76° 55' 30" S, 167° 00' E;
- From 76° 55' 30" S, 167° 00' E south along the 167° longitude parallel to where it intersects with the coastline of Beaufort Island at 76° 55' 30"S, 167° E (Map 1).

The island is part of the late Tertiary volcanic vents that developed in a series along a line of weakness in the Ross Sea floor. The island is the remains of a basaltic cone of about the Last Interglacial age, and is one portion of the caldera. More than three quarters of the cone now comprises a circular series of submerged peaks to the east of Beaufort Island. These submerged peaks, along with the island, block the predominant westward drift of pack ice and cause icebergs to ground here which in turn allows fast ice to establish in this area. It is upon this fast ice that the Emperor penguins breed. The location of the breeding colony varies with the fast ice distribution and therefore the protected area boundary has been extended to account for the location of the colony in any given season.

The geology of the island is typical of an eroded, sub-aerially produced basaltic complex, with lava flows and explosion breccias and tuffs evident. Many of the volcanic rocks have been intruded by a series of late stage basaltic dikes, and there is evidence of layered ash-fall tuffs and welded spatter flows from local subsidiary cinder and spatter cones. The island is roughly 7 km long and 3.2 km wide rising to a highest point of 771 m at Paton Peak. The west and northwest side of the island is predominantly an ice field with ice cliffs along the northwest edge of about 20 m on the coast, while the east and south sides of the island are largely ice-free, with almost vertical, inaccessible cliffs rising straight from the sea. On the south west shore is Cadwalader Beach which comprises a beach foreland and cuspate spit, backed by steep basaltic cliffs and several talus cones. A series of beach ridges, which are generally occupied by the breeding Adélie penguins, have trapped meltwater ponds and mark the growth of the beach face away from the cliffs with time and isostatic uplift. A series of raised beaches is evident at the northern side of the island, some with evidence (quills and guano) of former and apparently substantial penguin occupation (to 45,000 years). Sub-tidal (abrasion) platforms and massive boulders are found below the highly weathered southern cliffs. The eastern cliffs descend directly into the sea. Beaufort Island is relatively inaccessible by sea, except on the south and north shores, due to the steep cliff nature of the island and owing to the submerged peaks and grounded icebergs. Shipping, therefore, gives the island a wide berth. In view of the isolation of Beaufort Island and the current low levels of shipping activity in the region, boundary markers and signs have not been installed to mark the Area.

There is one main Adélie penguin colony and one newly formed subcolony on Beaufort Island. The main colony of 70,468 breeding pairs (2013/14) occupies the flat area at Cadwalader Beach (Maps 1 and 3). Between 1981 and 2000 there was a general decreasing trend in the number of breeding pairs at the main colony, then an increasing trend from 2001-2012. The 2013/14 count is the highest number of breeding pairs recorded at this site since counts began in 1981 and is nearly twice the 30 years average (39,391 breeding pairs) for this site (Lyver et al., 2014). In 1995 a sub-colony established at the west end of the ice-free beach on the northern coast (76° 55' S, 166° 52'E) comprising 2 pairs with 3 chicks and approximately 10-15 non breeders. The sub-colony has continued to grow with 525 breeding pairs in the 2005-06 breeding season, 677 breeding pairs in the 2008-09 season and 989 breeding pairs in the 2013/14 season. Since 1996, scientists from the USA and NZ programmes have been banding a sample of 400 near-to-fledging Adélie penguin chicks at the Cadwalader Beach area. A few hundred banded adults, survivors of their juvenile years, now reside in the colony. Penguins banded at Cape Royds, Cape Bird and Cape Crozier have been sighted especially at the sub-colony on the north beach. Beaufort Island not long ago provided many emigrants to Ross Island colonies, but with recession of the ice fields and increased availability of nesting space, this is no longer the case. Above the beach, a raised ice-cored moraine terrace (5–20 m elevation, ranging from 2-3 metres wide over most of its length but broadening to 50 metres at its eastern end) extends for 550 m before rising more steeply toward the unstable basaltic cliffs which persist around the entire eastern side of the island. At least three sub-fossil penguin colony deposits have been identified within the moraine terrace, each layer vertically separated by around 50–100 cm of gravels and sand, suggesting this part of the island had been occupied by a sizable breeding penguin colony.

South polar skuas nest (roughly 150 pairs, but not specifically known) on the steep talus accumulating below the cliffs that rise behind the Adélie penguin colony at Cadwalader beach. Another population of approximately 50 pairs of skuas (1995 count) breed on the terrace and ice-free slopes on the northern shore. The proportion of breeders to non-breeders in this population is not known, but approximately 25 and 50 chicks were counted in January 1995 and 1997 respectively. Several snow petrels have also been seen in the cliffs above the Adélie colony at Cadwalader Beach.

On the fast-ice extending out from the northern and eastern coasts of Beaufort Island, a small colony of Emperor penguins (live chick counts from 1962 to 2012 range from 131 to 2,038 individuals; aerial photo of adult abundance was 812 in 2012 and 462 in 2018) is present annually between the months of approximately April to January. Chick counts minimally represent the number of breeding pairs. Chick counts at Beaufort Island declined between 2000 and 2004 when the giant iceberg B15A collided with the north-west tongue of the Ross Ice Shelf at Cape Crozier, Ross Island (Kooyman et al., 2007). In 2012 aerial photo of chick abundance was 705 and 417 in 2018.

Between 2000 and 2012 chick and adult counts have been variable. The size of the colony is limited by the areal extent and condition of the fast-ice, which affects the availability of breeding sites in the lee of the northern slopes of Beaufort Island. The precise location of the colony varies from year to year and the colony moves within a breeding season, but the general area of occupation is on the fast ice at the foot of the cliffs off the north-eastern corner of the island, indicated on Maps 1 and 2. A higher coefficient of variation in chick abundance found at this small colony suggests that it occupies a marginal habitat and may be susceptible to environmental change.

The ice-cored moraine terrace above the beach on the north end of the island (Maps 1 and 3) supports the growth of vegetation. Little can grow in the thick guano covering the Cadwalader beach area and all other areas of the island are either cliffs or ice covered. An area of vegetation, 50 meters wide and 5-7 meters above the beach on the north of the island, was described from site visits in January 1995 and 1997, consisting of an extensive (approximately 2.9 ha), continuous area of a single moss species Bryum argenteum. A second species of moss, Hennediella heimii, is also found among the B.argenteum. The moss community is known to support significant populations of mites (Acari) and springtails (Collembola). Although a detailed survey of invertebrates has not been conducted, Gomphiocephalus hodgsoni (Collembola) and Stereotydeus mollis (Acari) were found to be very abundant in moss samples taken from Beaufort Island. Recent genetic analysis of these populations has found unique genetic mitochondrial DNA haplotypes at Beaufort Island not found in other invertebrate populations in the Ross Sea region.

A diverse community of algae, also prolific on the south-shore shelf, is found at this site and while a detailed algal survey has not yet been undertaken, several species of algae have been found including the red snow algae Chlamydomonas sp., Chloromonas sp., and Chlamydomonas nivalis, representing one of the most southerly locations where red snow algae have been observed and Prasiola crispa is particularly abundant at the north beach site. A number of unicellular chlorophytes and xanthophytes (including Botrydiopsis and Pseudococcomyxa species) and cyanobacteria (particularly scillatorians) were found mixed with P. crispa. Green snow algae, noticeable as a green band at the lower levels of snow banks above the beach and below the ice cliffs, contained a mixture of Chloromonas and Klebsormidium species.

6(ii) Restricted zones within the Area

None.

6(iii) Structures within and near the Area

The only structure known to exist on the island is a signpost on a prominent rock in the Adélie penguin colony at Cadwalader Beach (Map 3). The sign, erected in 1959–60, bears the names and home towns of the seamen and the Captain of the HMNZS *Endeavour.* The sign is set in concrete and was in good condition in November 2008. The sign is of potential historic value and should remain *in situ* unless there are compelling reasons for its removal, which should be kept under review.

An astronomical survey station is recorded on a map of the island compiled in 1960, but it is unknown whether any associated permanent marker exists. The station is recorded as located at the south end of the main island ridge-line divide at an altitude of 549 m (Map 3).

6(iv) Location of other protected areas within close proximity of the Area

The nearest protected area to Beaufort Island is New College Valley, Caughley Beach, Cape Bird (ASPA 116) located approximately 30 km to the south at Cape Bird, Ross Island. Cape Royds and Backdoor Bay (ASPAs 121 and 157) are a further 35 km to the south on Ross Island. Cape Crozier (ASPA 124) is about 40 km to the east. (Refer to the inset: Map 1).

7. Terms and Conditions for Entry Permits

Entry into the Area is prohibited except in accordance with a Permit issued by appropriate national authorities. Conditions for issuing a Permit to enter the Area include:

- It is issued only for essential management purposes or compelling scientific reasons that cannot be served elsewhere;
- The actions permitted will not jeopardise the ecological or scientific values of the Area;
- Any management activities are in support of the aims of the Management Plan;
- The actions permitted are in accordance with the 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;
- Permits shall be issued for a stated period.

7(i) Access to and movement within the Area

- Land vehicles are prohibited within the Area and access shall be by small boat or by aircraft.
- There are no special restrictions on where access can be gained to the island by small boat. Pilots, air or boat crew, or other people on aircraft or boats, are prohibited from moving on foot beyond the immediate vicinity of the landing site unless specifically authorised by a Permit.
- 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).
- Over flight of bird breeding areas lower than 610 m (or 2000 ft) is normally prohibited. The areas where these special restrictions apply are shown on Maps 1 and 3. When required for essential scientific or management purposes (e.g. aerial photography to assess colony size), transient over flights down to a minimum altitude of 300 m (1000 ft) may be allowed over these areas. Conduct of such over flights must be specifically authorised by a Permit.
- Aircraft should land on the island only at the designated site (166° 52' 05" E, 76° 55' 09" S: Maps 1 and 3) on the large flat toe of ice on the north end of the island.
- Should snow conditions at the designated landing site at the time of visit prevent a safe aircraft landing, a suitable mid- to late-season alternative to the designated landing site may be found at the nominated northern camp site at the western end of the northern beach on Beaufort Island. It is preferred that aircraft approach and depart from the designated landing site from the south or west (Map 1). When it is found necessary to use the alternative site at the northern beach campsite, practical considerations may dictate a northern approach. When this is the case, aircraft shall avoid over flight of the area east of this site indicated on Maps 1 and 3.
- Use of smoke grenades when landing within the Area is prohibited unless absolutely necessary for safety and all grenades should be retrieved.
- The operation of Remotely Piloted Aircraft Systems (RPAS) in the area should be carried out, as a minimum, in compliance with the ‘Environmental Guidelines for operation of Remotely Piloted Aircraft Systems (RPAS)1 in Antarctica’ contained in Resolution 4 (2018).Visitors should avoid unnecessary disturbance to birds, or walking on visible vegetation. 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 effects.

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

- Compelling scientific research that will not jeopardise the ecosystem of the Area and which cannot be served elsewhere;
- Essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

No scientific equipment or structures are to be erected within the Area except as specified in a Permit. All markers, structures or scientific equipment installed in the Area must be approved by Permit and 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 shall be a condition of the Permit.

7(iv) Location of field camps

Camping is permitted only at two designated sites (Maps 1, 2 and 3). The north camping site is located on the flat area north of the designated landing site, on a more sheltered location at the NW end of the beach, 200 m from where several pair of Adélie penguins and skuas nest (if present). The second site is located 100 m from the northern edge of the large Adélie penguin colony at Cadwalader Beach.

7(v) 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 and the precautions listed in 7(ix) below shall be taken against accidental introductions.
- 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.
- No poultry products, including food products containing uncooked dried eggs, shall be taken into the Area.
- 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 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. Permanent depots are not permitted.

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

Taking or interfering with native flora or fauna is prohibited, except in accordance with a separate Permit issued under Article 3 of Annex II by the appropriate national authority specifically for that purpose. 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(vii) 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, which was not brought into the Area by the Permit holder or otherwise authorised, 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(viii) Disposal of waste

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

7(ix) Measures that are 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 biological monitoring and site inspection activities, which may involve the collection of small samples for analysis or review, or for protective measures.
- Any specific sites of long-term monitoring shall be appropriately marked.
- To help maintain the ecological and scientific values of the isolation and historically low level of human impact at Beaufort Island 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. 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, to the maximum extent practicable, 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, carry-bags, tent pegs, tarps and any other camping equipment) 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 exposed surfaces in 70% ethanol solution in water.

7(x) Requirements for reports

Parties should ensure that the principal holder for 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 organising the scientific use of the Area.

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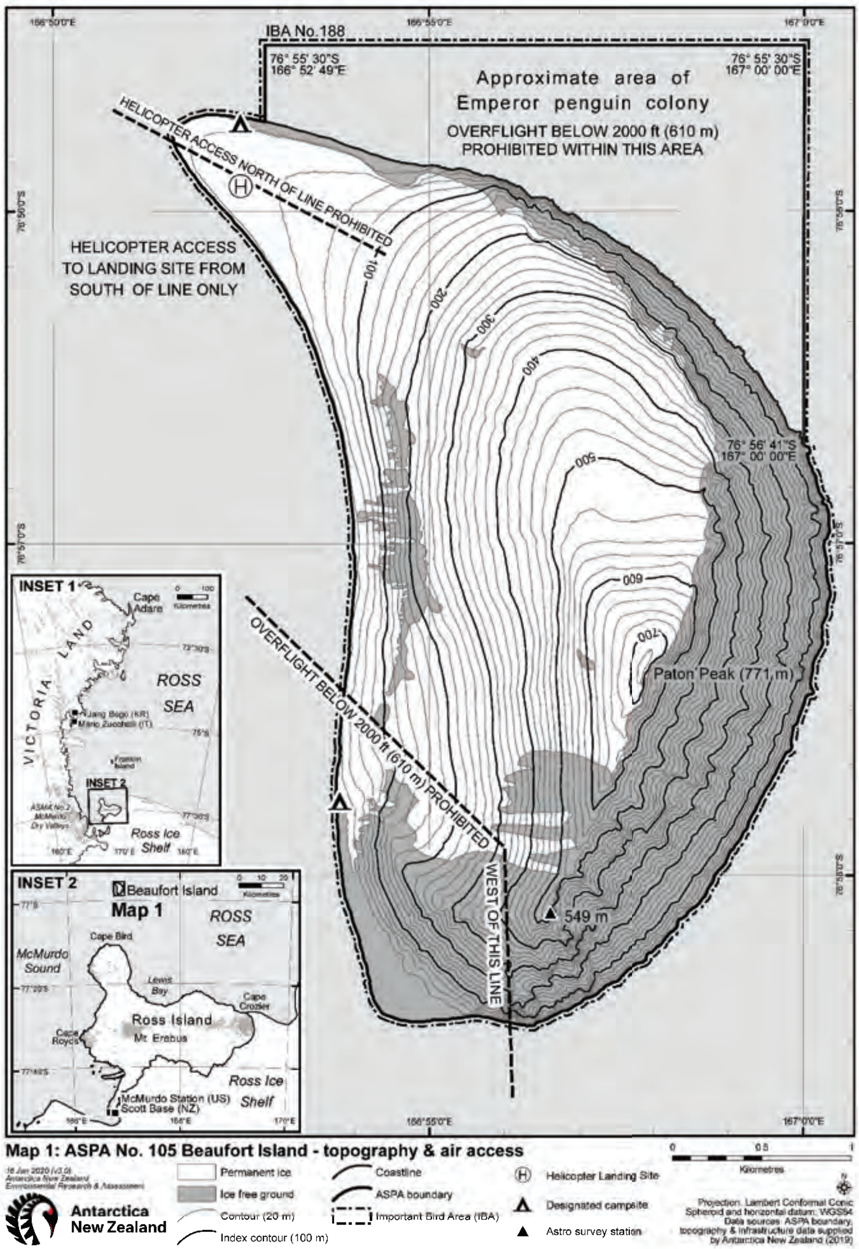
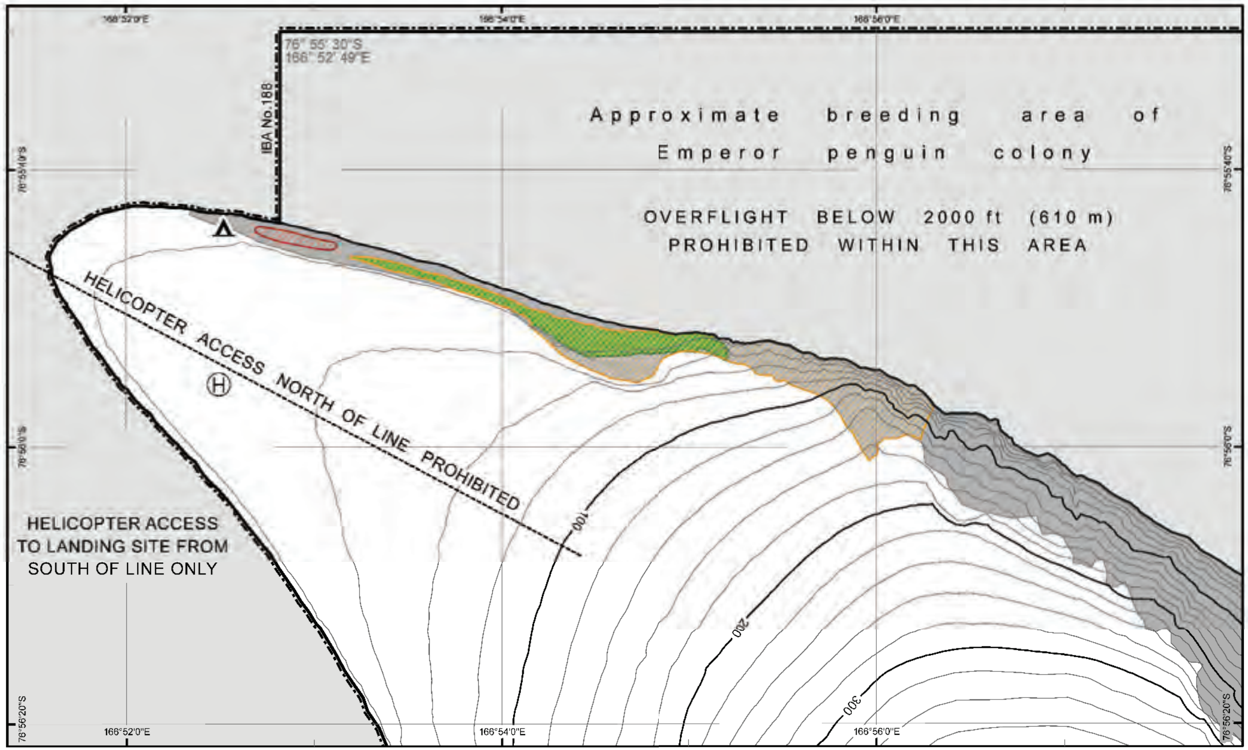


Map 1: ASPA No. 105 Beaufort Island - topography & air access



Map 2: ASPA No. 105 Beaufort Island - wildlife & vegetation on northern coast

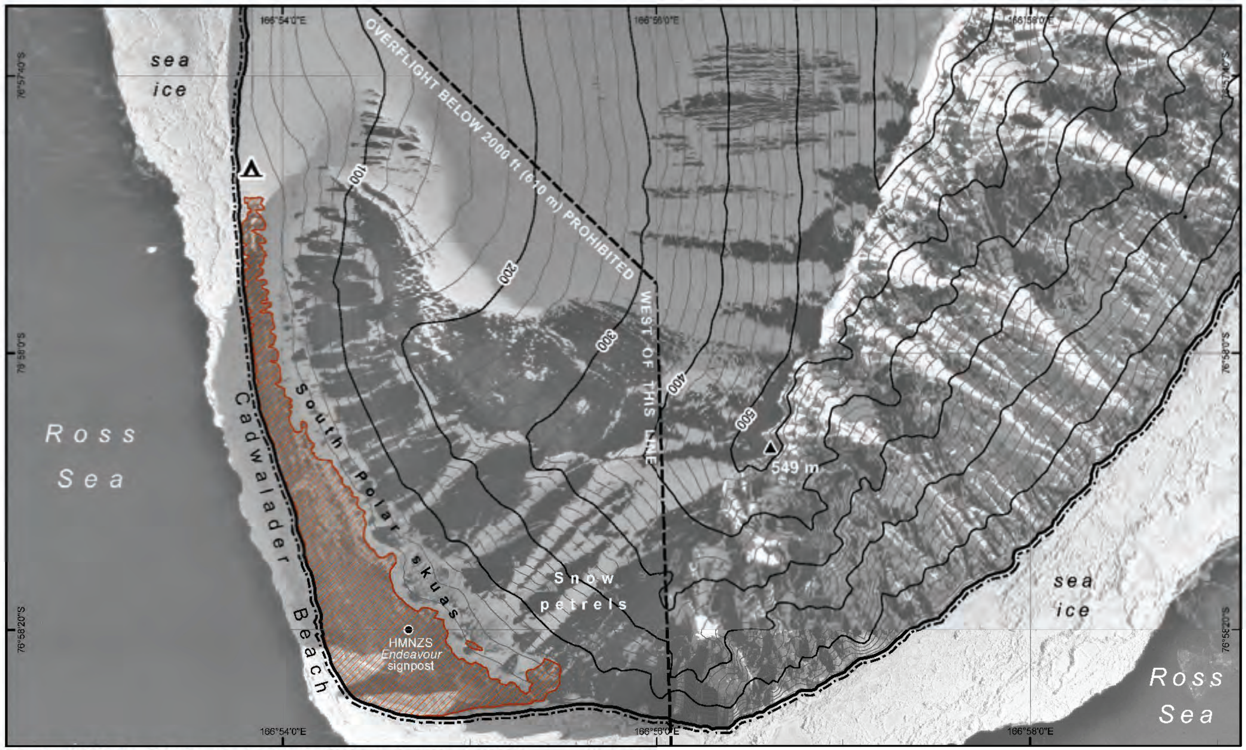
16 Jan 2020 (v3.0)
Antarctica New Zealand
Environmental Research & Assessment

Antarctica New Zealand

Permanent ice
Ice free ground
Coastline
Contour (20 m)
Index contour (100 m)
Protected area boundary
Rich vegetation (approx)
Important Bird Area (IBA)
Adélie penguin colony (approx)
South Polar skua colony (approx)
Helicopter Landing Site
Designated campsite

0 100 200 300 400 500
Metres

Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84
Contour interval: 20 m.
Data sources: Protected area boundary,
topography & infrastructure data supplied
by Antarctica New Zealand (2019).
Ice-free ground from NZ Aerial Mapping imagery (22 Nov 1993).



Map 3: ASPA No. 105 Beaufort Island - Cadwalader Beach Adélie penguin colony

Management Plan for Antarctic Specially Protected Area (ASPA) No. 106 CAPE HALLETT, NORTHERN VICTORIA LAND, ROSS SEA

Introduction

The Cape Hallett Antarctic Specially Protected Area is situated at the northern extremity of the Hallett Peninsula, northern Victoria Land at 72° 19' 11"S, 170° 13' 25"E. Approximate area: 0.53 km^2. The primary reason for designation of the Area is that it provides an outstanding example of biological diversity, in particular a rich and diverse terrestrial ecosystem. It includes a small area of particularly rich vegetation that represents a valuable scientific resource for monitoring of vegetation change in Antarctica. The Area contains the most diverse arthropod community known in the Ross Sea region, which is of scientific interest. Furthermore, the Area contains a substantial Adélie penguin (*Pygoscelis adeliae*) breeding colony comprising around 47,000 pairs in 2017/18, which is recolonizing the site of the former Hallett Station (NZ / US) and is therefore of particular scientific interest. Cape Hallett is the only protected area in northern Victoria Land designated on the grounds of its terrestrial ecosystem or which includes a substantial bird colony, providing an important representation of the ecosystem in this region of Antarctica. The Area was proposed by the United States of America and adopted through Recommendation IV-7 [1966, Specially Protected Area (SPA) No. 7]; boundaries were extended by Recommendation XIII-13 (1985); the Area was renamed and renumbered through Decision 1 (2002), and the boundaries were further extended through Measure 1 (2002) to include the Adélie penguin colony, increasing the size of the Area to 75 ha. A further adjustment of the boundary was made through Measure 5 (2010) to delete the Managed Zone and replace this with two sites outside of the protected area, to be managed by Antarctic Treaty Site Guidelines for Visitors. One of the sites identified for visitor access is on the northern / NW coast of Seabee Hook and the second is on the SE coast. A revised management plan was adopted through Measure 6 (2015).

ASPA No.106 was not classified under the Environmental Domains Analysis for Antarctica (EDA v.2.0) (Resolution 3 (2008)), although subsequent analysis has confirmed that the Area lies within 'Environment U – North Victoria Land Geologic'. Under the Antarctic Conservation Biogeographic Regions classification (Resolution 3 (2017)) the Area lies within ACBR8 – North Victoria Land. The Area has been identified as Antarctic Important Bird Area (IBA) No. 170.

1. Description of values to be protected

An area of approximately 12 ha at Cape Hallett was originally designated through Recommendation IV-7 (1966, SPA No. 7) after a proposal by the United States of America on the grounds that the Area provided an outstanding example of biological diversity, containing "a small patch of particularly rich and diverse vegetation which supports a variety of terrestrial fauna". The proposal gave special mention to the rich avifauna in the Area, which was noted as being of "outstanding scientific interest". The boundaries of the Area were enlarged in Recommendation XIII-13 (1985) to include extensive stands of vegetation to the south and north of the Area, increasing the Area to approximately 32 ha. The boundaries were further extended in Measure 1 (2002) to include scientific values related to the Adélie penguin (*Pygoscelis adeliae*) colony on Seabee Hook, which was identified as IBA No. 170 in 2015, increasing the size of the Area to 75 ha. Boundary and zoning revisions through Measure 5 (2010) reduced the size of the Area to 53 ha.

The eastern part of the Area contains a variety of habitats with plant communities that are considered important as they include most extensive, representative, and outstanding examples known near the northern extremity of the latitudinal gradient of Victoria Land and the Ross Sea. Vegetation surveys have recorded five species of moss in the Area, dominated by *Bryum subrotundifolium*, and 27 species of lichen. Although few algal species have been identified numerous species are expected to be present. The terrestrial habitats have been extensively studied, most recently as part of the international Latitudinal Gradient Project (LGP) (Italy, New Zealand, and United States). A vegetation plot in the eastern part of the Area is particularly valuable as a scientific resource for monitoring vegetation change in Antarctica, and this is designated a Restricted Zone. This site was first surveyed in detail in 1961/62 and provides a valuable baseline against which vegetation changes can be measured at a fine scale.

Detailed information on the distribution and abundance of arthropod species in the Area is available, which also represents a valuable scientific resource. In terms of species richness, Cape Hallett represents the most diverse arthropod community known in the Ross Sea region, with eight species of mites (Acari) and three of springtails (Collembola) identified within the Area. Of these, two (*Coccorhagidia gressitti* and *Eupodes wisei*) have their type localities at Cape Hallett.

A large number of markers were placed during early scientific studies conducted within the Area to mark sites of plant and bird studies. Many of these markers remain *in situ* and now represent a highly valuable resource for scientific studies that may wish to make repeat measurements.

Hallett Station was established by New Zealand and the United States on Seabee Hook in 1956 as part of the International Geophysical Year (IGY), and operated continuously until it closed in 1973. Although all structures have been removed, the site continues to possess enduring historic and heritage values relating to its former human use. In recognition of these values, many of the structures and artefacts from the former station are now held at the Canterbury Museum, Christchurch. In 2015, the only known remaining item of potential historical value and /or scientific value is the well-preserved body of a husky that died in 1964, which is contained in an enclosed wooden box located in the eastern part of the Area.

Adélie penguins have started to recolonize the site where the station was previously located. The history of human impact on the Adélie penguin colony and the subsequent station closure, together with the availability of reliable and repetitive historical data on Adélie population changes, make this site unique and ideal for scientific study of impacts on, and recovery of, the colony following substantial ecosystem disturbance. As such, the site has high scientific value, and in order to maintain this value it is desirable that any further human presence be carefully controlled and monitored.

In addition to the ecological and scientific values described, the Area possesses outstanding aesthetic values, with its combination of prolific biological resources and the impressive surrounding scenery of Edisto Inlet and Mt. Herschel (3335 m). Seabee Hook is one of only a few such sites that are relatively accessible in the northern Ross Sea. The site also has high educational value as an example of a station that was decommissioned and removed, with the site now showing evidence of recovery.

2. Aims and objectives

Management at Cape Hallett 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 particular on terrestrial and seabird ecology and on environmental recovery, while preventing unnecessary sampling and human disturbance in the Area;
- allow other scientific research provided it will not jeopardize the values of the Area;
- prevent the removal of, or disturbance to, markers used in previous scientific research that could be valuable for future comparative studies;
- allow environmental clean-up and remediation activities associated with the decommissioning and removal of the former Hallett Station as required and appropriate, provided the impacts of these activities are not greater than those arising from leaving material *in situ*;
- take into account the potential historic and heritage values of any artifacts before their removal and/or disposal, while allowing for appropriate clean-up and remediation;
- minimize the possibility of introduction of alien 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; and
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

- Markers should be installed to identify areas requiring specific management activities, such as scientific monitoring sites;

- 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;
- National Antarctic programs operating in the Area should maintain a record of all new markers, signs and structures erected within the Area;
- National programs shall ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and charts for which they are responsible;
- To the extent practicable, efforts shall be made to remove any small waste debris still present within the Area following the removal of Hallett Station, although this shall be undertaken in consultation with an appropriate authority to ensure that potentially important historic or heritage values of any artifacts are not lost;
- The Area shall be visited as necessary (preferably at least 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 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

Map 1: ASPA No. 106 Cape Hallett: Regional overview.

Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 72° 20'S; 2nd 72° 30'S; Central Meridian: 170° 00'E; Latitude of Origin: 72° 00'S; Spheroid and horizontal datum: WGS84; Contour interval 200 m.

Map 2: ASPA No. 106 Cape Hallett: Air access guidance.

Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 72° 19'S; 2nd 72° 19' 30"S; Central Meridian: 170° 13' 30"E; Latitude of Origin: 72° 00'S; Spheroid: WGS84; Datum: USGS 'Fisher' geodetic station 1989-90: ITRF93 Coordinates 72° 19' 06.7521"S, 170° 12' 39.916"E;

Map 3: ASPA No. 106 Cape Hallett: Topography.

Specifications for Map 3 are the same as for Map 2. Contour interval 5 m: contours derived from a digital elevation model used to generate an orthophotograph at 1:2500 with a positional accuracy of ±1 m (horizontal) and ±2 m (vertical) with an on-ground pixel resolution of 0.25 m.

Map 4: ASPA No. 106 Cape Hallett: Former Hallett Station area.

Specifications for Map 4 are the same as for Map 2.

Map 5: ASPA No. 106 Cape Hallett: Restricted Zone.

Specifications for Map 5 are the same as for Map 2. Digital orthophoto and facilities data supplied by Jeong-Hoon Kim pers. comm. 2020.

6. Description of the Area

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

Overview

Cape Hallett is located at the southern end of Moubray Bay, Northern Victoria Land, in the western Ross Sea (Map 1). The protected area occupies most of the ice-free ground of a cuspate spit of low elevation known as

Seabee Hook and includes the adjacent western slopes of the northern extremity of Hallett Peninsula, extending east of Willett Cove to the margin of the permanent glaciers (Maps 1 – 3).

Boundaries and coordinates

The northern boundary of the Area extends along the northern coast of Seabee Hook from 72° 19' 05.0"S, 170° 14' 25.5"E to the eastern limit of the Adélie penguin colony at 72° 19' 04.9"S, 170° 14' 19.3"E (Map 3). The boundary then follows the edge of the nesting area of the Adélie penguin colony (as defined in 2009), maintaining a distance of at least 5 m from the colony, extending to the coordinate 72° 19' 07.9"S, 170° 12' 25.3"E (Map 4).

From 72° 19' 07.9"S, 170° 12' 25.3"E the boundary extends 33 m due west to the coast at 72° 19' 07.9"S, 170° 12' 21.8"E (Map 4). From this coastal position, the boundary of the Area continues southward to follow the western and southern coastline of Seabee Hook to the position 72° 19' 19.1"S, 170° 12' 54.3"E, which is near the southeastern extremity of the spit (Map 3). From this location the boundary extends northward, following around the edge of the nesting area, maintaining a distance of at least 5 m from the colony, in the southeastern part of Seabee Hook to the position 72° 19' 15.3"S, 170° 12' 58.7"E (Map 3). From this coastal position, the boundary of the Area continues northward to follow the low water shoreline along the eastern coast of Seabee Hook, and then follows the low water coastline around Willett Cove to the southern boundary at 72° 19' 28.0"S, 170° 13' 24.9"E (Map 3).

From 72° 19' 28.0"S, 170° 13' 24.9"E the boundary extends eastward to the Bornmann Glacier, following a seasonal stream which descends from the glacier. The eastern boundary of the Area then follows the glacier and permanent ice margin northward at elevations approximately between 120 – 150 m, crossing the steep western slopes of Hallett Peninsula and following the upper outcrops of a series of rocky ridges dissecting the slope. The boundary then descends to join the northern coastline of Seabee Hook at the base of a rock buttress at 72° 19' 05.0"S, 170° 14' 25.5"E (Map 3).

Climate

Seabee Hook is surrounded by sea ice for approximately eight months of the year. Sea ice usually breaks out annually, beginning in late December to early January, and re-forms in early March. Summer temperatures range from 4°C to -8°C, with a mean annual temperature of -15.3°C, and winds are predominantly from the south. Precipitation in the form of snow is common during the summer, with annual precipitation approximately 18.3 cm of water equivalent.

Geology, geomorphology, soils and freshwater environment

The topography of the Area comprises the large flat area of the spit and adjoining steep scree forming part of the western slopes of northern Hallett Peninsula. Seabee Hook is composed of coarse volcanic material deposited in a series of beach ridges, with gently undulating terrain of hummocks and depressions and a number of level areas. Many of the depressions contain melt water in the summer, and are colonized by dense mats of algae. In the northeastern part of the Area a small meltwater stream flows from the western slopes of the Hallett Peninsula down to Willett Cove. There is higher moisture availability in soils at Cape Hallett compared to sites in Southern Victoria Land. Sub-surface soils are typically saturated after snowfall, with groundwater at between 8 and 80 cm below the soil surface during summer. Permafrost underlies soils on Seabee Hook at a depth of ~1 m (Hofstee *et al*. 2006). Soils in areas occupied by, or affected by water runoff from, penguin colonies are ornithogenic in character and were classified as Typic Haplorthels over mounds and Typic Aquorthels between mounds by Hofstee *et al*. (2006). Beyond areas influenced by the presence of penguins, these authors classified soils as Typic Haplothels, with one example of Typic Haploturbels in an area of patterned ground.

Vegetation

In wetter parts of the Area, the algal component is comprised mainly of the sheet-like green alga *Prasiola crispa* and *Protococcus* sp., with associated filamentous and blue-green forms (*Ulothrix* sp.) and cyanobacteria (e.g. *Nostoc*). It is expected that a number of other algal species may be present, but few have been identified.

The vegetation within the Area, with the exception of algae such as *Prasiola*, is largely confined to the ice-free ground not occupied by breeding Adélie penguins, which is to the east of Willett Cove and south of 72° 19' 10" S. This area includes a 100-200 m strip of relatively level ground adjacent to Willett Cove and steeper slopes up to the crest of the Hallett Peninsula ridge. The strip of flat ground comprises a number of dry, gravel hummocks up to 1.5 m high, many of which are occupied by nesting skuas, and in the northern part old guano deposits indicate former occupation by Adélie penguins. Small patches of moss and algae may be found at the base of these hummocks but the upper parts are devoid of vegetation. Substantial beds of moss colonize stable gravel flats in the north part of the flat ground where there is a high water table, while scattered patches of moss, algae and lichen occur on coarser, more angular, loose rocks in the south. The moss becomes more sparse as the ground slopes upwards, with the notable exception of a particularly dense and extensive patch covering approximately 3900 m^2 with almost complete coverage of the substratum occupying a shallow valley on a scree slope in the south of the Area (Map 3). Only the most prolific areas are illustrated on Map 3.

Five moss species have been identified within the Area (Table 1). *Bryum subrotundifolium* is the dominant moss within the Area. The presence of *Bryum subrotundifolium* in such a bird enriched area makes the Area an excellent example of a bird affected vegetation site. Also, the presence of almost mono-specific stands of *Bryum pseudotriquetrum* at the site is unusual for the region.

The steep scree slope adjoining the largely flat area is dissected by shallow gullies and small ridges, with a number of prominent rock outcrops. These rock outcrops, particularly in the north of the Area, support large stands of lichens and scattered moss, with cover of 70 – 100% in many places. Twenty-seven lichen species have been recorded in the Area (Table 1). Nitrogen-tolerant lichen species such as *Xanthomendoza borealis* and species of *Caloplaca, Candelariella, Physcia* and *Xanthoria* may be observed in the immediate vicinity of the penguin breeding area (Crittenden *et al.* 2015).

Eight species of mites and three species of springtails have been recorded from within the Area (Table 1) (Sinclair *et al*. 2006). *F. grisea* occurs mainly on the scree slopes and adjacent level areas, *C. cisantarcticus* was reported to be associated with moss, occurring plentifully on level ground, while *D. klovstadi* was abundant under stones on the slopes. Four species of nematodes have been found in the Cape Hallett area (Table 1), the most abundant, and in general the most dominant, species of which is *Panagrolaimus davidi* Timm (Raymond *et al*. 2013).

Table 1: Moss, lichen and invertebrate species recorded within ASPA No. 106, Cape Hallett

Mosses a	**Lichens** a, b, c, d	**Invertebrates**
		Mites e
Bryum subrotundifolium	*Acarospora gwynnii*	*Coccorhagidia gressittii*
Bryum pseudotriquetrum	*Amandinea petermannii*	*Eupodes wisei*
Ceratodon purpureus	*Amandinea coniops*	*Maudheimia petronia*
Grimmia sp	*Buellia frigida*	*Nanorchestes* sp.,
Sarconeurum glaciale	*Caloplaca athallina*	*Stereotydeus belli*
	Caloplaca citrina	*S. puncatus*
	Caloplaca saxixola	*Tydeus setsukoae*
	Candelaria murrayi	*T. wadei*
	Candelariella flava	
	Lecanora chrysoleuca	**Springtails** e
	Lecanora expectans	*Cryptopygus cisantarcticus*
	Lecanora mons-nivis	*Friesea grisea*
	Lecanora physciella	*Desoria klovstadi*
	Lecidea cancriformis	
	Lecidella greenii	**Nematodes** f
	L. siplei	*Eudorylaimus antarcticus* (Steiner) Yeates
	Physcia caesia	*Panagrolaimus davidi* Timm
	Pleopsidium chlorophanum	*Plectus* sp.
	Rhizocarpon geographicum	*Scottnema lindsayae* Timm
	Rhizoplaca chrysoleuca	
	Rhizoplaca macleanii	

Mosses a	**Lichens** a, b, c, d	**Invertebrates**
	Rhizoplaca melanophthalma	
	Umbilicaria decussata	
	Usnea sphacelata	
	Xanthomendoza borealis	
	Xanthoria elegans	
	Xanthoria mawsonii	

Sources:
a T.G.A. Green, University of Waikato, New Zealand and R. Seppelt, Australian Antarctic Division, 2002;b Smykla *et al*. 2011; c Ruprecht *et al*. 2012; d Crittenden *et al.* 2015; e Sinclair *et al*. 2006; f Raymond *et al*. 2013.

Birds

Seabee Hook is the site of one of the largest Adélie penguin colonies in the Ross Sea region, with a mean of 42,628 breeding pairs of Adélie penguins (*Pygoscelis adeliae*) reported over 14 seasons sampled between 1981 and 2012 (Lyver *et al*. 2014). Approximately 63,971 breeding pairs were present in 2009/10 (combined total of direct nest, oblique aerial and ground photo counts made 26 November – 3 December 2009; unpublished data ERA 2010). Seabee Hook is also the site of the former Hallett Station, a joint United States and New Zealand station that was open from 1956-73. During operation the station and associated infrastructure occupied an area of 4.6 ha on land that had formerly been occupied by breeding Adélie penguins. Establishment of Hallett Station in 1956 required eviction of 7580 penguins, including 3318 chicks, in order to clear the 0.83 ha required for bulldozing and erection of buildings. The colony was subjected to substantial impacts from the establishment and operation of Hallett Station, and declined from 62,900 pairs in 1959 to a low of 37,000 pairs in 1968, although increased again to 50,156 by 1972. Fluctuations in populations may have been exacerbated by changes in sea ice cover documented for the entire region. By 1987, after the closure of the station in 1973, the colony had increased to near its 1959 population; however, few areas modified by humans had by that time been fully recolonized. The area formerly occupied by the station has now been partly recolonized, although numbers were estimated at 39,014 breeding pairs in 1998/99, and an aerial census in 2006/07 (conducted as part of a long-term program) recorded only 19,744 breeding pairs (Lyver and Barton 2008, unpublished data). The count of 63,971 breeding pairs of Adélie penguins made in late 2009 (unpublished data ERA 2010) is comparable to numbers recorded on Seabee Hook around the time Hallett Station was built. More recently, Kim *et al* (2018) recorded 47,373 breeding pairs from a drone survey conducted on 23 Nov 2017.

South Polar skuas (*Catharacta maccormicki*) breed within the Area. The population declined from 181 breeding pairs in 1960/61 to 98 breeding birds recorded in both 1968/69 and 1971/72. In January 1983 there was a population of 247 birds (84 breeding pairs and 79 non-breeding birds). A survey conducted between 27 November – 02 December 2009 recorded 14 breeding pairs and 66 individuals on Seabee Hook. An additional 23 breeding pairs and 92 individuals were counted in the area east of Willett Cove, giving a total of 37 breeding pairs and 158 individuals, and a grand total of 232 birds in 2009/10. Approximately 250 skua nest sites are marked and numbered within the Area; markers should not be disturbed or removed.

Emperor penguins (*Aptenodytes forsteri*) have been recorded in the vicinity in late December, and solitary Chinstrap penguins (*Pygoscelis antarctica*) have been recorded in late January and February. Wilson’s Storm petrels (*Oceanites oceanicus*) and Snow petrels (*Pagodroma nivea*) breed close to Cape Hallett across Edisto Inlet; numerous Snow petrels were observed around the cliffs of Cape Hallett in December 2009, suggesting they may breed in this area. Southern Giant petrels (*Macronectes giganteus*) have been sighted frequently in the vicinity of the Area, although numbers have dropped in recent years, possibly due to declining populations further to the north. Weddell seals (*Leptonychotes weddellii*) are commonly seen; these seals breed in Edisto Inlet, and have been recorded ashore on Seabee Hook. Other mammals commonly seen offshore include Leopard seals (*Leptonyx hydrurga*) and Minke whales (*Balaenoptera acutorostrata*).

Antarctic Important Bird Area (IBA) No. 170 Seabee Hook, Cape Hallett, was identified because the penguin colony contains ≥1% of the global Adélie penguin population (Harris *et al*. 2015). The IBA has the same boundary as the ASPA (Map 3).

Human activities and impact

Hallett Station was established by New Zealand and the United States on Seabee Hook in December 1956 as part of the IGY. The base operated continuously until its closure in February 1973 and supported a range of activities including the 1967/68 Mt. Herschel expedition led by Sir Edmund Hillary. Station construction had significant impacts on the environment, with almost 8000 Adélie penguins removed from the site. Beginning in 1984, the station was progressively cleaned up, and a joint NZ / US multi-year remediation plan for the station and surrounding area was formulated in 2001. Remediation continued in 2003/04 and 2004/05, when most remaining structures were demolished and removed, and the last remaining substantial items were removed at the end of January 2010. Many of the buildings and artefacts from the former Hallett Station are now held at the Canterbury Museum, Christchurch.

Some material associated with the former station still remains dispersed throughout the Area, including small pieces of wood and metal, wire, and metal drums, much of which is firmly embedded in the ground. In addition, the well-preserved body of a husky that died in 1964 remains contained within an enclosed wooden box covered by rocks in the east of the Area (Map 3).

As part of the clean-up operation, mounds were constructed within the old station footprint to encourage Adélie penguin recolonization, and substantial parts of these areas have now been occupied (Map 4). The history of human impact on the Adélie penguin colony and its subsequent recovery make the site of high scientific value for research into the impacts on and recovery of the colony following significant ecosystem disturbance.

6(ii) Access to the Area

Access to the Area may be made by air, from the sea or by pedestrians over sea ice.When sea ice is present, areas of sea ice that are potentially more stable and better suited to aircraft landing may be found at sites southwest of Seabee Hook in the enclosure of Edisto Inlet. However, sea ice within Edisto Inlet can break out rapidly, even early in the season, so care is needed.

Access restrictions apply within the Area, in particular for all aircraft operations. The specific conditions for access are set out in Section 7(ii) below.

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

Hallett Station was established on Seabee Hook in December 1956 and closed in February 1973. By 1960 the buildings of Hallett Station occupied 1.8 ha and the associated roads, refuse dumps, fuel caches and radio aerials a further 2.8 ha. The station was occupied year-round until 1964, from when summer-only operation continued until closure. The station was progressively dismantled after 1984 and in 1996 only six structures, including a large 378,500 liter (100,000 gallon) fuel tank remained. Liquid fuel remaining in the large fuel tank was removed in February 1996. Further clean-up work was undertaken in 2003/04 and 2004/05 to remove all remaining structures including the fuel tank, and to remove contaminated soil from the area. All remaining substantial items were removed from the Area on 30-31 January 2010.

Two Automatic Weather Stations (AWS) operated by the United States (McMurdo Dry Valleys Long Term Ecological Research) and New Zealand (National Institute of Water and Atmospheric Research) are located 10 m apart approximately 50 m north of the designated campsite (Map 3). New Zealand maintains a bunded fuel cache of several drums approximately 50 m south of the designated campsite. An enclosed box containing the remains of a husky dog that died in 1964 is located near a large rock in the eastern part of the Area, covered by loose rocks (Map 3).

A multi-year research camp designed to accommodate up to ~12 people was installed at the designated campsite by the Republic of Korea in 2017/18 (Maps 3 & 5) and will remain in the Area until at least 2021/22. The camp occupies an area of ~100 x 40 m close to the shore of Willett Cove, and is contained within the Facilities Zone, although camping may take place on adjacent sea ice outside of the Facilities Zone and Area. In 2020/21 the camp comprised a main building (7 x 6 m), storage facilities (one 9 x 4 m wooden building, several wooden crates, and a snowmobile shelter), two toilets, three fuel caches, and up to ~12 tents for camping and housing equipment. Solar panels are installed on the main building to reduce fuel consumption. The camp site is accessed on foot from sea ice or along the shoreline of Willett Cove. The designated Secondary helicopter landing site (Map 2) is used for helicopter access.

The USGS geodetic station 'FISHER' (Maps 3 & 4) consists of a standard USGS Antarctic brass tablet stamped with "FISHER 1989-90" and is set flush on the top of a large concrete block (2x1x1 m) at an elevation of 2.15 m. The benchmark is located approximately 80 m south of the emergency cache and 140 m inland from the NW coast of Seabee Hook. Following recolonization of the old station area, the benchmark now lies within a small Adélie penguin subcolony, and is therefore likely to be surrounded by breeding birds during the summer. An emergency cache, comprising a large box (~1.5 m square and 1 m in height) painted bright red on top with smaller box alongside, is located on the site of the former station (Map 4).

Markers from a number of scientific studies are present within the Area, including those delineating the vegetation monitoring plot within the Restricted Zone. It should be noted that not all historical markers have been documented.

The nearest permanent scientific stations to the Area are Mario Zucchelli (Italy) and Jang Bogo (Republic of Korea), which are located ~330 km south of the Area (Map 1, Inset 1)

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

The nearest protected area to Cape Hallett is ASPA No.159 Cape Adare 115 km to the north.

6(v) Special zones within the Area

Facilities Zone

A Facilities Zone is designated on the eastern shoreline of Willet Cove to contain temporary camp, science and support facilities and to ensure related human activities are contained and managed within a clearly defined part of the Area (Map 5). Access to the Facilities Zone is allowed by Permit in support of activities authorized by the Permit. The Facilities Zone is designed to minimize the footprint of camping and associated facilities within the Area, and extends approximately 90 m in length along the shoreline and up to a maximum of 40 m inland. The coordinates of the Facilities Zone boundary corners are given in Table 2.

Table 2. Facilities Zone corner coordinates

Corner	**Latitude (S)**	**Longitude (E)**
A	72° 19' 13.1"S	170° 13' 33.8"E
B	72° 19' 13.5"S	170° 13' 37.8"E
C	72° 19' 14.4"S	170° 13' 36.8"E
D	72° 19' 14.3"S	170° 13' 35.2"E
E	72° 19' 16.1"S	170° 13' 33.0"E
F	72° 19' 15.8"S	170° 13' 30.5"E

The Facilities Zone is located to help minimize human impacts, and occupies an area of unconsolidated beach gravels that was formerly used as a road when Hallett Station was operational. Stakes for tent guys have been driven into the hard, stony ground within the Facilities Zone. The site is exposed to sea spray and occasional tidal events.

Restricted Zone

A small zone directly below the scree slopes in the northeast of the Area is designated a Restricted Zone in order to preserve part of the Area as a reference site for future comparative vegetation studies. Access to the Restricted Zone is allowed only for compelling reasons that cannot be served elsewhere in the Area. The remainder of the Area is more generally available for research programs and sample collection.

A vegetation study plot of approximately 28 m by 120 m was mapped in detail by Rudolph (1963), which was relocated and re-mapped by Brabyn *et al*. (2006) to provide a quantification of vegetation change at the site over a 42-year period. This site established by Rudolph represents an extremely valuable resource for monitoring vegetation change. Markers used in both studies remain *in situ* and define the extent of the vegetation monitoring plot. The NE corner of the monitoring plot is indicated by a large boulder with a cairn built on top, located at 72° 19' 11.37"S, 170° 14' 2.55"E . Detailed descriptions of the plot are given in Rudolph (1963) and Brabyn *et al*. (2006). Rudolph also photographed stones colonized by lichens, which Brabyn *et al.* (2006) re-photographed to measure lichen growth rates. One of these sites (shown on Map 3) is within the Restricted Zone and should not be disturbed.

The Restricted Zone provides a buffer around the monitoring plot of 20 m on the NW side and 10 m on the other three sides, making a rectangle of 58 m in width and 140 m in length. The corner coordinates of the Restricted Zone are defined in Table 3. A series of cairns has been constructed (on existing rocks where possible) to indicate the extent of the Restricted Zone (Map 3).

Table 3. Restricted Zone corner coordinates

Corner	Latitude (S)	Longitude (E)
Northeast	72° 19' 11.219"S	170° 14' 4.012"E
Northwest	72° 19' 10.43"S	170° 13' 58.341"E
Southwest	72° 19' 14.479"S	170° 13' 51.901"E
Southeast	72° 19' 15.299"S	170° 13' 57.338"E

Helicopter Access Zone

A Helicopter Access Zone shows the preferred access route from the Primary to the Secondary helicopter landing site, following a route along the southern coastline of Willett Cove (Map 2).

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 or for reasons essential to the management of the Area;
- 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, scientific, educational, historic, and aesthetic values of the Area;
- it is issued for compelling educational or outreach reasons 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 when in the Area.

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

Access into the Area shall be by small boat, helicopter, or on foot. Vehicle access is strictly limited to within the Facilities Zone.

Foot access and movement within the Area

- All 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 effects. Visitors should avoid walking on visible vegetation. Care should be exercised when walking in areas of moist ground and on screes, where foot traffic can easily damage sensitive soils and plant communities.
- Access to the Restricted Zone is allowed only for compelling reasons that cannot be served elsewhere in the Area.
- It is important that all visitors are careful to restrict their movements around the campsite, keeping to the area along the shoreline to avoid trampling inland areas that are seasonally moist and richly colonized by a variety of plants and invertebrates, which are the subject of on-going research.
- Within the Adélie penguin colony, visitors should not enter sub-groups of nesting penguins unless required for research or management purposes: visitors should walk around the coastal strip of Seabee Hook when possible, and/or around or between sub-groups. Traces of the old station road extend from the NW corner of Willett Cove through to the former station site, and remains a comparatively wide corridor where pedestrians can maintain a reasonable distance from nesting birds.
- Visitors should avoid walking on the scree slopes in the eastern part of the Area unless necessary for essential scientific or management purposes; screes are a sensitive and easily damaged habitat for a diverse community of flora and fauna.

Vehicle access

Vehicles are prohibited from the Area, except small vehicles (e.g. snowmobiles or all-terrain vehicles (ATVs), which may be used on sea ice surrounding the Area) may access the Facilities Zone by permit for parking, which should be as close to the shoreline as practicable. Access by vehicles shall be made by the least sensitive and the shortest practicable route, avoiding wet or vegetated areas.

Small boat access

There are no special restrictions on where access can be gained to the Area by small boat, although small boat landings with the purpose of camping should be made to Willett Cove in order to avoid the need to haul camp equipment through the Adélie penguin colony. Strong currents and eddies have been reported on the seaward margins of Seabee Hook, which may prove difficult for small boat landings. Ocean conditions are generally calmer in Willett Cove and in the lee of Seabee Hook.

Aircraft access and overflight

Restrictions on aircraft operations apply during the period between 01 October and 31 March, when all aircraft shall operate and land within the Area according to strict observance of the following conditions (refer to Map 2):

1) Overflight of the Area by piloted aircraft below 2000 feet (~610 m) is prohibited, unless authorized by permit for purposes allowed for by the Management Plan;
2) Overflight and landings by piloted aircraft within ½ nautical mile (~930 m) of the Adélie penguin colony on Seabee Hook for tourism is strongly discouraged;
3) Landings by piloted aircraft within ½ nautical mile (~930 m) of the Adélie penguin colony on Seabee Hook should be avoided wherever possible;
4) Landings by piloted aircraft beyond ½ nautical mile (~930 m) of the Adélie penguin colony may select landing sites according to visit needs and local conditions;
5) The Primary Landing Site (72° 19.686'S, 170° 11.460'E) shown on Map 2 represents the location where access to the designated camping site is shortest by traverse over sea ice. Landings at this site may be made as local conditions allow;
6) The Secondary Landing Site shall be used only for essential purposes for which a permit has been granted; and
7) When piloted aircraft landings beyond ½ nautical mile (~930 m) of the Adélie penguin colony are considered unsafe or impractical (e.g. because sea ice is absent or poor, if weather conditions are

unfavorable, or because there is an important logistic need such as to move heavy equipment), the following conditions apply:

FIXED WING

- Piloted fixed wing aircraft may land beyond ¼ nautical mile (~460 m) of the Adélie penguin colony;
- Piloted fixed wing aircraft landings shall not be made in Willett Cove.

HELICOPTERS

- Helicopters shall land at the designated Secondary site at Willett Cove (72° 19.262'S, 170° 13.523'E) (Map 2), either on land or on sea ice adjacent to the campsite;
- On occasions the landing site is susceptible to inundation by high tides: if this occurs landings may made on nearby dry ground, avoiding vegetated sites and preferably remaining on beach gravels south of the designated landing site, keeping as close to the shore as possible. Landings closer to the Adélie penguin colony shall be avoided;
- Helicopters should follow the recommended Helicopter Access Zone to the maximum extent practicable when accessing the Secondary landing site. The preferred helicopter approach route is from the south and extends from the Primary landing site to the Secondary landing site following a route along the southern coastline of Willett Cove (Map 2).

8) 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 values of the Area;
- Essential management activities, including assessment or remediation of impacts, monitoring and inspection;
- Activities with educational and / or outreach purposes (such as documentary reporting (photographic, audio or written), the production of educational resources or services, or educating program personnel about clean-up methods) that are for compelling reasons that cannot be served elsewhere. Educational and / or outreach activities do not include tourism; and
- Activities with the aim of preserving or protecting historic resources within 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;
- All structures and scientific equipment installed in the Area must be authorized by permit and 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;
- Installation (including site selection), maintenance, modification or removal of structures shall be undertaken in a manner that minimizes disturbance to flora and fauna, preferably avoiding the main breeding season (01 Oct – 31 Mar);
- The emergency cache should only be used in genuine emergency, and any such use should be reported to an appropriate authority so the cache can be restocked; and
- Removal of specific 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 field camps should be located within the Facilities Zone (see Section 6(v)) (Maps 3 & 5). Exceptions may be made for compelling scientific or logistic reasons (e.g. to continuously attend a bird

observation hide or perform other observations) provided these have been authorized in the permit, and provided this is not within the Restricted Zone. Use existing tent stakes within the Facilities Zone if practicable. If the camp needs to be moved to dry ground owing to a tidal or storm event, avoid vegetated sites to the maximum extent practicable and keep as close to the shore as possible. Sparse vegetation colonises nearby ground and south polar skua nests are present nearby and care should be exercised to minimize disturbance.

- Camping is prohibited within the Restricted Zone (see Section 6(v)) (Map 3).
- Camping is permitted on sea ice in Willett Cove, which is outside of the Area. When conditions allow, camping on sea ice may be preferable to camping on land within the Facilities Zone, and may help meet the objective of minimizing impacts.

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 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 e.g. backpacks, carry-bags, tents, walking poles, tripods etc.) 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 and raw eggs, or products containing raw poultry or raw eggs, are prohibited from the Area. Processed and / or cooked poultry and egg products should be avoided where practicable. 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 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 for which the permit has been granted. Such materials should be stored within the Facilities Zone unless they are necessary elsewhere for essential purposes authorized by permit. 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 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 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 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.
- Removal of, or disturbance to, markers left by previous scientific work within the Area is prohibited unless specifically authorized by permit.
- Other than scientific markers as noted above, material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder, and is clearly of no historic value or otherwise authorized, 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.
- Material found that is likely to possess important historic or heritage values should not be disturbed, damaged, removed or destroyed. Any such artifacts should be recorded and referred to the appropriate authority for a decision on conservation or removal. Relocation or removal of artifacts for the purposes of preservation, protection, or to re-establish historical accuracy is allowable by permit.
- The well-preserved body of a husky is contained in an enclosed wooden box located in the eastern part of the Area and should not be disturbed while options for its future management remain under consideration.

7(ix) Disposal of waste

All wastes, including all solid human wastes, shall be removed from the Area. Liquid human wastes and Domestic Liquid Wastes may be disposed of into the sea outside of the Area, for example in Willett Cove. It is recommended that when sea ice is present in Willett Cove such liquid wastes be disposed down a tide crack at least 100 m from the Facilities Zone, where practicable, and when sea ice is absent it is recommended that such wastes be disposed into the sea at low tide at the shoreline at least 100 m south from the Facilities Zone. If it is practicable, it is recommended that liquid wastes be removed to the nearest station for disposal.

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:

1) carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
2) install or maintain signposts, structures or scientific equipment (specific sites of long-term monitoring should be appropriately marked);
3) 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 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 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, to be used both in 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, of anything removed, and / or of any materials released and not removed, that were not included in the authorized permit.

8. Supporting documentation

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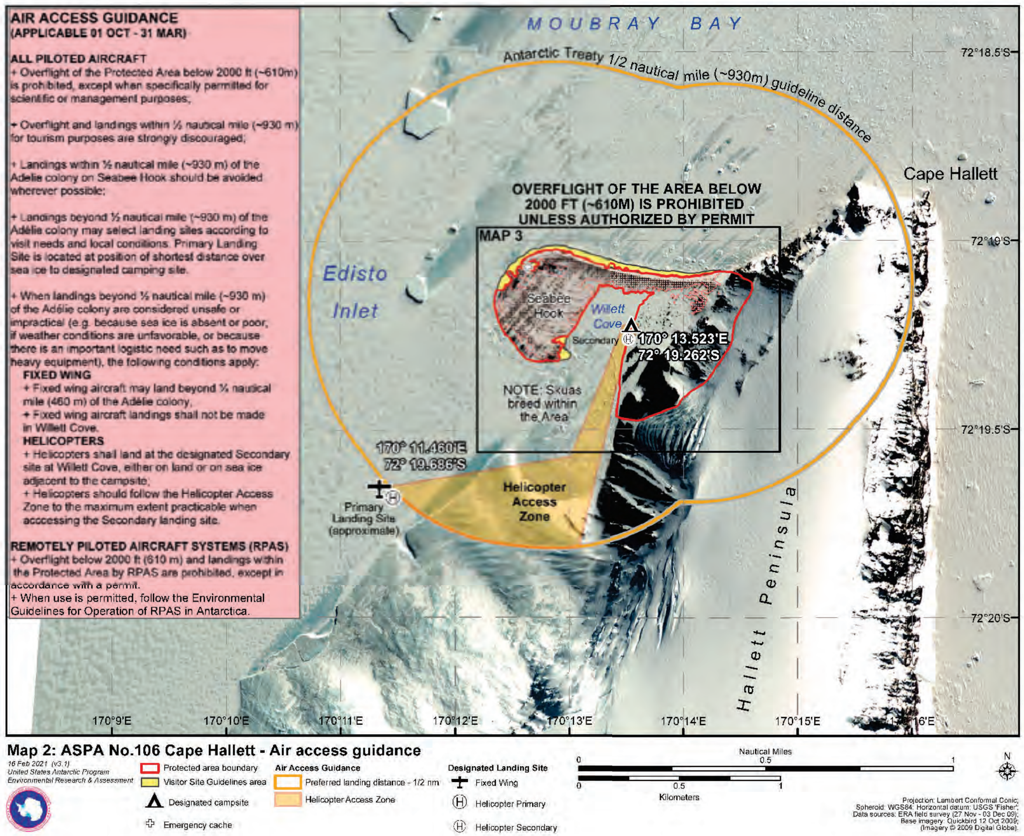
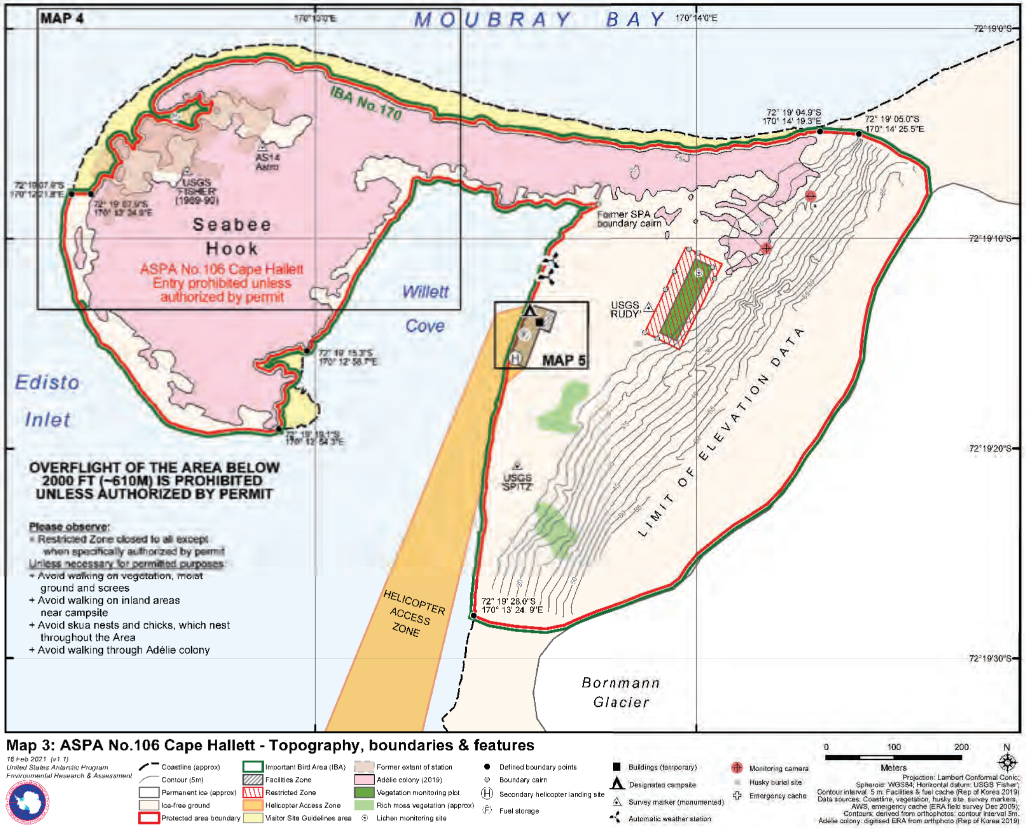
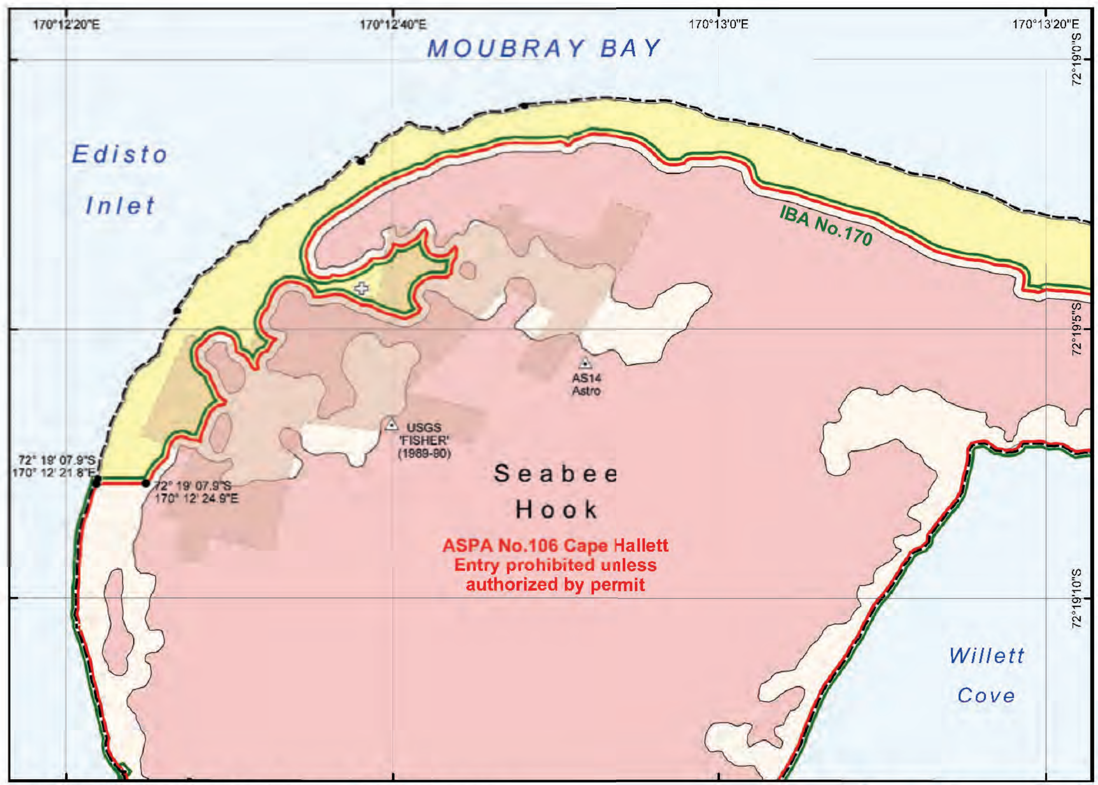
ADMIRALTY
MOUNTAINS
MOUBRAY
BAY
ROSS
SEA
HALLETT
PENINSULA
Cape Hallett
Seabee Hook
Cape Christie
Cape Wheatstone
Tucker Inlet
Tucker Glacier
Edisto Inlet
Edisto Glacier
Manhaul Glacier
Ironside Glacier
Quarterdeck Ridge
Cotter Cliffs
Mount Herschel (3335)
Mount Peacock (3210)
Mount Humphrey Lloyd (2975)
Luther Pk (840)
Tombstone Hill (1049)
Football Mtn (823)
Mt Vernon Harcourt (1571)
Mt Geoffrey Markham (1770)
Felsite Island
Redcastle Ridge
Salmon Cliff
Roberts Cliff
Helm Point
Copper Cove
NOTE: OVERFLIGHT AND LANDING RESTRICTIONS APPLY: SEE MAP 2 & MANAGEMENT PLAN
MAP 2
MAP 1
169°30'E
170°00'E
72°10'S
72°20'S
72°30'S
Map 1: ASPA No. 106 Cape Hallett - Regional overview
Permanent ice
Ice shelf
Ice free ground
Coastline
Index contour (1000m)
Contour (200m)
Glacier flow line
Spot height (m)
Fuel cache & geology camp (IT)
Kilometers
Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84
Data: SCAR Antarctic Digital Database v7.3 (2020)
Contours: REMA v1.1 (2020)
Contour interval: 200 m; Heights in meters



Map 2: ASPA No.106 Cape Hallett - Air access guidance



Map 3: ASPA No.106 Cape Hallett - Topography, boundaries & features



Map 4: ASPA No.106 Cape Hallett - former Hallett Station area

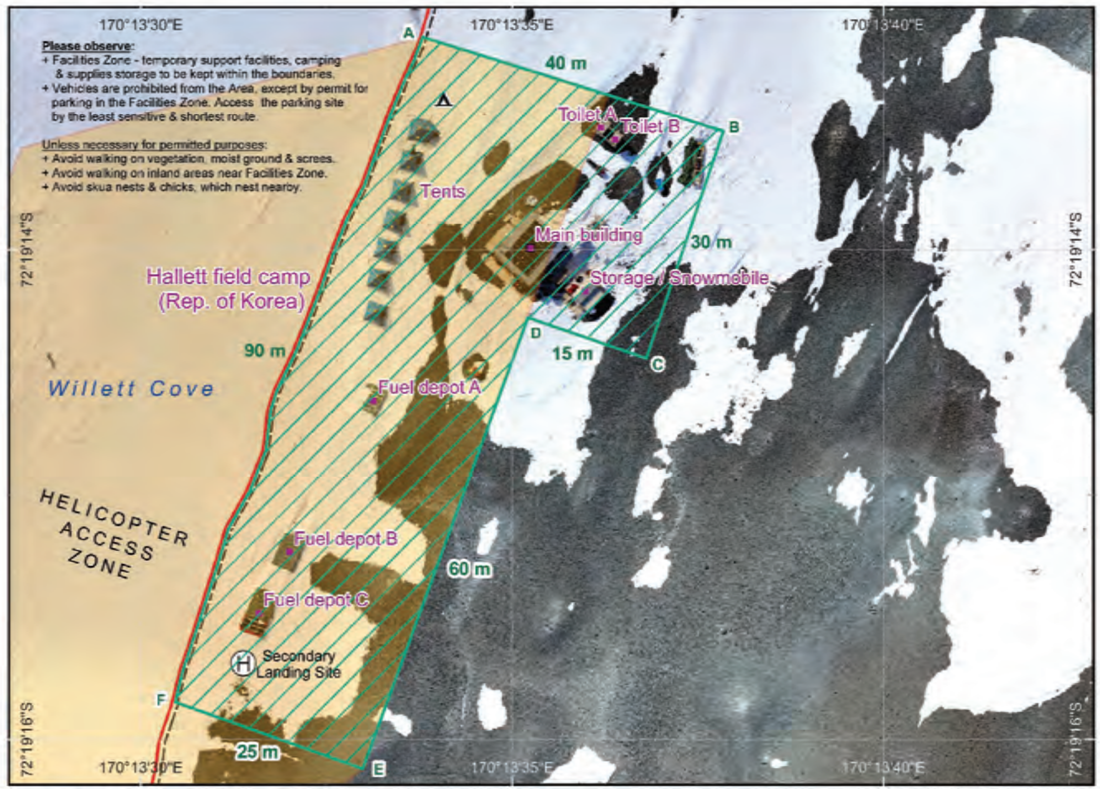
16 Feb 2021 (v1.0)
United States Antarctic Program
Environmental Research & Assessment

- Coastline (approx)
- Ice-free ground
- Protected area boundary
- Important Bird Area (IBA)
- Visitor Site Guidelines areas
- Former extent of station
- Adélie colony (2019)
- Defined protected area boundary points
- Emergency cache
- Survey marker (monumented)

0 50 100
Meters

N

Projection: Lambert Conformal Conic;
Spheroid: WGS84; Horizontal datum: USGS 'Fisher'; Contour interval: 5 m;
Data sources:
Coastline, AS14 Astro & emergency cache: ERA field survey (Dec 2009).
Penguin colony: digitised ERA from orthophoto (Rep. of Korea 2019)



Map 5: ASPA No.106 Cape Hallett - Facilities Zone

Management Plan for Antarctic Specially Protected Area No. 120

POINTE-GÉOLOGIE ARCHIPELAGO, TERRE ADÉLIE

Jean Rostand, Le Mauguen (formerly Alexis Carrel), Lamarck and Claude Bernard islands, Bon Docteur nunatak and emperor penguin breeding site

Introduction

The Pointe-Géologie archipelago, in Adélie Land, is made up of 8 main islands grouped together over less than 2.4 km², about 5 km from the Antarctic continent. Petrel Island, the largest of these islands, is home to the French scientific station Dumont-d'Urville (66° 39′ 46″ S, 140° 0′ 07″ E).

This archipelago is unique in that it hosts the reproduction of eight of the nine species of birds that nest on the coasts of the Antarctic continent, as well as one of the four species of seals endemic to Antarctica. Among these 8 species of birds, 4 belong to the *Procellariidae* family, 2 to the *Spheniscidae* family, 1 to the *Stercorariidae* family and finally 1 to the *Hydrobatidae* family. Most notable is the presence of emperor penguins, an emblematic species of Antarctica, whose winter colony is located a few hundred meters from the Dumont-d'Urville base.

Four islands, a nunatak and the emperor penguin breeding site were classified in 1995 (ATCM XIX Measure 3) as an Antarctic Specially Protected Area on the basis that they constituted a biologically, geologically and aesthetically representative example of terrestrial Antarctic ecosystems.

Resolution 3 (2008) recommended that the Environmental Domains Analysis for the Antarctic Continent serve as a dynamic model for the identification of Antarctic Specially Protected Areas (see also Morgan et al. 2007). According to this model, ASPA 120 falls under environmental domain L (continental coastal-zone ice sheet).

Resolution 6 (2012) also recommended that "Antarctic Conservation Biogeographic Regions" should be used in conjunction with the analysis of environmental domains to qualify the regions where ASPAs are established and thus to respond to the notion of systematized environmental and geographical framework referred to in paragraph 2 of article 3 of Annex V of the Protocol to the Antarctic Treaty regarding protection of the environment. Thus, the Pointe-Géologie archipelago is linked to the Antarctic Conservation Biogeographic Region No. 13 "Adélie Land" (see Terauds et al. 2016), one of the smaller Conservation Biogeographic Regions (178 km²).

It should also be noted that the Pointe-Géologie sector has been identified as an important area for bird conservation (IBA 150) under criteria A1 (presence of a globally threatened species) and A4iii (the site is known or thought to hold, on a regular basis, at least 10 000 pairs of seabirds of one or more species) (Harris et al. 2015).

Pointe-Géologie's Specially Protected Antarctic Area No. 120, hereinafter referred to as "the Area", corresponds to the perimeter as delimited in point 6(i) and illustrated in Map 2.

1. Description of values to be protected

Environmental value

The Area constitutes one of the most representative of the Adélie Land coasts for its fauna and scientific interest. It has exceptional environmental and scientific value due to the diversity of bird and marine mammal species that breed there:

- Weddell seal (*Leptonychotes weddellii*)
- Emperor penguin (*Aptenodytes forsteri*)
- South polar skua (*Catharacta maccormicki*)
- Adélie penguin (*Pygoscelis adeliae*)
- Wilson's storm petrel (*Oceanites oceanicus*)
- Southern giant petrel (*Macronectes giganteus*)
- Snow petrel (*Pagodroma nivea*)
- Cape petrel (*Daption capense*)

Scientific value

Research and continuous monitoring programs for these species have been under way for many years (from 1952 or 1964 depending on the species), currently supported by the French Polar Institute Paul-Emile Victor (IPEV) and the French National Centre for Scientific Research (CNRS). This allowed a demographic database to be established which is of exceptional value in terms of the duration of the observations and the number of species and individuals monitored. These long-term follow-ups have received the “Antarctic Workshop Areas” label from the CNRS, which gives them the status of iLTsERs (international Long-Term socio-Ecosystem Research), the biological equivalent of physical environmental observatories. Research programmes contribute, in particular, to the CCAMLR Ecosystem Monitoring Program (CEMP).

The human presence in the Area is mostly linked to the implementation of scientific programmes carrying out these monitoring surveys. The number of people present at any one time in the Area is usually 2, or very exceptionally 4. The frequency of visits varies from year to year. It remains less than one access per day.

Among the 61 emperor penguin breeding sites listed (Fretwell and Trathan 2020), that of Pointe-Géologie is one of the few to be located in the immediate vicinity of a permanent base. This is therefore a privileged site for the study of this species and its environment, and therefore requires special attention as regards the reduction of disturbances linked to the proximity of the base.

2. Aims and objectives

Management of the specially protected area of Pointe-Géologie aims to:

- avoid any degradation or any risk of degradation of the values of the Area;
- allow scientific research that cannot be carried out elsewhere, while ensuring that its potential impacts are minimized, in particular by developing, as far as possible, the use of means that allow reducing human presence on the site;
- prevent disturbances of the environments and species of the Area by preventing any unjustified human presence in the Area;
- reduce disturbances related to human presence near the Area, in particular due to the nearby presence of the Dumont-d'Urville base and the logistics operations deployed there;
- minimize the risk of introducing alien plants, animals or microbes into the Area.

3. Management activities

The following management activities will be carried out to protect the values of the Area:

- This Management Plan is regularly reviewed in order to ensure the monitoring of measures to protect the values of the ASPA.

- Start considering implementing a database on the ASPA's biodiversity and its state of conservation, ultimately allowing regular monitoring of changes in environmental values.
- In accordance with Article 7 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, access to the Area at any time of the year is subject to obtaining a permit issued by a competent authority.
- All activities of a scientific or management nature carried out in the Area must be subject to an environmental impact assessment in accordance with the requirements stipulated in Annex I to the Protocol on Environmental Protection to the Antarctic Treaty.
- In accordance with Annex III to the Protocol on Environmental Protection to the Antarctic Treaty, abandoned equipment or materials will be removed as far as possible, provided that such removal does not affect the environment and the values of the Area.
- All persons staying in or passing through the Dumont-d'Urville station will be duly informed of the existence of the ASPA, its geographical limits, the regulated access and, more generally, of this Management Plan. To achieve this, a sign containing a map of the Area indicating the restrictions and specific management measures that apply to it is displayed at the Dumont-d'Urville station and on board the Astrolabe. Activities are being implemented to raise awareness of biodiversity issues linked to the ASPA.
- Copies of this Management Plan are also available in the four Treaty languages at the Dumont-d'Urville station. Information relating to each incursion into the ASPA (consisting of at least: activity undertaken or reason for presence, number of people involved, length of stay and specific observations) will be recorded by the Dumont-d'Urville station manager and entered into a database.
- Activities near the ASPA (development of the Dumont-d'Urville station, energy, waste water and waste management, logistics, supplies, transit of motor vehicles, helicopter flights, etc.) are to be performed, as far as possible, taking into account the sensitivity to disturbances of the environments and species of the ASPA and attempting to reduce the potential pressures in terms of disturbance of species, pollution and introductions of species and pathogens.

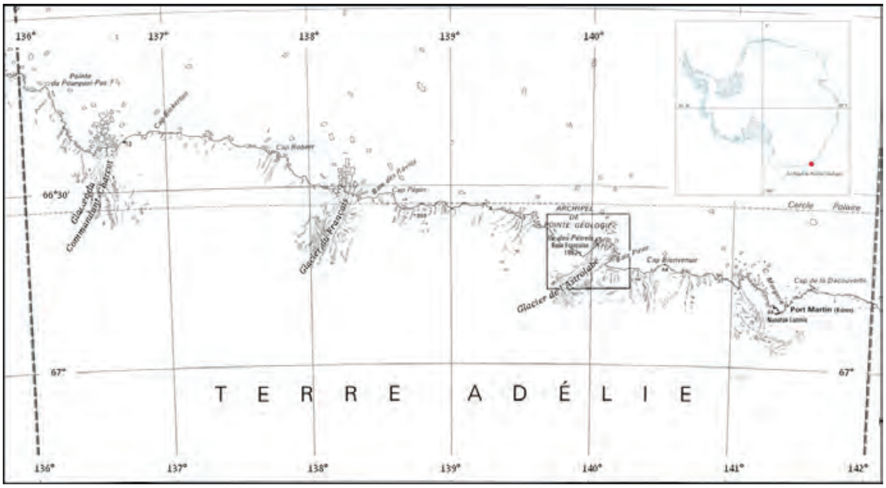
4. Period of designation

The Area is designated as an Antarctic Specially Protected Area (ASPA) for an indefinite period.

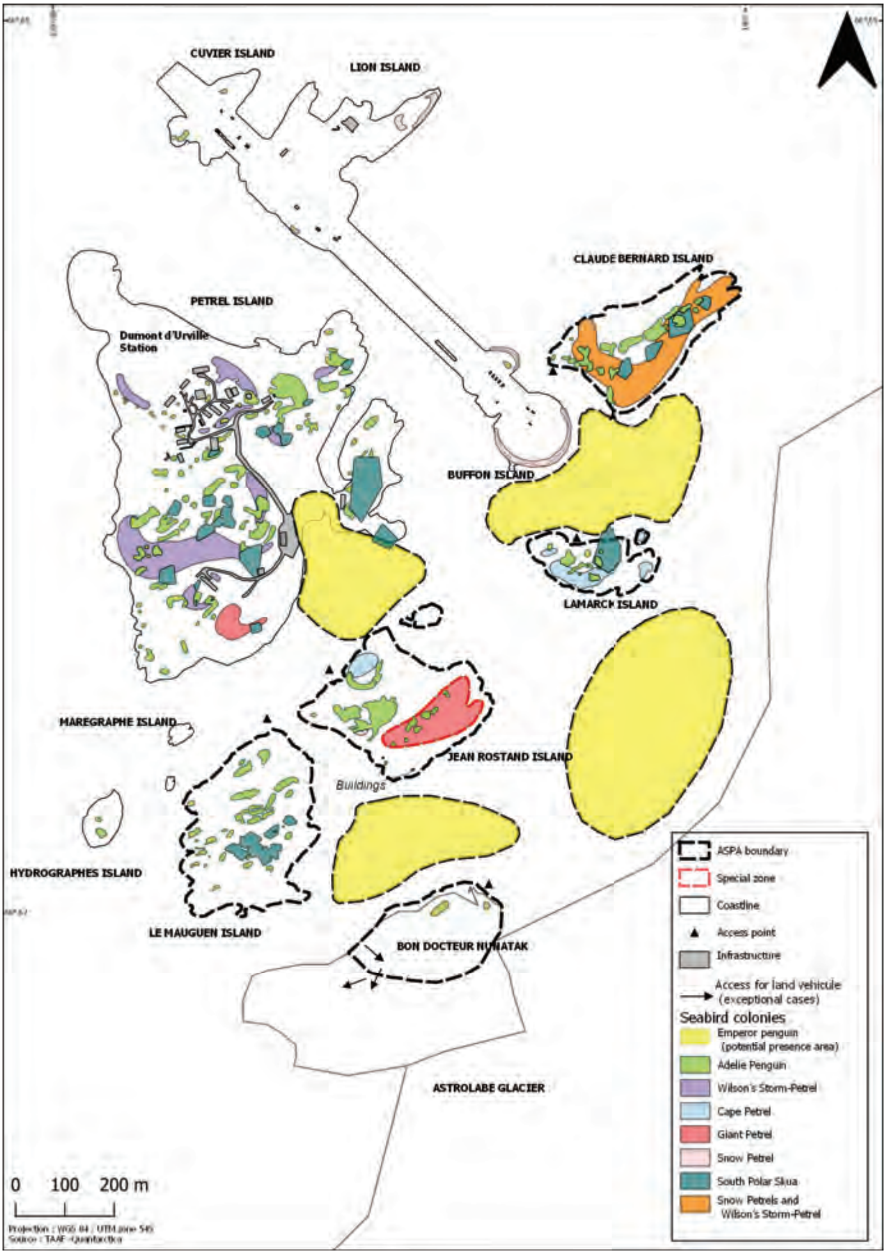
5. Maps

Map 1 shows the geographical location of Adélie Land within the Antarctic continent and the location of the Pointe-Géologie archipelago on the coast of Adélie Land.

Map 2 of the Pointe-Géologie archipelago indicates the location of the main bird colonies and, in dotted lines, the delimitation of Antarctic Specially Protected Area No. 120 within this archipelago.



Map 1. Location of the Pointe-Géologie archipelago, in Adélie Land (Antarctica)



Map 2. **Location of bird colonies within the ASPA and in the Pointe-Géologie archipelago.** Dashed lines mark the boundaries of the ASPA. Emperor penguins, present from March to mid-December, establish their colony on the pack ice between the islands and their location fluctuates.

6. Description of the Area and identification of the sectors

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

LIMITS AND COORDINATES

ASPA 120 is located along the coast of Adélie Land, in the heart of the Pointe-Géologie archipelago (140° to 140° 02’ E; 66° 39' 30" to 66° 40’ 30" S). It consists of the following territories:

- Jean Rostand Island,
- Le Mauguen Island (formerly Alexis Carrel Island),
- Lamarck Island,
- Claude Bernard Island,
- Bon Docteur Nunatak,
- The emperor penguin breeding site, the limit of which is determined by the presence of one or more groups of emperor penguins increased by a buffer area of 40 m[1].

In total, the surface area of the outcropping rocks does not exceed 2 km². The highest points are distributed along a NE-SW ridge (Claude Bernard Island: 47.60 m; Jean Rostand Island: 36.39 m; Le Mauguen (formerly Alexis Carrel) Island: 28.24 m, Bon Docteur Nunatak: 28.50 m).

During the austral summer the pack ice between the islands sometimes disappears and only the northern slopes of the islands remain partially covered by snowfields. The ASPA is then well delimited by its natural features (outline of the islands and rocky outcrops).

There are no roads or paths within the Area.

GENERAL DESCRIPTION OF THE AREA

Weather

The average seasonal and meteorological conditions (temperature: -10.8° C, pressure: 987.3 hPa, wind speed: 9.5 ms^{-1} , prevailing wind direction: 120-160°) (König-Langlo *et al.* 1998) at the edge of the icecap play a fundamental role in the accumulation of snow, its melting, and the extent of pack ice near the continent. The seasons are characterized by a long winter, from May to October, a short summer, from November to January, and extremely short interseasonal periods (Périard & Pettré 1993). The strong seasonality of temperatures (-15° C in winter, -0.5° C in summer on average) implies that the melting only occurs from December to February, affecting the snow conditions on the various nunataks and the breakup of the ice pack around the archipelago. This is the direct result of variations in the energy supplied by solar radiation, which is strong in the summer, and of the "nocturnal" radiative cooling on the Antarctic plateau responsible for the establishment of stable atmospheric layers that cause the katabatic winds. (Gallée & Pettré 1998; König-Langlo *et al.* 1998). The strong and persistent katabatic wind is a key feature of the archipelago's climate (Périard & Pettré 1993). The area is nevertheless affected by frequent low pressure systems coming from the north-west (King & Turner 1997). More high pressure conditions are observed in summer and in winter but precipitation occurs all year round without the appearance of a clear seasonal cycle. (König-Langlo *et al.* 1998). Notable snowfall is limited to a few heavy precipitation events that can occur at any time of the year (Turner *et al.* 2019). These are caused by intense moisture transport from the mid-latitudes. These events occur during atmospheric blocking conditions, causing significant rises in temperature and heavy precipitation, which can give rise to the rare rain events reported in the area. (Favier *et al.* 2011 ; Wille *et al.* 2021). Although rare, the occurrence of precipitation as rain during the first weeks

[1] In the event that groups or the colony are located within 40 m of existing human settlements on Petrel Island or the Lion Trail, ad hoc procedures will be determined in accordance with the provisions of the Madrid Protocol and its Annex II.

of life of Adélie penguins can have a dramatic effect on their breeding success. (Ropert-Coudert *et al.* 2015). The evolution of temperatures in the sector over the next century will exceed that observed on a global scale (according to the greenhouse gas emission scenarios, the entire continent will warm between 1.3 ± 0.5° C and 4.8 ± 1.2° C (Bracegirdle *et al.* 2020 ; Krinner *et al.* 2019). This warming will directly influence the communities of birds and mammals living on the archipelago. Nevertheless, the interannual climatic variability in the area is extremely strong and depends firstly on large-scale atmospheric conditions, mainly on the intensity of the southern annular mode (e.g. Marshall *et al.* 2017) and secondly on regional conditions (e.g. extent of sea ice; see Goursaud *et al.* 2019 ; Krinner *et al.* 2014). This is why anthropogenic global warming is not expected to emerge in this sector before the middle of the 21st century (Mora et al. 2013).

Geology

Well-marked escarpments offer asymmetrical transverse profiles, gently sloping to the north and steeper to the south. Numerous faults and fractures make the terrain very rugged. The basement rocks, mainly made up of gneisses rich in sillimanite, cordierite and garnets, are crossed by a dense network of pink anatextite veins. The most depressed parts of the islands are covered with moraines with a heterogeneous grain size (with blocks varying in diameter from a few centimetres to more than one metre).

Terrestrial biological communities
Flora and invertebrates

No vascular plants and no macro-arthropods live in the Area. Only the cosmopolitan seaweed *Prasiola crispa* is present and may have significant local coverage in connection with the contributions of bird droppings.

Fauna

Seven species of birds and a marine mammal (Weddell seal) breed in the Pointe-Géologie archipelago. They have all been the subject of population monitoring since the 1950s-1960s. Table 1 provides information on the numbers of seabirds observed, Table 2 on the periods these different species are present, and Table 3 on the estimated sensitivity of each species. The Weddell seal does not breed in the Area but on the pack ice outside. The population at the end of October varies between 70 and 170 individuals depending on the year, including 30 to 50 newborns (unpublished CEBC-CNRS data).

Regular visiting bird species include the Antarctic petrel *Thalassoica antarctica* and the chinstrap penguin *Pygoscelis antarctica*. Several species of marine mammals regularly visit the archipelago but do not reproduce there, including four seals (leopard seal *Hydrurga leptonyx*, crabeater seal *Lobodon carcinophaga*, Southern elephant seal *Mirounga Leonina,* Ross seal *Ommatophoca rossii*), and two cetaceans (killer whale *Orcinus orca* and Antarctic minke whale *Balaenoptera bonaerensis*).

Threats and pressures

The establishment of the Dumont-d'Urville station has led to a significant decrease in the population of giant petrels in the Pointe-Géologie archipelago. The breeding colonies located on Petrel Island almost completely disappeared in the late 1950s during the first years after the installation of the base in the immediate vicinity of these colonies (extension of buildings, intensification of helicopter flights, installation and replacement of oil tanks, direct persecution). Currently 95–100% of the Pointe-Géologie Giant petrel population breeds in the ASPA, in the south-eastern part of Rostand Island. A pair breeds regularly on Petrel Island on the Mount of Giants.

The works carried out between 1984 and 1993 to connect the Buffon, Cuvier and Lion islands in order to establish an airstrip destroyed the breeding sites of approximately 3000 pairs of Adélie penguins, 210 pairs of snow petrels, 170 pairs of Cape petrels, 180 pairs of Wilson's storm petrels and 3 pairs of south polar skuas (Micol & Jouventin 2001). A relatively large portion of Adélie penguin pairs moved within the ASPA, unlike the other species (Micol & Jouventin 2001, CEBC unpublished data).

The significant decrease in emperor penguins at the end of the 1970s seems to be due to a prolonged climatic anomaly between 1976 and 1982, which led to a significant reduction in the extent of the sea ice (Barbraud & Weimerskirch 2001, Barbraud et al. 2011, Jenouvrier et al. 2009, 2012). Other cumulative effects, such as construction of the Lion Island station and airstrip and scientific work carried out at the time are also likely to have impacted the Pointe-Géologie population and pushed some of the birds to emigrate to other colonies, notably that of Mertz (Cristofari et al. 2016). For the past fifteen years, the breeding population of emperor penguins has been stable or increasing slightly, in parallel with an increase in the extent of the sea ice in the Adélie Land sector (Barbraud et al. 2020, Table 3). However, vigilance is required in view of the recent changes observed (see below).

Among the bird species present in the Pointe-Géologie archipelago, the emperor penguin and the giant petrel breed only inside the ASPA (with the exception of a pair of giant petrels present on Petrel Island). Since the establishment of this ASPA in 1995, the populations of these two species are now stable or increasing slightly (Table 3). Long-term projections, however, make it necessary to maintain a high protection status through this Management Plan.

The region of the Pointe-Géologie archipelago does not yet show a significant trend of changes in temperature and precipitation. The area is in fact mainly marked on the one hand by very high interannual meteorological variability, and on the other hand by sea ice conditions that undergo extreme changes from one year to the next. Since 2010, the Pointe Géologie archipelago has experienced particularly extensive sea ice, probably attributable to the impact of the arrival of the giant iceberg B9B in Adélie Land. In addition to these sea ice conditions at Pointe-Géologie there have been two years of more intense meteorological phenomena than usual (rain, temperatures), and the populations of seabirds whose food ecology depends on sea ice have shown extreme responses, going as far as zero reproductive success for some of them, especially in the case of Adélie penguins (Barbraud et al. 2015, Ropert-Coudert et al. 2015, 2018). However, recent seasons suggest that a new pattern of sea ice conditions is developing which will be less unfavourable to penguins and some petrels, with a faster recession in the summer season.

IPCC climate projections suggest a decrease in the extent and concentration of sea ice off the coast of Adélie Land from the mid-21st century. This decrease will very likely have negative impacts on several species of seabirds breeding in the archipelago, such as the emperor penguin (Jenouvrier et al. 2009, 2014), the Adélie penguin (Iles et al. 2020), and the south polar skua (Pacoureau et al. 2019); but little effect for others such as the snow petrel (Barbraud et al. 2011, Sauser et al. 2021).

Structures equipped with guy wires such as the ionospheric mast on Petrel Island (out of use for several years) as well as overhead electric cables between buildings constitute a serious threat to several species. In fact, collisions and deaths of flying birds have been observed regularly for several years (at least 70 individuals have died by collision with these cables since 1999, including 45 south polar skuas and 14 giant petrels, CEBC-CNRS unpublished data). This shows the vulnerability of these species to overhead cables, and suggests that installing new cables in areas used by flying seabirds would have negative impacts. These species have very low numbers at Pointe-Géologie (south polar skua, Antarctic fulmar, giant petrel) and additive mortality in such long-lived species can have an almost immediate negative effect on their population.

Pollutants pose an additional threat to several species: several types of contaminants of anthropogenic origin (mercury, persistent organic pollutants such as hexachlorobenzene, polychlorobiphenyls, polybrominated diphenyl ethers, organochlorines) have been detected in several species (emperor penguin, Adélie penguin, snow petrel, south polar skua) reproducing in the area (Goutte et al. 2013, Tartu et al. 2014, Carravieri et al. 2020). For certain contaminants, such as mercury, negative effects on reproduction parameters have been demonstrated, with a potential impact on population dynamics (Goutte et al. 2014, 2018).

Table 1: Number of breeding pairs of seabirds in ASPA 120 (counted during the 2019/2020 breeding cycle). The proportion of the population breeding inside this ASPA compared to that of the

archipelago of Pointe-Géologie as a whole (PG) is also mentioned (Source: unpublished data CEBC-CNRS on the reproductive cycle 2019/2020 except for Wilson's storm petrels, 2016 data in Barbraud et al. 2018)

Site	Emperor penguin	Adélie penguin	South polar skua	Snow petrel	Cape petrel	Wilson's storm petrel	Giant petrel
Claude Bernard Island	--	4201	10	132	99	106	--
Lamarck Island	--	1445	2	27	11	32	--
J. Rostand Island		5396	8	44	20	83	19
Le Mauguen (formerly Alexis Carrel) Island	--	4396	18	15	11	63	--
Bon Docteur Nunatak	--	1461	3	2	--	43	--
Winter ice floes between the islands	3727	--	--	--	--	--	--
ASPA Total	3727	16899	41	220	141	327	19
Pointe-Géologie Total	3727	41151	78	856	266	793	20
% ASPA/Pointe-Géologie	100%	41 %	53 %	26 %	53 %	41 %	95 %

Table 2: Presence of birds on breeding sites

	Emperor penguin	Adélie penguin	South polar skua	Snow petrel	Cape petrel	Wilson's storm petrel	Giant petrel
First arrival	March	October	October	September	October	November	July
First laying	May	November	November	December	December	December	October
Last departure	End December	March	March	March	March	March	April

Table 3: Sensitivity to human-induced disturbances and trend in bird populations in the Pointe-Géologie archipelago (Sources: unpublished data CEBC-CNRS, Barbraud et al. 2020 Pacoureau et al. 2019, Sauser et al. 2021, Barbraud et al. 2018 for Wilson's storm petrel data).

		Emperor penguin	Adélie penguin	South polar skua	Snow petrel	Cape petrel	Wilson's storm petrel	Giant petrel	Weddell seal
Sensitivity		high	medium	medium	high	high	high	high	medium
Trends	**1952-1984**	decrease	?	?	?	?	?	decrease	?
	1984-2000	stable	increase	increase	stable	stable	decrease	stable	stable
	2000-2019	increase	stable	increase	stable	stable	?	slight increase	decrease

6(ii) Structures within the Area

The historic Prévost shelter and a refuge are located on Rostand Island, to the exclusion of any other structure in the whole Area. These buildings are mainly used by scientists to shelter themselves from meteorological conditions during their population monitoring operations.

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

The closest protected area to ASPA 120 is ASPA 166 “Port Martin”, located 60 km to the east.

6(iv) Special zones within the ASPA

Giant petrel nesting sites on Rostand Island

Within the ASPA, giant petrel breeding sites are exclusively present in the south-eastern part of Rostand Island. All the nesting sites of this species on Rostand Island are covered by a special area to provide them with increased protection, the perimeter of which is defined on map 2.

Authorizations to access this special area are subject to their explicit mention in the ASPA entry permits issued under Article 7. Only visits for scientific purposes are authorized. A maximum of five annual visits may be authorized for all programmes.

7. Terms and conditions for entry permits

- Access to the Area is prohibited unless a permit has been issued by a competent national authority designated under Article 7 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty. In order to avoid conflict between operations in area, and to assess potential cumulative impacts prior to the activity, the national competent authority issuing the permit should inform the head of the Dumont-d'Urville station leader and/or the French national competent authority as soon as possible.
- Permits may be issued for the activities provided for in paragraph 7(ii) of this document. The permits specify for each visit the planned activities, their duration, the number of entries and the maximum number of people who can enter the Area (permit holders and any accompanying persons necessary for professional or safety reasons and who must be chosen by scientists based on their expertise).

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

Access to the Area is authorized only on foot or by light boat (in summer).

Aircraft operation

- No helicopter may land in the ASPA (except for emergency procedures).
  Overflying the Area is prohibited for any aircraft (except in the case of emergency procedures). Overflight and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except when carried out within the framework of the activities provided for in 7(ii) and 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).
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Land vehicles

- Land vehicles normally cross between the Dumont-d'Urville station, on Petrel Island, and the Cap Prudhomme station, on the mainland, in winter in a straight line over the pack ice. When, on very rare occasions, the state of the sea ice does not allow them to cross safely, a journey via the western edge of the Bon Docteur Nunatak may be exceptionally authorized by the head of the Dumont-d'Urville station, as shown on Map 2.
- In all cases, land vehicles driven to circulate near gatherings of emperor penguins must maintain a minimum distance of 40 m from these animals.

Walking

- Authorized persons moving within the Area must be particularly vigilant to avoid disturbing birds and deteriorating the nesting areas and access to these.

7(ii) Activities which may be conducted within the Area with time and space restrictions

- Activities intended to serve essential scientific objectives and which cannot be carried out elsewhere.

- Activities aimed at pursuing conservation objectives for the environments or species present.
- Essential management and logistical activities. In this case, the permit application must demonstrate that there is no viable alternative for access to the Area.
- Activities for educational or scientific popularization (filming, photography, sound recording, etc.) which cannot be carried out elsewhere.

7(iii) Installation, modification or removal of structures

- The establishment of new structures or permanent installations is prohibited. Only temporary structures or equipment may be installed in the Area for essential scientific reasons or for management or conservation activities authorized by a competent national authority.
- Any modification or dismantling of the only installations currently present on Rostand Island can only be carried out with an authorization.

7(iv) Location of field camps

Camping is forbidden in the Area. An exception can be made only for security reasons, in particular when conducting scientific or conservation expeditions. If this is the case, the tents should be pitched in such a way that they disturb the environment as little as possible.

7(v) Restrictions on materials and organisms which may be brought into the Area[2]

- In accordance with the provisions of Annex II to the Protocol on Environmental Protection to the Antarctic Treaty, deliberate introductions of live animals or plants are prohibited in the Area.
- In order to avoid the inadvertent introduction of microbes, invertebrates or plants from other sites in Antarctica, including stations, or other regions outside Antarctica, all material brought into the Area, including scientific equipment, must be cleaned or sterilized.
- Shoes, clothing, bags, and in general all containers brought into the Area must have been thoroughly cleaned beforehand.
- No poultry products, including waste associated with these products and products containing egg powder, may be brought into the Area.
- Chemicals are prohibited in the Area with the exception of those introduced for scientific activities under the conditions indicated in the permits issued. All chemicals must be removed from the Area no later than the end of the activities for which permits have been issued.
- The deposit of fuels, food products or any other material is prohibited except when imperative for the activities for which permits are issued. All materials brought in must be withdrawn as soon as they are no longer useful. Permanent storage is prohibited.

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

- Any removal of or interference with native flora and fauna is prohibited except for holders of a permit specifying this. In the event of permitted removal or interference, the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica (ATCM XLII-CEP XXII Resolution 4) should be used as a minimum standard.
- Dead or unhealthy specimens of native flora and fauna may only be taken out of the Area if this is expressly mentioned in the permit.

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

- The collection or removal of objects or materials that have not been brought into the Area by the holder of a permit is prohibited except if specified in the permit.
- Debris generated by humans may be removed from the Area provided that such removal does not harm the environment and the values of the Area.

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[2] The CEP Non-Native Species Manual and the COMNAP/SCAR Checklists for Supply Chain Managers of National Antarctic Programmes for the Reduction in the Risk of Transfer of Non-native Species provide further guidance on the matter.

7(viii) Disposal of waste

All waste produced must be removed from the Area after each visit in accordance with Annex III to the Protocol on Environmental Protection to the Antarctic Treaty, as a minimum standard.

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

- Visits to the Area are strictly limited to duly authorized activities provided for in paragraph 7(ii).
- Activities of a scientific nature will be carried out in accordance with SCAR's Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica (ATCM XXXII-CEP XII IP004) and the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica (ATCM XXXIV-CEP XIV IP53).

7(x) Visit reports

The Parties shall ensure that the principal holder of each permit issued submits a report on the activities carried out in the Area to the competent authority. This report, to be provided at the end of each campaign, must include, if applicable, the information identified in the visit report form which appears in the Guide to the preparation of management plans for Antarctic Specially Protected Areas (Resolution 2 [2011]).

These reports contain, where applicable, the sites visited and the data collected that is necessary for environmental monitoring of the Area (population size and distribution in particular).

If applicable, the national authority should send a copy of the visit report to the Party that proposed the Management Plan so that it can use it for proper management of the Area or to review the Management Plan.

As far as possible, Parties should deposit the original or copies of the original visit reports in an archive accessible to the public in order to preserve a customary archive that can be used in the review of the site Management Plan and organization of the Area for scientific purposes.

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Management Plan for

Antarctic Specially Protected Area (ASPA) No. 121

CAPE ROYDS, ROSS ISLAND

Introduction

Cape Royds lies at the western extremity of Ross Island, McMurdo Sound, at 77° 33' 20" S 166° 09' 56"E. Approximate area of the ASPA: 0.66 km^2. The primary reasons for designation are that the Area supports the current most southerly established Adélie penguin (*Pygoscelis adeliae*) colony, for which there exists the longest time series of population size in the Antarctic, data that are of unique and outstanding scientific value. In addition, the Area has important terrestrial and freshwater ecological values, including the most southerly observation of snow algae, the type locality for original descriptions of a number of species of algae, and the unusual presence of a form of Dissolved Organic Matter that is almost entirely microbially-derived.

The Area was originally designated as Site of Special Scientific Interest (SSSI) No. 1 in Recommendation VIII-4 (1975) after a proposal by the United States of America. The SSSI designation was extended through Recommendation X-6 (1979), Recommendation XII-5 (1983), Resolution 7 (1995) and Measure 2 (2000). A revision was adopted through Recommendation XIII-9 (1985). The site was renamed and renumbered as Antarctic Specially Protected Area (ASPA) No 121 by Decision 1 (2002). A revised management plan was adopted through Measure 1 (2002), then through Measure 5 (2009) when the size of the marine component was reduced, and through Measure 2 (2014).

The Area is situated within Environment P – Ross and Ronne-Filchner ice shelves based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and within Region 9 - South Victoria Land based on the Antarctic Conservation Biogeographic Regions (Resolution 3 (2017)).

1. Description of values to be protected

An area of about 300 m^2 at Cape Royds was originally designated in Recommendation VIII-4 (1975, SSSI No. 1) after a proposal by the United States of America on the grounds that it currently supports the most southerly established and consistently occupied Adélie penguin (*Pygoscelis adeliae*) colony known. The most southerly intermittently occupied colony occurs at Cape Barne across Backdoor Bay ~1.4 km from Cape Royds, e.g. 1988-2001; likely a demographic extension of the Royds colony. The Adélie penguin population at Cape Royds decreased from 1956 to the early 1960s as a consequence of human interference during a period when heavy sea ice cover made the colony particularly susceptible to reduced recruitment. In 1963 United States and New Zealand authorities agreed to restrict activities and develop a management plan for the Area in order to protect the scientific values related to penguin research. The site was specially protected to allow the population to recover and protect on-going science programs. The population began to grow reaching almost 4,000 pairs by 1999, primarily due to natural variation in local sea ice cover. More recently the colony has been impacted (including the loss of the Cape Barne component) by severe sea ice conditions, especially in 2001-2005. Since 2005 the penguin colony at Cape Royds has been recovering.

The long time series of population data on the penguin colony at Cape Royds is of unique and outstanding scientific value, for it enables investigations into long-term biological interactions with and responses to environmental forcing factors. The colony remains of high scientific and ecological value and as such merits continued long-term special protection, especially in view of ongoing visits to Cape Royds from nearby stations and tourist groups.

The original Area was enlarged in 1985 as a result of a proposal by New Zealand (Recommendation XIII-9) to include a 500 m–wide coastal strip to protect the seaward access and nearshore feeding ground of the Adélie penguins, as well as projected research on the Cape Royds inshore marine ecosystem. This coastal area of Cape Royds was a site of studies on Nototheniid fish population structure and dynamics. More recently, research on foraging patterns of Adélie penguins from Cape Royds, conducted since this marine component of the Area was adopted, has shown that the marine area as it had been designated is not significant as a penguin feeding ground and that the birds forage more widely than had previously been known. In addition, projected research on the Cape Royds inshore marine ecosystem has not occurred to the extent that had been anticipated, and currently few studies are being carried out on the Nototheniid fish population at Cape Royds. In view of these factors, and because specific values related to the marine environment adjacent to Cape Royds remain undescribed, the marine boundary was redefined through Measure 5 (2009) to focus more particularly on the area immediately surrounding the Adélie penguin colony. The marine component immediately adjacent to the Cape Royds penguin colony has been retained because it includes the primary access route of the penguins to the colony, which could otherwise be subjected to unnecessary disturbance by both visitors and local helicopter activity in the vicinity.

Research carried out over the last several decades has also noted that the Area has important values related to freshwater and terrestrial ecology. Pony Lake is a type locality for original descriptions of a number of species of algae collected during Shackleton’s British Antarctic Expedition of 1907-09. The most southerly observation of snow algae, dominated by *Chlamydomonas*, has been made within the Area. In addition, recent studies have shown fulvic acid Dissolved Organic Matter (DOM) present in Pony Lake is almost entirely microbially-derived, which is considered unusual. Because these substances are poorly understood, isolated reference samples are needed for research purposes: a sample collected from Pony Lake has made a valuable contribution as a reference for the International Humic Substances Society. Finally, it has been noted that the very low diversity of soil organisms at the site makes it valuable for comparisons with other, more favorable, habitats.

Shackleton’s hut (Historic Monument No. 15), located in ASPA No. 157 (Backdoor Bay), lies 170 meters to the northeast of the Adélie colony and, together with the colony, are attractions of high aesthetic and educational value to visitors. Regular and frequent visits to Cape Royds mean that the Area could easily be damaged by human impact if not provided with adequate protection. The scientific and ecological values of the Area require long-term protection from possible adverse impacts associated with these activities. However, in recognition of the value of the Adélie colony as the most accessible of any penguin species to visitors and national program participants in the southern Ross Sea, provision has been made for controlled access to two viewing areas outside, but near, the ASPA boundaries in order to allow visitors to Cape Royds the opportunity to observe the penguin colony without causing significant impact. Such visits are subject to Site Guidelines agreed through Resolution 3 (2021).

Relics from the time of Shackleton’s voyages are present at the site of a small depot in an embayment on the west side of the penguin nesting area (77° 33' 14.3" S 166° 09' 35.2" E: Map 2). The depot has historic value and should not be disturbed except by permit for conservation or management purposes.

The boundaries encompass the entire Adélie penguin colony, the southern part of Pony Lake, and the marine environment up to 500 meters from the shoreline surrounding Flagstaff Point, comprising a terrestrial component of 0.05 km^2 and a marine component of 0.61 km^2, giving a total area of 0.66 km^2.

2. Aims and objectives

Management at Cape Royds aims to:

- Avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance and sampling in the Area;

- Allow scientific research on the ecosystem of the Area, in particular on the avifauna and terrestrial and freshwater ecology, provided it will not compromise the values for which the Area is protected;
- Allow other scientific research and 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;
- Minimize the possibility of introduction of non-native species (e.g. plants, animals and microbes) to the Area;
- Minimise the possibility of the introduction of pathogens that may cause disease in faunal populations within the Area;
- Take into account the potential historic and heritage values of any artifacts before their removal and/or disposal, while allowing for appropriate clean-up and remediation if required;
- 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:

- Brightly colored markers, which should be clearly visible from the air and pose no significant threat to the environment, should be placed to mark the helicopter landing sites adjacent to the protected area (Maps 1 and 2);
- Signs illustrating the location and boundaries with clear statements of entry restrictions shall be placed at appropriate locations at the boundaries of the Area to help avoid inadvertent entry. In addition, on the first visit each season flags should be placed to mark the vehicle access route over sea-ice and the parking area in Backdoor Bay so those travelling over sea ice to Cape Royds can avoid the marine boundary of the Area. Flags placed shall be removed immediately prior to closure of sea-ice travel each season;
- 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, in all research hut facilities located at Cape Royds;
- Copies of this management plan shall be made available to all vessels and aircraft visiting and/or operating in the vicinity of Cape Royds, and all personnel (national program staff, field expeditions, tourist expedition leaders, pilots and ship captains) operating in the vicinity of, accessing or flying near the Area, shall be informed by their national program, tour operator or appropriate national authority 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 structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer necessary;
- National Antarctic programs operating in the Area should maintain a record of all new markers, signs and structures erected within the Area;
- The Area shall be visited as necessary (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 these steps are carried out.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA No. 121 Cape Royds - location.

Projection: Lambert Conformal Conic; Standard parallels: 1st 77° 33' 10" S; 2nd 77° 33' 30"S; Central Meridian: 166° 10' 00" E; Latitude of Origin: 78° 00' 00" S; Spheroid: WGS84.
Data sources:
The base map and contours are derived from an orthophotograph using aerial imagery acquired by USGS/DoSLI (SN7847) 16 November 1993 prepared at 1:2500 with a positional accuracy of ±1.25 m (horizontal) and ±2.5 m (vertical) and an on-ground pixel resolution of 0.4 m. Signposts: UNAVCO (Jan 2014). ASPA boundary: ERA (Jan 2014). Survey markers: LINZ (2011). Viewing areas and AWS (approx.): ERA (Jan 2014). Paths and anchorages from ASPA No. 157 Management Plan; approximate penguin nesting area digitized from georeferenced aerial image acquired 19 Jan 2005 (P. Lyver, pers. comm. 2014), updated by D. Ainley pers. comm. 2019. Contours (interval 10 m) and other infrastructure supplied by Gateway Antarctica (2009).
Inset 1: Ross Sea region, showing location of Inset 2.
Inset 2 Ross Island region, showing location of Map 1 and McMurdo Station (US) and Scott Base (NZ).

Map 2: ASPA No. 121 Cape Royds – air access. Map specifications as per Map 1.

Map 3: ASPA No. 121 – topography, access, facilities and wildlife. Map specifications as per Map 1, except the contour interval is 2 m.

6. Description of the Area

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

Overview

Cape Royds (77° 33' 20" S 166° 09' 56" E) is situated at the western extremity of Ross Island, McMurdo Sound, and occupies a coastal strip of ice-free land approximately 8 km wide on the lower western slopes of Mount Erebus (Map 1, Insets). The Area comprises a small part of Cape Royds, and includes both terrestrial and marine components.

The terrestrial component of the Area consists of ice-free land within approximately 350 m of Flagstaff Point (77° 33' 21" S 166° 09' 55" E) that is seasonally occupied by a breeding Adélie penguin (*Pygoscelis adeliae*) colony. The boundary includes all of the area occupied by breeding penguins and the two main routes used by the penguins to access the sea: Arrival and Backdoor bays. The marine component comprises an area of sea within 500 m of the Cape Royds coastline, which includes the main penguin access routes to the colony.

Boundaries and coordinates

The northern boundary of the terrestrial component of the Area extends from a small embayment at the northwestern corner of the Area for 53 m in a straight line northeast to a survey mark identified on earlier New Zealand maps as IT2 (77° 33' 11.1" S 166° 09' 33.8" E), which is an iron tube embedded in the ground. The boundary thence extends 9 m east from IT2 to a signpost (77° 33' 11.2" S 166° 09' 35.2" E), thence a further 30 m east-northeast to a signpost (77° 33' 10.9" S 166° 09' 39.4" E) half way down the slope of a small hill. From this signpost the boundary extends in a southeast direction for 133 m to a signpost (77° 33' 11.8" S 166° 09' 59.0" E) east of Pony Lake. The boundary thence extends 42 m in a south-southeast direction to a signpost (77° 33' 12.9" S 166° 10' 01.9" E), thence a further 74 m to a signpost (77° 33' 15.2" S 166° 10' 05.7" E) at the southern end of the penguin viewing area. The boundary thence extends 18 m to the coast at Arrival Bay (77° 33' 15.8" S 166° 10' 06.6" E). The northeastern boundary thence follows the coastline from Arrival Bay to Derrick Point. The boundary from Pony Lake (signpost at 77° 33' 11.8" S 166° 09' 59.0" E) to Derrick Point is coincident with the southern boundary of ASPA No. 157 Backdoor Bay, which has been designated to protect Shackleton's historic hut and associated artefacts (Historic Site and Monument No. 15).

The marine component of the Area encompasses the area within 500 m of the mean high water coastline of Flagstaff Point, with the boundary extending 500 m southwest from Derrick Point in the east (77° 33' 14.1" S 166° 10' 22" E), thence westward maintaining a distance of 500 m from the shore to 77° 33' 11.8" S 166° 08' 10" E, thence due east 500 m to coast at the northwestern corner of the Area (77° 33' 11.8" S 166° 09' 25" E).

Climate

An Automatic Weather Station (AWS) installed 1.75 km northeast of the Area has recorded data since 2004. Data are archived and available at the University of Wisconsin-Madison Antarctic Meteorological Research Center at ftp://amrc.ssec.wisc.edu/pub/aws/spawar/ (accessed 30 March 2020). Air temperature data collected at Cape Royds and nearby McMurdo Station, located approximately 35 km southeast of Cape Royds indicate that, in general, December is the warmest month and July is the coolest month. The wind at Cape Royds is predominantly from the southeast and deposits sea spray across the Area (Broady 1989a). Data from McMurdo Station over the period 1973–2004 showed average wind speeds of around 10 knots, whilst the maximum recorded reached 112.3 knots (Antarctic Meteorological Research Centre 2009).

Long term climate records indicate that during the 1960's air temperatures and wind speeds recorded at Scott Base were relatively low, which was followed by a period of warming in the early 1970's (LaRue *et al*. 2013). From the early 1980's a marked warming trend was observed across the McMurdo Sound area (Blackburn *et al*. 1991) and records from McMurdo Station suggest that air temperatures peaked in the late 1980's. While warm temperatures peaked then, minimum temperatures continued to rise (LaRue *et al*. 2013).

Geology and soils

The terrestrial component of the Area is composed of rocky terrain of irregular lava flows, volcanic gravels and dark reddish scoria, bounded on the seaward side by a low cliff of approximately 10-20 m in height. Mineral soils and sand are present together with encrusted salts and compacted ornithogenic soils associated with the Adélie penguin colony (Cowan and Casanueva 2007).

Breeding birds

The Area contains the world's current most southerly established Adélie penguin (*Pygoscelis adeliae*) colony, with annual population numbers that in recent years have ranged 2,500 to 4,000 breeding pairs during the approximate mid-October to mid-February occupation (Figure 1). The population size in 1959 was deemed to be equivalent to that in 1909 with no evidence that it had been larger in historical times (Ainley 2002), then decreased to fewer than 1000 breeding pairs in 1963, a result of severe ice conditions sensitizing the population to disturbance by visitation and helicopter movements (Thompson 1977). Following visitor restrictions and, in 1996, relocation of the helicopter pad away from the colony, penguin numbers increased, eventually quadrupling the population (Ainley *et al*. 2005; Taylor and Wilson 1990). Following a peak in 1987, Adélie numbers at Cape Royds decreased sharply in 1988 and 1989, before recovering once more to reach a population comparable to levels recorded during the late 1980's. By 1998, the Adélie population at Cape Royds had reached 4,000 breeding pairs, with numbers subsequently decreasing to 2,400 pairs by 2000 (Ainley *et al*. 2004).

Fluctuations in Adélie penguin populations at Cape Royds have been linked to changes in a range of climatic and environmental variables. The sharp population increase during the 1980s has been linked to the take of minke whales from the Ross Sea sector, which continued for a time as 'scientific whaling'; the penguin population increase ceased upon the cessation of whaling and recovery of the minke whale population (Ainley *et al*. 2007). Rather than decreasing as the whale numbers recovered, increasing winds made persistence of the McMurdo Sound and Ross Sea polynyas more consistent to the benefit of the Cape Royds (and other Ross Sea) colonies (Ainley *et al*. 2005, 2010). Overall, on a shorter-time scale perspective, Wilson *et al*. (2001) found a significant inverse correlation between annual variation in Adélie numbers and winter sea ice extent, with more extensive (i.e. more northerly) sea ice coverage reducing sub-adult survival rates by restricting access to productive feeding areas. Consequently, total Adélie numbers at Cape Royds showed a 5-year lagged response to sea ice concentration variation. The influence of sea ice coverage on Adélie numbers within the Area was further highlighted following the grounding of large icebergs (including the iceberg designated B-15A) on the northern shore of Ross Island prior to the 2001 nesting season (Arrigo *et al*. 2002; Ainley *et al*. 2003). The obstruction caused by the icebergs resulted in unusually extensive sea ice coverage during 2001-05, with the exception of 2003. The number of breeding pairs and the number of chicks fledged decreased dramatically, with a significant portion moving to Cape Bird (Dugger *et al*. 2014). Upon disappearance of the icebergs in 2005, the sea ice regime returned to a 'normal' state, with the number of breeding pairs showing a gradual recovery and as of 2019 had achieved a level similar to that which existed prior to the icebergs event (Figure 1).

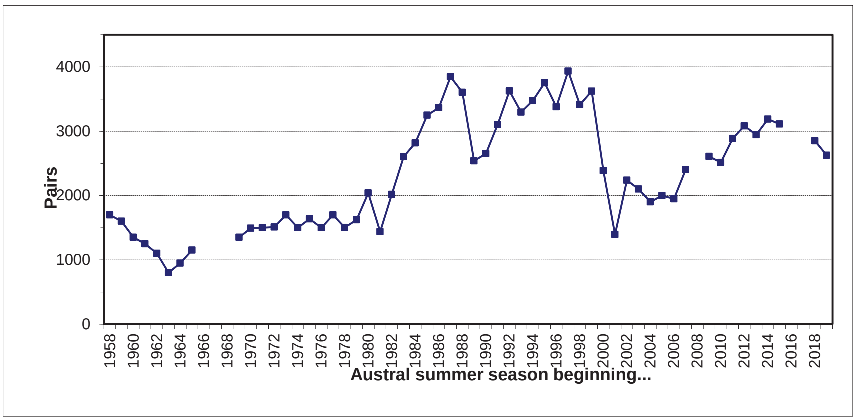

Figure 1. Number of breeding pairs of Adélie penguins at Cape Royds 1958-59 – 2019-20. (Sources: Stonehouse 1965; Taylor *et al*. 1990; Woehler 1993; Woehler pers. comm. 1999; Ainley *et al*. 2004; Lyver *et al*. 2014; Ainley 2014, Ainley pers. comm. 2019).

The Area has been monitored regularly since 1957 and has been photographed from the air during the incubation phase of breeding annually since 1981, i.e. around 1 December each year, the date when only single incubating birds are present. The annual assessment of Adélie penguin population size at colonies on Ross Island, Ross Sea, from 1959 to 2019 is the longest-running marine biological time series in the Antarctic (Taylor and Wilson 1990; Taylor *et al*. 1990; Wilson *et al*. 2001). The long history of scientific observations at Cape Royds thus provides rare opportunities to assess population trends over long periods.

Studies of Adélie foraging patterns during austral summers 1997/98 to 2014/15 indicate that the mean foraging distance from Cape Royds ranges between 9.70 km and 12.09 km (Ainley *et al*. 2004; Ford *et al*. 2015; Saenz *et al*. in press), and observations suggest that little foraging occurs within 200 m of the coast (Ainley pers. comm. 2008). The foraging range of penguins belonging to the Cape Royds colony overlaps extensively (30–75%) with the ranges of birds originating from both Cape Bird and Beaufort Island (Ainley *et al*. 2004). Banded penguins from Cape Royds, Cape Bird and Beaufort Island are often seen within the other colonies (LaRue *et al*. 2013, Dugger *et al*. 2014).

In addition to the Cape Royds Adélie penguin colony, a significant breeding population of south polar skuas (*Catharacta maccormicki*) is located within the ASPA, with a number of nests near to the boundary. Numbers totalled 76 breeding pairs in 1981 (Ainley *et al*. 1986). While many of those skuas nesting at Cape Royds then were likely sustained by refuse from McMurdo Station, some were observed to forage for food within the Adélie penguin colony (Young 1962a). It was noted, however, that preying of skuas on young penguins was limited and that only a portion of the skuas breeding at Cape Royds obtained food from within the colony (Young 1962b). Following the cessation of human refuse disposal at McMurdo Station in the 1980s and improved waste management procedures, the Cape Royds (and Cape Evans) skua populations decreased. Now the skuas number fewer than 30 pairs including the entire Cape (Wilson *et al*. 2016). Currently, 9-11 pairs nest within or in close proximity to the ASPA.

Marine biology and oceanography

The marine ecosystem within and near the boundaries of the Area was investigated in 2012-2014 (Saenz *et al*. in press). The prime penguin prey, silverfish and crystal krill, abound along the McMurdo Sound fast ice edge, which usually extends west from Cape Royds across the Sound. Upon intensive foraging by the penguins and minke whales, krill become less available at shallow depths and the penguins turn increasing to silverfish (Ainley *et al*. 2006; Saenz et al. in press). In regard to the sea floor, samples collected several kilometers north of Cape Royds consisted of coarse volcanic gravels and small to large boulders. Research on the Nototheniid fish population and structure in this vicinity indicated that fish were abundant, with the most common species at that time being *Trematomus bernacchii*. The surveys also recorded the presence of *Trematomus hansoni, T. centronotus, T. nicolai and Gymnodraco acuticeps.* The surveys identified the presence of invertebrates such as echinoids, asteroids (e.g. *Odontaster validus*), ophiuroids, pycnogonids (e.g. *Pentanymphon antarcticum, Colossendeis robusta*), pteropods, copepods, amphipods, isopods, hirudinea, bryozoa, polycheates, ctenophores, mollusca, and medusae. Several kilometers to the south, in Erebus Bay, the fish fauna shifted during the heavy sea ice event associated with large icebergs grounding, when air breathing predators (especially seals) were precluded from the area. During 2005 only *T. bernacchi* was observed but with return of more ‘normal state’ sea ice conditions, several additional species were observed (Buckley 2013). The benthic invertebrate community is dominated by what was termed a ‘basin’ faunal group (Barry *et al*. 2003).Local ocean currents originate from the eastern Ross Sea continental shelf and flow westward along the Ross Ice Shelf past Cape Crozier, and then turns northward along the Victoria Land coast. The current divides at Beaufort Island, where a minor arm veers southward past Capes Bird and Royds (Jacobs *et al*. 1970; Barry 1988). The warmer, south flowing current along the western shore of Ross Island brings an injection of phytoplankton from the Ross Sea (Barry & Dayton 1988, Saenz *et al*. in press).

Terrestrial and freshwater ecology

Ponds within the Area, including Pony Lake, are nutrient-enriched and contain an abundant and diverse algal community adapted to high nutrients and salinity, dominated by phytoplankton, diatoms and oscillatorian benthic felts (Broady 1987). Some species of algae were first formally described from Pony Lake (West and West 1911), making the site a ‘type locality’. Snow algae are present on small patches of snow on the coastal ice-foot adjacent to the penguin colony, dominated by species of *Chlamydomonas*, which is the most southerly record of snow algae (Broady 1989a).

Pony Lake has been identified as an important source of microbially derived Dissolved Organic Material (DOM) (Brown *et al.*2004). One type of DOM, fulvic acid, is derived from decaying plant matter and microbial activity. The fulvic acid present in Pony Lake has been identified as an important end-member as it is almostly entirely microbially-derived. Fulvic acids affect the chemistry, cycling and bioavailability of chemical elements in terrestrial and aquatic environments. Because these substances are poorly understood, isolated reference samples are needed for research purposes. A reference sample of Pony Lake fulvic acid was collected and made available to serve as a microbial end-member for distribution through the International Humic Substances Society. The lake's abundant levels of DOM and convenient location from McMurdo Station make it an ideal place to conduct such fieldwork.

Studies of terrestrial invertebrate (nematode) populations from the ornithogenic soils at Cape Royds have been carried out since 1990. In contrast to the greater invertebrate diversity in the Dry Valleys, only one species of nematode was observed at Cape Royds (*Panagrolaimus davidi*) (Porazinska *et al*. 2002). The very high-nutrient soils at Cape Royds lead to low biodiversity of soil organisms, making the Area susceptible to local and global human disturbance. Additionally, Cape Royds serves as a comparison for habitats under investigation in the McMurdo Dry Valleys.

There is little lichen growth within the Area, although different lichen growth forms (crustose, foliose and fruticose) are found in other parts of Cape Royds, distributed in three distinct zones believed to result from marine aerosol and snow accumulation patterns (Broady 1989a, 1989b).

Human activities and impact

Changes to the population of Adélie penguins at Cape Royds attributed at least in part to human visitation and helicopter movements is discussed in the section above on breeding birds.

National program personnel from nearby McMurdo Station (US), Scott Base (NZ) and tourist groups regularly visit Cape Royds to view Shackleton’s hut and the Adélie penguin colony. Visits to Cape Royds are carefully controlled by national authorities, and entry to protected areas is strictly by permit and permits for entry into ASPA 121 are issued only under the conditions in Section 7(i) below. Numbers of visitors may fluctuate depending on a range of factors, including sea ice and weather conditions, available logistics, and the number of tour operators in any given year.

Penguin viewing areas are located outside of the Area immediately to the north and east of the existing boundary (Map 3). Visitors are briefed and visits are supervised, and the boundaries of the Area are generally respected.

6(ii) Access to the Area

The Area may be accessed by traversing over land or sea ice, by sea or to nearby helicopter landing sites outside of the Area by air. Particular routes are recommended for access to the Area, and overflight and aircraft landing restrictions apply, the specific conditions for which are set out in Section 7(ii) below.

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

Shackleton’s Hut (ASPA No. 157 and Historic Site and Monument No. 15) (77° 33' 10.7" S 166° 10' 06.4" E) is situated approximately 70 m from the NE boundary sign of the terrestrial component of the Area, 100 m northeast of which is a small research shelter (New Zealand) (77° 33' 07.5" S 166° 10' 10.6" E) (Map 2). An AWS and remote camera installation is located 10 m inside the eastern boundary of the Area (Map 2), 80 m from Shackleton’s hut (present in April 2020). Two survey markers are present within the Area – marker IT2 is on the northern boundary of the terrestrial part of the Area and is described above, while marker IT3 (77° 33' 19.7" S 166° 09' 52.7" E) (also an iron tube embedded in the ground) is 45 m NW of Flagstaff Point. Relics at the site of a small depot from the time of Shackleton’s voyages are present in a small embayment on the west side of the penguin nesting area (77° 33' 14.3" S 166° 09' 35.2" E: Map 2). The depot should not be disturbed except by permit for conservation or management purposes.

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

The nearest protected areas to Cape Royds are Backdoor Bay (ASPA No.157 and HSM No.15) which is adjacent to and shares part of the boundary of the Area, Cape Evans (ASPA No.155) 10 km to the south, Tramway Ridge (ASPA No.130) close to the summit of Mount Erebus situated 20 km east, New College Valley (ASPA No.116) 35 km to the north at Cape Bird, and Arrival Heights (ASPA No.122) which is adjacent to McMurdo Station 35 km to the south. Cape Crozier (ASPA No.124) is 75 km to the east on Ross Island.

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 to enter 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 and scientific values of the Area;
- Approach distances to fauna must be respected, except when scientific needs 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 within the Area.

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

Within the terrestrial part of the Area access shall be on foot and vehicles are prohibited. Within the marine part of the Area, access should be by foot or vehicle when sea-ice is present, or by ship or small boat during open water periods. Foot access into the Area should be from the direction of the Primary helicopter landing site, and if arriving over the sea ice or by boat, then access should first be to Backdoor Bay and thence on foot following the paths shown on Maps 1 and 3.

Foot access and movement within the Area

Movement on land within the Area shall be on foot. Pedestrians should maintain a minimum approach distance of 5 m from wildlife, unless it is necessary to approach closer for purposes allowed for by the permit. Visitors should move carefully so as to minimize disturbance to flora, fauna, soils, and water bodies. Pedestrians should walk around the penguin colonies and should not enter sub-groups of nesting penguins unless required for research or management purposes. Care should be taken to avoid trampling nests when moving through skua territories. 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.

Ship and small boat access

Ships and small boats are prohibited from entering the marine component of the Area except by permit. Ships embarking passengers should remain at least 300 m from shore and visitor access either by small boat or over sea ice should be to the landing site on the northwestern shore of Backdoor Bay (Maps 1 and 3).

Aircraft access and overflight

Aircraft shall operate within and near the Area according to strict observance of the following conditions (refer Map 2):

1) Helicopter landings within the Area are prohibited.
2) Overflight of the Area by piloted aircraft below 2000 ft (~610 m) Above Ground Level is prohibited, except in accordance with a permit issued by an appropriate national authority.
3) Overflight / landings of all aircraft within ½ nautical mile (~930 m) of ASPA No. 121 are strongly discouraged, except for scientific or management purposes (Map 2).
4) Helicopters should land at the Primary landing site (77° 33.06' S 166° 10.38' E) (Maps 1-3), 250 m northeast of Shackleton's hut, and ~125 m north of the New Zealand refuge hut.
5) A secondary landing site is located at 77° 33.11' S 166° 10.24' E, ~100 m southwest of the Primary landing site (Maps 2 and 3), which should be avoided when the penguin colony is occupied (01 November through 01 March). Another secondary landing site, which may be used year-round, is located adjacent to the seasonal field camp (US) ~200 m north of the Primary landing site.
6) 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 scientific 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 that cannot be served elsewhere. Activities for educational and / or outreach purposes do not include tourism;
- Activities with the aim of preserving or protecting historic resources within the Area;
- 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, 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 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 flora and fauna, 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

Camping within the terrestrial part of the Area is prohibited. Camping within the marine part of the Area when sea ice is present is allowed by permit. Such camps should avoid the penguin approach routes within 200 m of the breeding colony, but are otherwise not restricted to a particular location. Outside of the Area, a New Zealand campsite is located adjacent to the shelter (NZ) 175 m northeast of the Area, and a United States campsite is located ~350 m north of and above the shelter (Maps 1 and 3).

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, walking poles and other 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));
- All poultry and poultry products, including products containing uncooked dried eggs, are prohibited from the Area. All poultry brought to and not consumed or used at nearby huts, facilities and / or camping sites, including all parts, products and / or wastes of poultry, should be removed or disposed of by incineration or equivalent means that eliminates risks to native flora and fauna;
- 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, 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, shall be removed at or before the conclusion of that stated period;
- All materials shall be 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 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, soil and historical items.
- 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 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.

- Unless specifically authorized by permit, visitors are prohibited from interfering with or from handling, taking or damaging any historic artifacts found within the Area. Any new artifacts observed should be notified to the appropriate national authority. Relocation or removal of artifacts for the purposes of preservation, protection or to re-establish historical accuracy is allowable by permit.

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:

1) 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;
2) Install or maintain signposts, markers, structures or scientific or essential logistic equipment;
3) Carry out protective measures;
4) 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 the United States and New Zealand, 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 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 exceptionally been undertaken, and / or of any materials released and not removed, that were not included in the authorized permit.

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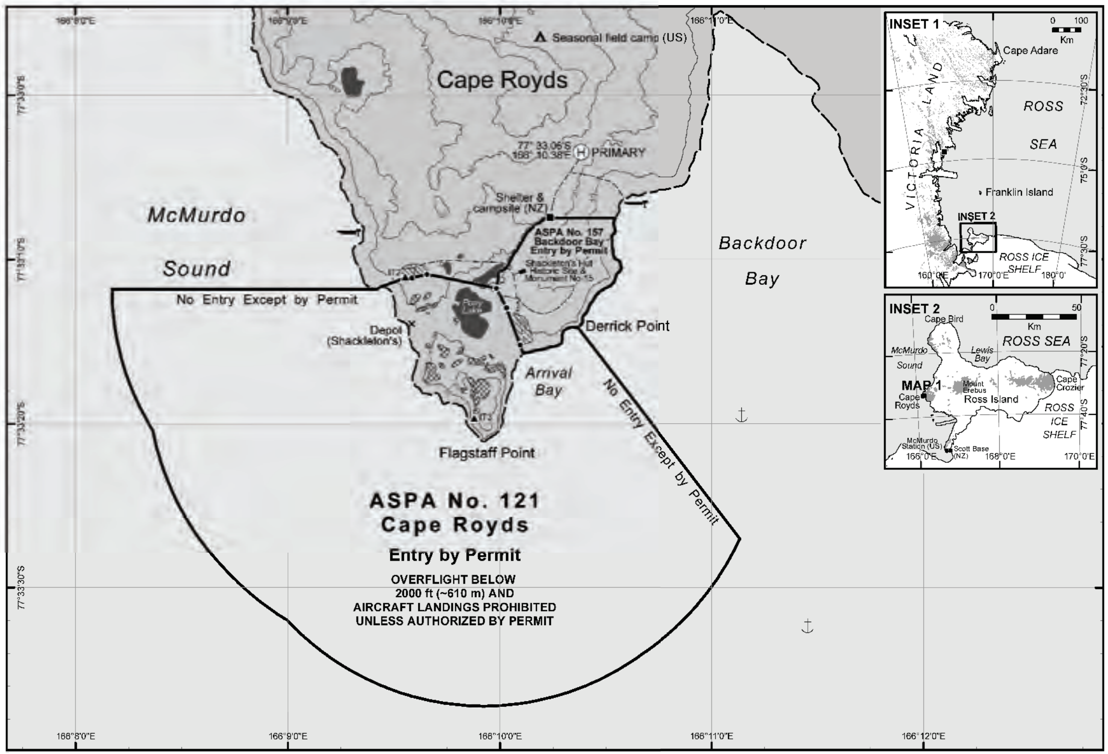


Map 1: ASPA No. 121 Cape Royds - location

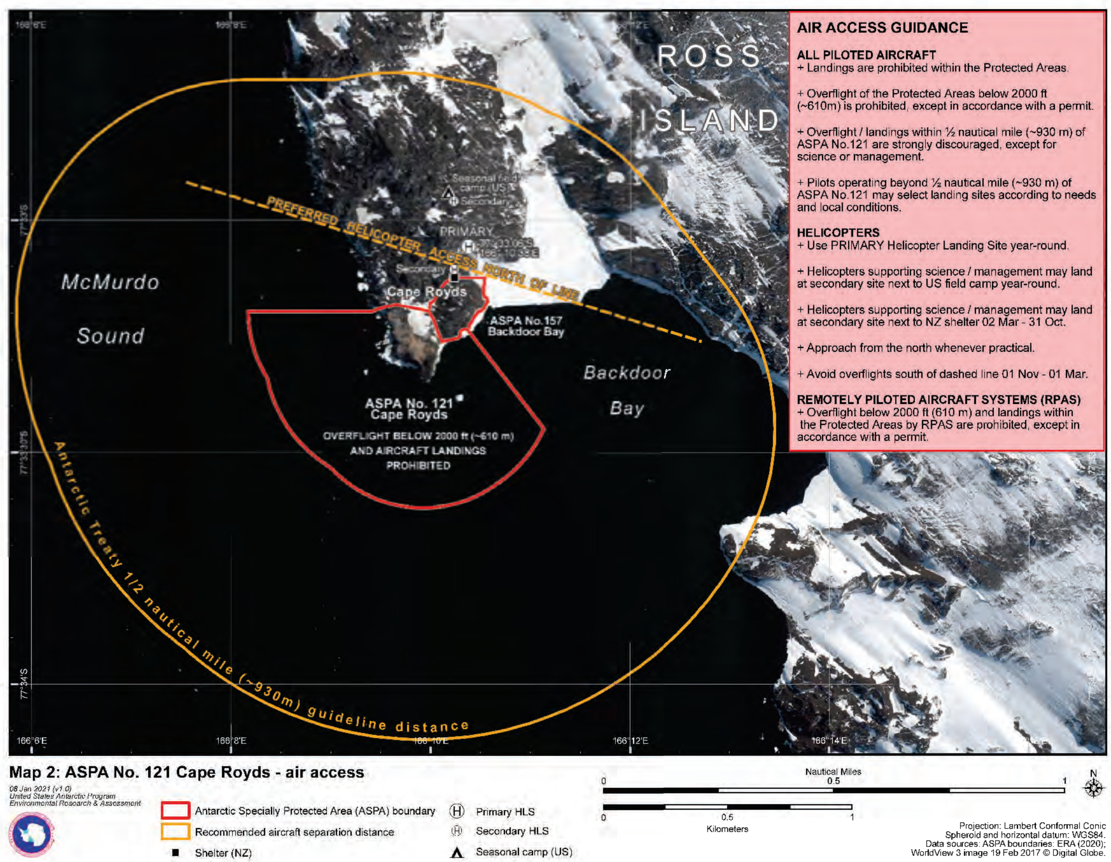
08 Jan 2021 (v1.0)
United States Antarctic Program
Environmental Research & Assessment

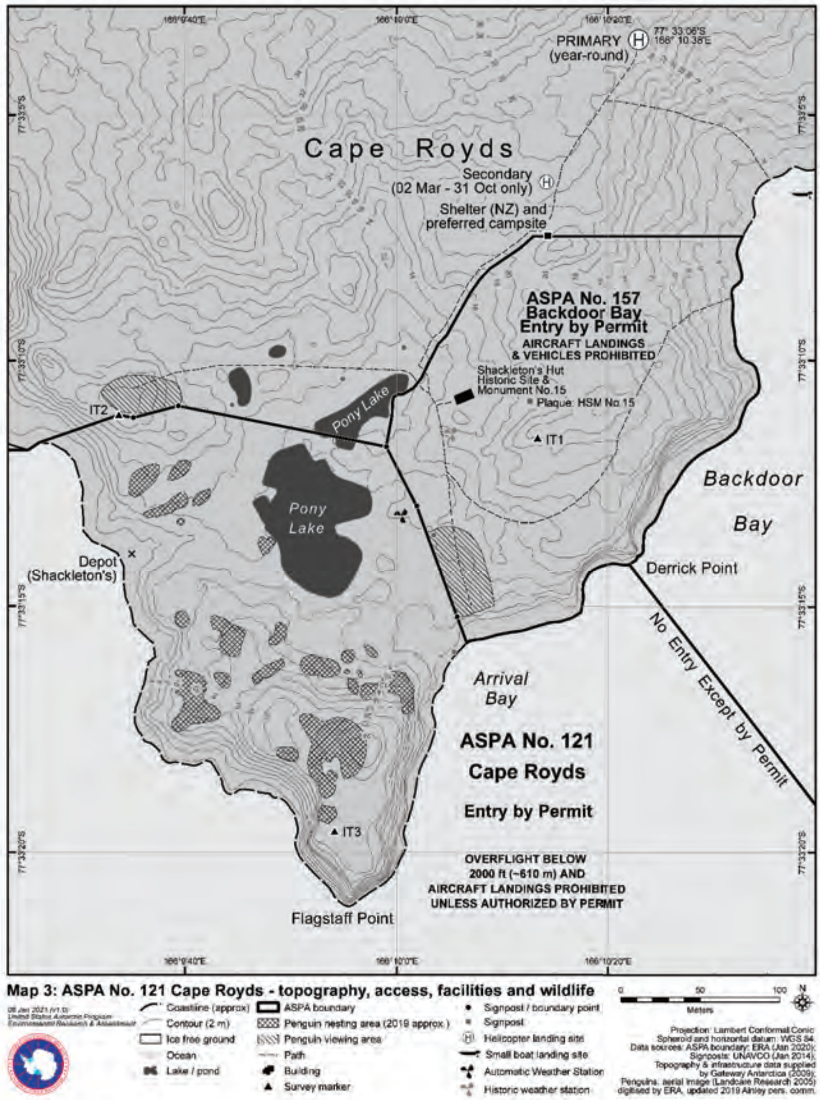
Coastline (approx)
Contour (10 m)
Ice free ground
Ocean
Lake / pond
Antarctic Specially Protected Area (ASPA) boundary
Penguin nesting area (2019 approx.)
Penguin viewing area
Path
Building
Survey marker
Signpost / boundary point
Helicopter landing site
Small boat landing site
Ship anchorage

0 50 100 150 200
Meters

N

Projection: Lambert Conic Conformal.
Spheroid and horizontal datum: WGS 84.
Data sources: ASPA boundary: ERA (Jan 2020);
Signposts: UNAVCO (Jan 2014); Topography &
infrastructure data supplied by Gateway Antarctica (2009);
Penguins: aerial image (Landcare Research 2005)
digitised by ERA, updated 2019 Ainley pers. comm.


AIR ACCESS GUIDANCE
ALL PILOTED AIRCRAFT
+ Landings are prohibited within the Protected Areas.
+ Overflight of the Protected Areas below 2000 ft (~610m) is prohibited, except in accordance with a permit.
+ Overflight / landings within ½ nautical mile (~930 m) of ASPA No.121 are strongly discouraged, except for science or management.
+ Pilots operating beyond ½ nautical mile (~930 m) of ASPA No.121 may select landing sites according to needs and local conditions.
HELICOPTERS
+ Use PRIMARY Helicopter Landing Site year-round.
+ Helicopters supporting science / management may land at secondary site next to US field camp year-round.
+ Helicopters supporting science / management may land at secondary site next to NZ shelter 02 Mar - 31 Oct.
+ Approach from the north whenever practical.
+ Avoid overflights south of dashed line 01 Nov - 01 Mar.
REMOTELY PILOTED AIRCRAFT SYSTEMS (RPAS)
+ Overflight below 2000 ft (610 m) and landings within the Protected Areas by RPAS are prohibited, except in accordance with a permit.
ROSS ISLAND
McMurdo Sound
Backdoor Bay
PREFERRED HELICOPTER ACCESS NORTH OF LINE
Seasonal field camp (US)
Secondary
PRIMARY
Cape Royds
ASPA No.157 Backdoor Bay
ASPA No. 121 Cape Royds
OVERFLIGHT BELOW 2000 ft (~610 m) AND AIRCRAFT LANDINGS PROHIBITED
Antarctic Treaty 1/2 nautical mile (~930m) guideline distance
166°6'E
166°8'E
166°10'E
166°12'E
166°14'E
77°34'S
Map 2: ASPA No. 121 Cape Royds - air access
08 Jan 2021 (v1.0)
United States Antarctic Program
Environmental Research & Assessment
Antarctic Specially Protected Area (ASPA) boundary
Recommended aircraft separation distance
Shelter (NZ)
Primary HLS
Secondary HLS
Seasonal camp (US)
Nautical Miles
0
0.5
1
Kilometers
0
0.5
1
N
Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84.
Data sources: ASPA boundaries: ERA (2020);
WorldView 3 image 19 Feb 2017 © Digital Globe.



Map 3: ASPA No. 121 Cape Royds - topography, access, facilities and wildlife

Management Plan For

Antarctic Specially Protected Area No. 131

CANADA GLACIER, LAKE FRYXELL, TAYLOR VALLEY, VICTORIA LAND

1. Description of values to be protected

An area of approximately 1 km^2 between the east side of Canada Glacier and Lake Fryxell was originally designated in Recommendation XIII-8 (1985) as SSSI No. 12 after a proposal by New Zealand on the grounds that it contains some of the richest plant growth (bryophytes and algae) in the McMurdo Dry Valleys. The Area is designated primarily to protect the site's ecological and scientific research values.

The boundaries of the Area were increased by Measure 3 (1997) to include biologically rich areas that were previously excluded. The Area was redesignated by Decision 1 (2002) as Antarctic Specially Protected Area (ASPA) No. 131. and a revised Management Plan was adopted through Measure 1 (2006), Measure 6 (2011) and Measure 6 (2016).

The ecological values of the Area stem from the rich plant communities mostly found in a wet area (referred to as "the flush") close to the glacier in the central part of the Area. The Area comprises sloping ice-free ground with summer ponds and small meltwater streams draining from Canada Glacier towards Lake Fryxell. The composition and distribution of the moss, lichen, cyanobacteria, bacteria and algae communities in the Area are correlated closely with the water regime. Thus, hydrology and water quality are important contributors to the ecological values of the site.

The Area has been well-studied and documented, which adds to its value for scientific research. The vegetation communities, particularly the bryophytes, are vulnerable to disturbance by trampling and sampling. Damaged areas may be slow to recover. Sites damaged at known times in the past have been identified, which are valuable in that they provide one of the few areas in the McMurdo Dry Valleys where the long-term effects of disturbance, and recovery rates, can be measured.

The Area is of regional significance and remains of exceptional scientific value for ecological investigations. Increasing pressure from scientific, logistic and tourist activities in the region, coupled with the vulnerability of the Area to disturbance through trampling, sampling, pollution or introduction of non-native species mean the values of the Area require ongoing protection.

2. Aims and objectives

Management of Canada Glacier aims to:

- Avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area, including over sampling;
- Allow other scientific research in the Area provided it is only for compelling reasons which cannot be served elsewhere;
- Prevent or minimise the introduction to the Area of alien plants, animals and microbes; 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:

- Copies of this Management Plan, including maps of the Area, shall be made available at adjacent operational research stations and all of the research hut facilities located in the Taylor Valley that are within 20 km of the Area.
- 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 to help avoid inadvertent entry.
- 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.
- 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 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 131 Canada Glacier: Regional Map.

Map 2: ASPA 131 Canada Glacier: Helicopter access zone.

Map 3: ASPA 131 Canada Glacier: Vegetation density map.

Map specifications: Projection - Lambert conformal conic. Standard parallels - 1st 77° 35' 00" S; 2nd 77° 38' 00"S. Central Meridian - 163° 00' 00" E. Latitude of Origin - 78° 00' 00" S. Spheroid - WGS84. Contours are derived from combining orthophotograph and Landsat images. Precise areas of moist ground associated with the flush are subject to variation seasonally and inter-annually.

6. Description of the Area

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

Canada Glacier is situated in the Taylor Valley, in the McMurdo Dry Valleys. The designated Area encompasses most of the glacier forefront area on the east side of the lower Canada Glacier, on the north shore of Lake Fryxell (77° 37' S, 163° 03' E: Map 1). It comprises gently to moderately sloping ice-free ground at an elevation of 20 m to 220 m with seasonal meltwater ponds and streams draining Canada Glacier into Lake Fryxell.

The southern boundary of the Area is defined as the shoreline of Lake Fryxell, to the water's edge. The lake level is currently rising. This boundary extends northeast for approximately 1 km along the shoreline from where Canada Glacier meets Lake Fryxell (77° 37.20’ S, 163° 3.64’ E) to the southeast corner of the boundary which is marked with a cairn (77° 36.83' S, 163° 4.88' E) adjacent to a small island in Lake Fryxell. The island was once a part of a small peninsula extending into Lake Fryxell but lake level rise has turned it into an island (Map 3). The peninsula was once marked by a large split rock surrounded by a circle of rocks which was a benchmark for the 1985 NZ survey of the original SSSI, but is no longer visible. A wooden post marking the Dry Valley Drilling Project Site 7 (1973) is still visible on the island.

A moraine ridge extending upslope from the southeast corner of the boundary in a northerly direction defines the eastern boundary of the Area. A cairn (77° 36.68' S, 163° 4.40' E) is located on a knoll on this ridge 450 m from the southeast corner of the boundary. The ridge dips sharply before joining the featureless slope of the main Taylor Valley wall. The northeast boundary corner of the Area is in this dip and is marked by a cairn (77° 36.43' S, 163° 3.73' E).

From the northeast boundary cairn, the northern boundary slopes gently upwards and west for 1.7 km to Canada Glacier, to the point where the stream flows from the glacier and snow field, through a conspicuously narrow gap in the moraine (77° 36.42’ S, 162° 59.69’ E).

The western boundary follows the glacier edge for about 1 km, down a slope of lateral moraine of fairly even gradient to the southwest corner of the boundary where the glacier meets the lake shore (77° 37.20’ S, 163° 3.64’ E).

The flush area at Canada Glacier is believed to be the largest high-density area of vegetation in the McMurdo Dry Valleys (Map 3). The summer water flow, in conjunction with the microtopography, has the greatest influence in determining where mosses, lichens, cyanobacteria, bacteria, and algae grow. The glacier face also provides protection from destructive winds which could blow the mosses away in their freeze dry state, and from abrasion from wind borne dust.

The flush is located close to the glacier edge. There are two main vegetated areas, separated to the north and south by a small, shallow pond (Map 3). The flush area is gently sloping and very moist in summer with areas of wet ground, numerous small ponds and rivulets. The slopes above this area are drier, but vegetation colonises several small stream channels which extend parallel to the glacier from the upper boundary of the Area down to the flush. Undulating moraines assist accumulation of persistent snow patches on this slope, which may also provide moisture for plant growth. Stream channels, and associated vegetation, become less obvious with distance from the glacier (Map 3). These slopes and the central flush are drained to the southeast by Canada Stream. Prior to 1983, Canada Stream was informally known as Fryxell Stream.

Four moss species have been identified from the flush area: *Bryum argenteum* (previously referred to as *Bryum subrotundifolium)* and *Hennediella heimii* (previously referred to as *Pottia heimii)* dominate, with rare occurrences of *Bryum pseudotriquetrum* and *Syntrichia sarconeurum* (formerly known as *Sarconeurum glaciale*). *B. argenteum* occurs mainly in areas of flowing water and seepage. Where water is flowing, a high proportion of this moss has epiphytic *Nostoc* communities associated with it. Towards the edges of the flowing water zones or on higher ground, *Hennediella heimii* dominates. Sporophytes of *Hennediella heimii* are found at this location and may be one of the most southerly recorded fruiting locations for a moss.

Lichen growth in the Area is inconspicuous, but the epilithic lichens, *Carbonea vorticosa, Sarcogyne privigna*, *Lecanora expectans, Rhizoplaca melanophthalma* and *Caloplaca citrina* may be found in a small area near the outflow of the pond near Canada Glacier. Chasmoendolithic lichens also occur in many boulders throughout the flush area.

Over 37 species of freshwater algae and cyanobacteria have been described at the site. The upper part of Canada Stream superficially appears sparse but encrusting communities dominated by cyanobacterium grow on the sides and undersides of stones and boulders. Cyanobacterium *Chamaesiphon subglobosus* and a green alga *Prasiola* species, originally identified as *P. calophylla* but subsequently erected as a new species, *P. glacialis,* have been observed only in this upper part of the stream. *Prasiola glacialis,* growing in dense green ribbons beneath stones in the stream, is generally only apparent when stones are overturned. Cyanobacterial mats, comprising a diverse assemblage of species (including *Oscillatoria, Pseudanabaena, Leptolyngbya, Phormidium, Gloeocapsa, Calothrix* and *Nostoc*), and heterotrophic bacteria are extensive in the middle and lower reaches of the stream and more diverse than those in the upper stream. Mucilaginous colonies of *Nostoc commune* dominate standing water in the central flush and grow epiphytically on mosses in the wetted margins of water courses, while cyanobacterial mats cover much of the mineral fines and gravels in flowing sections. The filamentous green alga *Binuclearia* is found streaming out in the flow in the middle reaches of the stream. The lower stream is similar in floral composition to the upper, although the algae *Tribonema elegans* and *Binuclearia* have been reported as abundant, but *Prasiola glacialis* is absent. *Tribonema elegans* is rarely encountered in this region of Antarctica.

Invertebrates from six phyla have been described in the Area: the three main groups are Rotifera, Nematoda and Tardigrada, with Protozoa, Platyhelminthes, and Arthropoda also present. There are no records of Collembola found in the Area, though there are records where they have been found nearby outside the Area.

The Canada flush vegetation has been described as profuse but lacking in diversity, when compared to other botanically rich sites in Antarctica. This may be attributable at least in part to the oligotrophic nature of the site. Water flowing through the stream is similar to glacial ice melt, with conductivity in December 2014 of close to 35.32 $\mu S\ cm^{-1}$ from the point where it left the glacier to the delta where it enters the lake. The prevalence of nitrogen fixing cyanobacteria (*Nostoc* and *Calothrix* species) further supports the view of a low nutrient status.

Canada Glacier 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).

Evidence of past human activity is noticeable within the Area. Indications of past human activity are likely to be found in the soils adjacent to the original New Zealand hut and helicopter landing site. These may be in the form of localised areas of petrochemical residues and soil nutrients. Within the flush area, damage to the vegetation including paths and footprints and sites of experimental removal of core samples and larger clumps from moss turfs are visible. A number of old markers are also present in the flush area.

A plastic greenhouse was erected within the Area close to the flush from 1979 to 1983 for research and experimental growth of garden vegetables. The structure was removed at the end of each season until 1983 when it was used for the storage of equipment over winter. The structure. was destroyed by a storm that winter. Remains of the greenhouse found in the Area have since been removed.

Near the flush area, the first site of the New Zealand hut at Canada Glacier consisted of paths marked by lines of rocks, areas cleared for use as campsites, an old helicopter pad, and several low rock structures. A series of at least four shallow pits (~1 m in depth) were also dug close to the site. This site was relocated to a second site in 1989 and the first hut site was remediated. The second hut site comprised two small buildings, several new campsites, and a helicopter pad. The buildings were removed completely in the 1995–96 season. The helicopter pad remains and is the only helicopter landing site in the Area. The campsite area was removed in 2021, however, the paths marked by lines of rocks and areas previously used as campsites are still present.

A weir is present on Canada Stream (see Section 6(iii)). Hydrological data collected from this stream measured the average discharge rate of Canada Stream when it was flowing as 22.13 L/s [min = 0.0 L/s and max = 395.76 L/s] from November 2014 to February 2015. The average water temperature over this time was 1.99 °C [min = -1.1 °C and max = 11.34 °C] (http://www.mcmlter.org/).

A path from the Lake Fryxell Camp Facilities Zone is located between the lake shore and the weir on Canada Stream (Maps 2, 3). Another path exists between the designated helicopter landing site and the Canada Glacier edge, crossing a moist area of plant growth, but is not indicated on the map. An access route is also located between the Lake Hoare Camp Facilities Zone and the Lake Fryxell Camp Facilities Zone running just above the northern boundary (Maps 1, 2 and 3).

6(ii) Special zones within the Area

None.

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

A rock weir was constructed in the constricted part of Canada Stream in the 1981/1982 season and was fully removed at the end of the season. In 1990, a more substantial weir and 9-inch Parshall flume were installed nearby (Map 3). The flume is made of black fibreglass. The weir consists of polyester sandbags filled with alluvium from near the stream channel. Areas disturbed during construction were restored and after one season were not evident. The upstream side of the weir is lined with vinyl-coated nylon. A notch has been built into the weir for relief in case of high flow. Clearance of seasonal snow from the channel has been necessary to prevent water from backing up at the weir. Data logging instrumentation and batteries are stored in a plywood crate located nearby on the north side of the stream. The weir is maintained by the McMurdo Dry Valleys Long Term Ecological Research project.

Three cairns mark the Area boundaries.

The Lake Fryxell Camp Facilities Zone (USA) is located 1.5 km to the east of the Area (20 m asl) midway along Lake Fryxell on the north side of the lake. The F6 Camp Facilities Zone (USA) is located approximately 10 km to the east of the Area on the south side of Lake Fryxell. The Lake Hoare Camp Facilities Zone (USA) is located 3 km to the west of the Area (65 m asl) on the western side of Canada Glacier at the base of the glacier on the north side of Lake Hoare. The Taylor Valley Visitor Zone is located to the south of the Area at the terminus of Canada Glacier (Map 1).

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

The nearest protected areas to Canada Glacier are:

- Lower Taylor Glacier and Blood Falls, Taylor Valley, McMurdo Dry Valley (ASPA No. 172) approximately 23 km west in the Taylor Valley;
- Linnaeus Terrace, Asgard Range (ASPA No. 138) approximately 47 km west in the Wright Valley; and
- Barwick and Balham Valleys, Southern Victoria Land (ASPA No. 123) approximately 50 km to the northwest (Map 1, Inset).

7. Terms and conditions for entry Permits

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 reasons that cannot be served elsewhere, or for reasons essential to the management of the Area;
- The actions permitted will not jeopardise the ecological values or value for scientific research of the Area;
- Access to any zone marked as possessing vegetation density higher than 21% (Map 3) and to any zone within 5 meters of streams should be carefully considered and special conditions to access such areas should be attached to the Permit;
- Any management activities are in support of the aims of the Management Plan;
- The actions permitted are in accordance with the 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; and
- Permits shall be issued for a stated period.

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

Access to the Area shall be primarily by foot. Access by helicopter shall be for essential scientific or management reasons only and specifically authorised by Permit. Vehicles are prohibited within the Area and all movement within the Area should be on foot.

Pedestrians travelling up or down the valley shall not enter the Area without a Permit. Permitted visitors entering the Area are encouraged to keep to established paths where possible. Visitors should avoid walking on visible vegetation, whether dry or wet, or through stream beds. Care should be exercised when walking in areas of moist ground, where foot traffic can easily damage sensitive soils, plant, algal and bacteria communities, and degrade water quality: walk around such areas, on ice or rocky ground, and step on larger stones when stream crossing is unavoidable. Care should also be taken around salt-encrusted vegetation in drier areas, which can be inconspicuous. 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.

By default, helicopters should land at existing landing sites in nearby Facilities Zones (Lake Hoare and Lake Fryxell). Access to the Area by helicopter shall be by exception and may only occur if specifically authorised by Permit. Helicopters shall land only at the designated landing site (163° 02.88' E, 77° 36.97' S: Map 2). Pilots should follow the Helicopter Access Zone to access the designated landing site (Map 2). Over flight of the Area below 300 feet (c.100 m) is prohibited. Exceptions to these restrictions will only be granted for an exceptional scientific or management purpose and must be specifically authorised by Permit. Use of helicopter smoke grenades within the Area is prohibited unless absolutely necessary for safety, and then these should be retrieved.

Pilots, air crews and other passengers are prohibited from moving on foot beyond the immediate vicinity of the landing site during a landing event. Only personnel authorized by Permit may do so.

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

- Scientific research that cannot be served elsewhere and that will not jeopardise the ecosystem of the Area;
- Essential management activities, including monitoring and inspection.

In view of the importance of the water regime to the ecosystem, activities should be conducted so that disturbance to watercourses and water quality is minimised. Activities occurring outside of the Area (e.g. on the Canada Glacier) which may have the potential to affect water quantity and quality should be planned and conducted taking possible downstream effects into account. Those conducting activities within the Area should also be mindful of any downstream effects within the Area and on endorheic Lake Fryxell.

Activities which cause disturbance to the flush area should take into account the slow recovery rates of the vegetation at this site. In particular, consideration should be given to minimising any required sample sizes and sample numbers and conducting the sampling regime in such a way that full recovery of the vegetation community is likely.

The use of Remotely Piloted Aircraft Systems (RPAS) in the Area is prohibited except in accordance with a Permit. 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) 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 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 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(iv) Location of field camps

Camping within the Area is prohibited. Nearby Facilities Zones outside of the Area should be used as a base for work in the Area (Map 1).

7(v) 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 and precautions listed in 7(ix) shall be taken against accidental introductions. 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.

No fuel or other chemicals shall be stored in the Area. Any other 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.

7(vi) Taking 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 separate 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 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.

Material may be collected or removed from the Area only in accordance with a Permit and should be limited to the minimum number of samples necessary to meet scientific or management needs. Sampling is to be carried out using techniques which minimise disturbance to the Area and from which full recovery of the vegetation from sampling can be expected.

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

Materials 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 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 prior to removal of the items.

7(viii) Disposal of waste

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

7(ix) 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;
- Erect or maintain signposts, structures or scientific equipment;
- Carry out protective measures;

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 Master Directory system through the appropriate national authority.

To help maintain the ecological and scientific values of the plant communities found 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 and any equipment to be used in the area, particularly sampling equipment and markers before entering the Area.

7(x) 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 visit reports should include, as applicable, the information identified in the recommended visit report form [contained in Appendix 4 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas appended to Resolution 2 (1998)] [available from the website of the Secretariat of the Antarctic Treaty www.ats.aq].

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 maintain a record of such activities and report them in the Annual Exchange of Information. 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.

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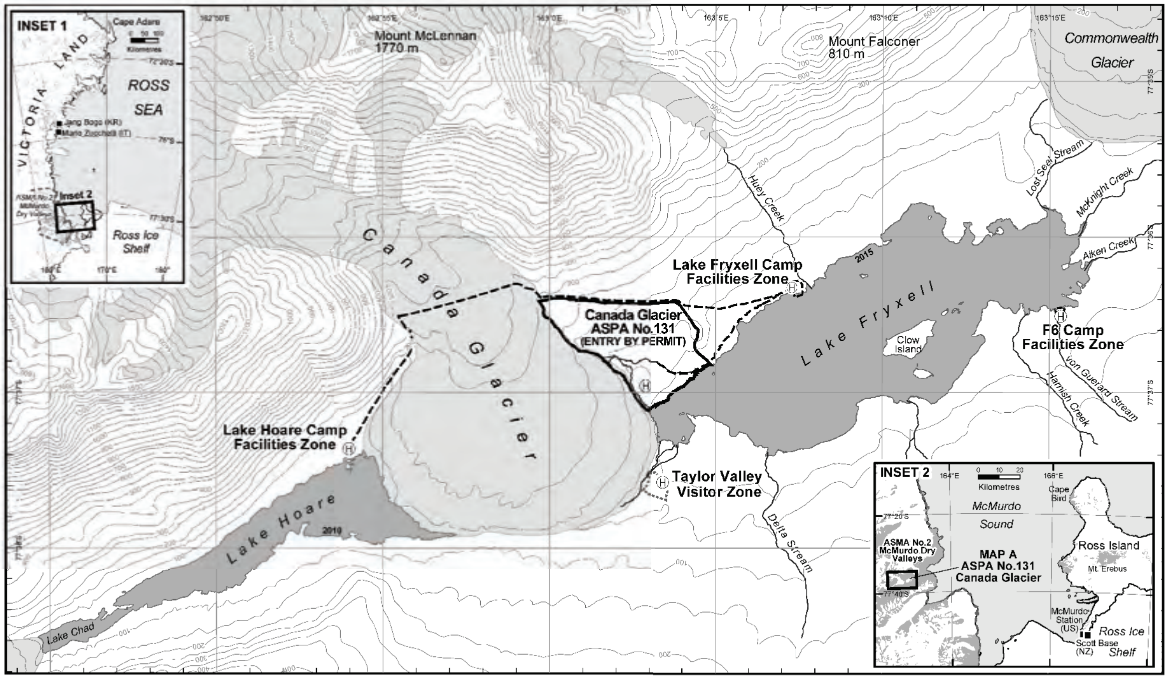


Map 1: ASPA No.131 Canada Glacier regional overview

Environmental Research & Assessment
Issued 28 Apr 2021

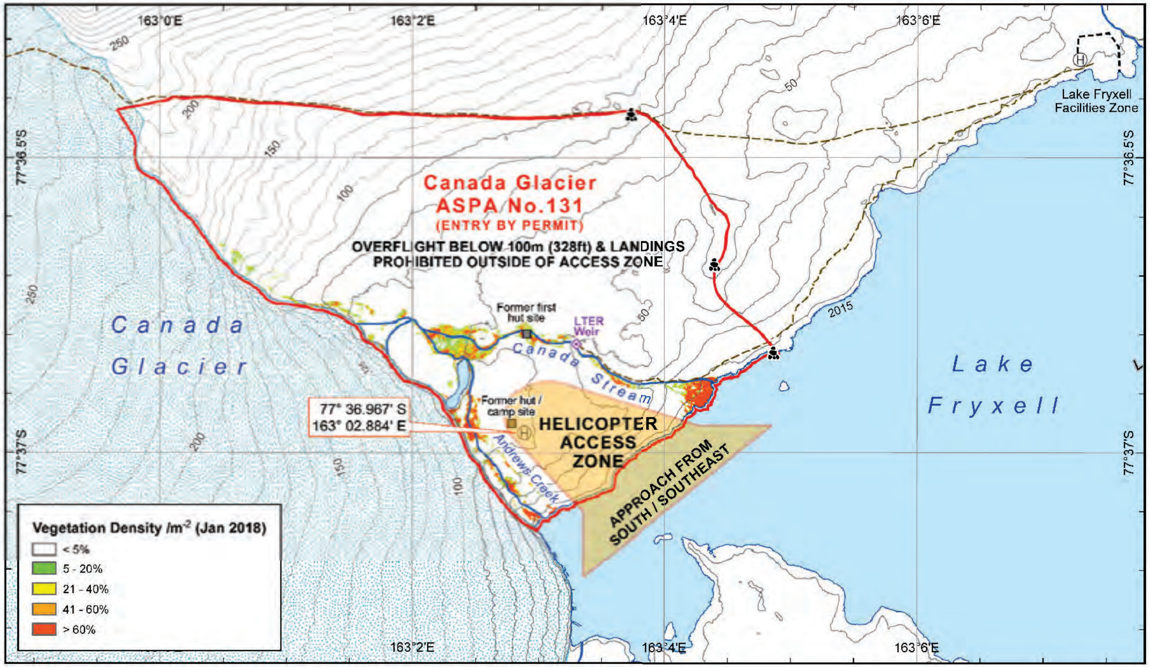
Antarctica
New Zealand

Contour (50 m)
Stream
Lake
Glacier
Path
Helicopter landing site
Protected Area boundary
Facilities Zone
Visitor Zone

0 1 2
Kilometres

N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: Streams digitised from aerial imagery (1993);
Lake Hoare: PGC shoreline survey (2010);
Lake Fryxell: shoreline based on LiDAR survey 2015 (Fountain et al. 2017).
Contours & glaciers: derived from USGS 1:50K map series;
Zone boundaries & facilities: USAP (Jan 2021);
ASPA boundary: Management Plan (Apr 2021).



Map 2: ASPA No.131 Canada Glacier Helicopter Access Zone

Environmental Research & Assessment
Issued 28 Apr 2021

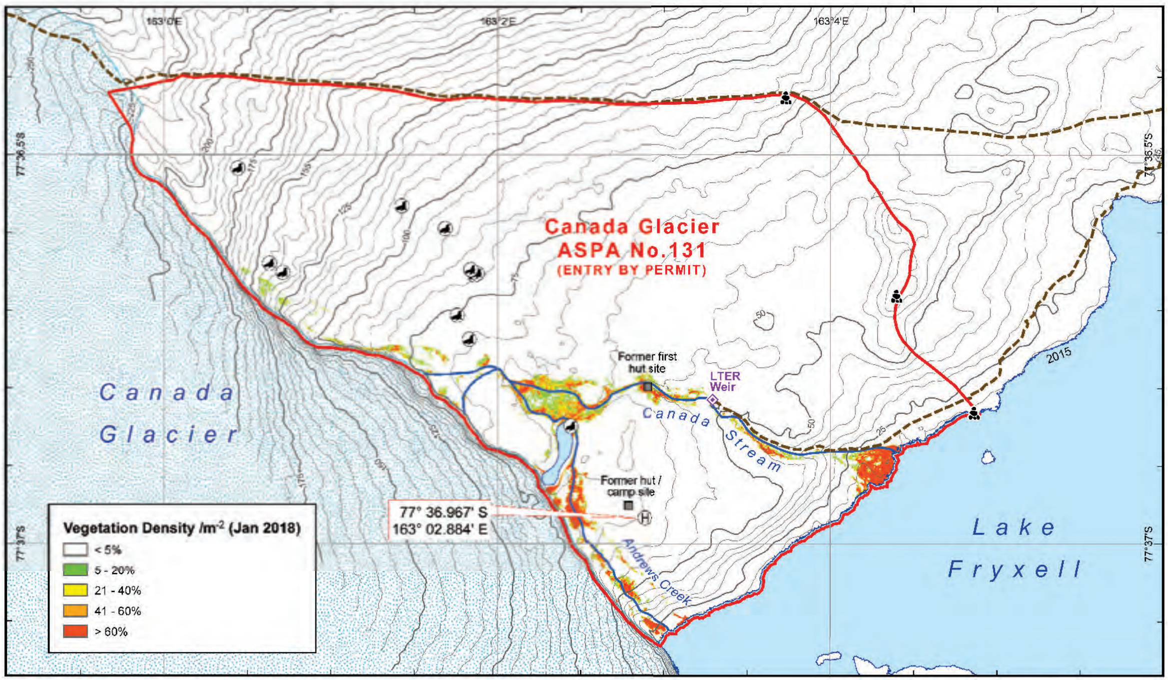
Antarctica New Zealand

Glacier
Lake / Pond
Contour (10 m)
Stream
Protected Area boundary
Path
Cairn
Weir
Helicopter Access Zone
Helicopter landing site
Former hut / camp site

0 100 200 300 400 500
Metres

N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: Streams digitised from aerial imagery (1993);
Cairns, former huts, weir: Gateway Antarctica;
Topography & lake shoreline: LiDAR survey 2015 (Fountain et al. 2017).
Vegetation survey: B.Bollard (AUT), Jan/Feb 2018;
ASPA boundary: Management Plan (Apr 2021).



Map 3: ASPA No.131 Canada Glacier vegetation density

Environmental Research & Assessment
Issued 28 Apr 2021

Antarctica New Zealand

Index Contour (25m)
Contour (5m)
Stream
Lake / Pond
Glacier
Protected Area boundary
Former hut / camp site
Path
Cairn
Helicopter landing site
Weir
Mummified seal

0 100 200 300 400 500
Metres

N

Projection: Lambert Conformal Conic;
Spheroid & horizontal datum: WGS84;
Data sources: *Streams* digitised from aerial imagery (1993);
Contours, cairns, former huts, weir: Gateway Antarctica;
Lake shoreline: based on LIDAR survey 2015 (Fountain et al. 2017).
Vegetation survey: B.Bollard (AUT), Jan/Feb 2018;
ASPA boundary: Management Plan (Apr 2021).

Management Plan for Antarctic Specially Protected Area No 134

CIERVA POINT AND OFFSHORE ISLANDS, DANCO COAST, ANTARCTIC PENINSULA

Introduction

This Area was originally designated as Site of Special Scientific Interest (SSSI) No 15 (ATCM Recommendation XIII-8, ATCM XIII, Brussels, 1985), after a proposal by Argentina, due to its great plant diversity and the fact that it has breeding colonies of at least ten species of birds.

During the XXI Antarctic Treaty Consultative Meeting (Christchurch 1997), the revised Management Plan for the Area was adopted in accordance with the format established by Annex V of the Madrid Protocol and as provided by Measure 3 (1997). During the XXV Antarctic Treaty Consultative Meeting (Warsaw 2002), and once Annex V entered into force, *Site of Special Scientific Interest* No. 15 was re-designated, by Decision 1 (2002), as *Antarctic Specially Protected Area* No. 134. The Management Plan was subsequently revised and at the XXIX Antarctic Treaty Consultative Meeting (Edinburgh, 2006), Measure 1 (2006) approved a new version of it. The Plan was again revised and the XXXVI ATCM (Brussels, 2013) approved the previous version through Measure 5 (2013), now superseded by the present version.

The original reasons for its designation are still valid and in recent years further reasons have made it even more significant. This area has great scientific value due to its unusual biodiversity, which includes numerous species of birds, flora, and invertebrates. The unique topography of the area, together with the abundance and diversity of vegetation, offers very favourable conditions for the formation of numerous microhabitats, which in turn favour the development of great biodiversity and give the Area exceptional landscape value.

At present, there is a need to increase the volume of studies related to the numbers and reproduction of seabirds and mammals, since they have the potential to be used as ecological indicators of processes on a global scale and of the environmental quality of the ecosystems (Costa et al, 2019; Croxall et al, 1998). In this regard, the geographical location of ASPA 134 is crucial for this type of study and other comparative studies between its fauna and that of other Antarctic areas. Climatic and oceanographic variability have been shown to have effects on seabird populations, generally with profound consequences, such as reduced breeding success and alterations in the mating cycles of some species (Chambers et al., 2011; Krüger et al., 2018; Warwick-Evans et al., 2021).

The Antarctic Peninsula region is one of the places on the planet where the greatest effects of global climate change have been observed, notably the direct impact on the formation and duration of sea ice and the consequent effects on the entire food chain (Morley et al., 2020; Turner et al., 2009). Recent studies indicate that the drivers of change in Southern Ocean ecosystems are causing, in the western region of the Antarctic Peninsula, increased temperatures, the loss of sea ice and increased potential for invasion of species, among other impacts (Morley et al., 2020). Specifically, some authors point out that the Cierva Point area has experienced the greatest warming in the entire peninsula (Wilhelm, Bockheim and Haus, 2016). Stability in the positive phase of the SAM (Southern Annular Mode) has had an impact on winds, water circulation and the extent of sea ice (Stammerjohn et al., 2008; Thompson and Solomon, 2002), and has repercussions for Antarctic flora and fauna.

In this context, ASPA 134 is an area that has suffered little disturbance, which allows comparative studies with populations that inhabit areas of frequent human disturbance (accumulation of refuse, pollution, tourism and fishing; Woehler et al., 2001, Patterson et al., 2008). In recent years there has been a trend towards increasing abundance of some populations that inhabit the ASPA, as is the case of penguins, in contrast to what is observed in other areas, where the frequency of human disturbance is correlated with the decrease in abundance of some populations (Woehler et al., 2001, Lynch et al., 2008, González-Zeballos et al., 2013). In the coming years we will also have to evaluate the effects of tourism as a source of disturbance of the ASPA and its possible effects on the populations of birds and mammals that inhabit it. It is also important to study in the ASPA the impacts of processes such as the increase in temperature, which has direct consequences in the increase of ice-free areas and the consequent formation of soils that are important in the dynamics of the area.

Its designation as an ASPA ensures that current long-term research programmes will not be adversely affected by accidental human interference, destruction of vegetation and soil, pollution of bodies of water, and disturbance of birds, especially at times that coincide with breeding periods.

Various Antarctic programmes are currently conducting research projects in this ASPA. Among others, the main scientific interests include the study of the population dynamics of penguin colonies and their reproductive chronology. The presence of marine debris and microplastics in the study colonies and species are also monitored. Other projects study glacier retreat and soil formation processes in the region. A topic of interest is also the inventory of the different types of wetlands present in Cierva Point in addition to their characterisation and monitoring over time. Studies are carried out on the richness of species and communities of algae and phytoplankton, as well as the flora present.

There are also several projects studying the effects of climate change on seal populations and seabird species. For example, work is being conducted on *Arctocephalus gazella, (the Antarctic fur seal) Leptonychotes weddellii (Weddell seal) and Hydrurga leptonyx (leopard seal),* studying the relationship with the ice cover in the area and global phenomena such as the El Niño Southern Oscillation (ENSO) through the evaluation of the impact of these predators on marine resources, their feeding strategies and their relationship with the availability of prey. Variations in various population parameters of birds exposed to different local conditions are studied with respect to the trophic biology of Antarctic birds with obvious global warming effects, analysing their responses to the changes observed. Finally, it is worth mentioning the studies carried out on permafrost dynamics in the area.

1. Description of values to be protected

The coastal area is home to a significant number of bird colonies, breeding colonies of marine mammals, and extensive vegetation. The coverage of lichens, mosses and grass-dominated communities is very extensive in Cierva Point. The values of the Area are associated with its high degree of biological diversity in flora and fauna and its topographical features, as well as a high landscape value. The coastline is very abrupt and the rocky intertidal zone is limited. The area is rich in species of both animals and vegetation, and in some cases their abundance is exceptional. The great diversity in relief and coastal forms and the extensive and varied vegetation cover offer a scenic diversity that is unusual in the Antarctic, giving it great landscape value, which is one of the reasons why it was designated an Antarctic Specially Protected Area (Santos, 2014). In general, there are 12 species of birds nesting in the area, some 18 species of mosses, 70 lichens, 2 liverworts and about 20 species of fungi.

Although Antarctica is considered one of the few uncontaminated areas of our planet because it is relatively isolated and distant from large industrial and urban centres, there is evidence of an excessive presence of pollutants in the north of the peninsula in the recent detection of substances associated with human activity in places that should be considered intact (Olalla, Moreno & Valcárcel, 2020).

For all the above reasons, its particular geographical location in the Northwest of the Antarctic peninsula gives this ASPA and the numerous scientific research programmes that are developed in the area a crucial importance in order to explain, at least partially, alterations in the Antarctic ecosystems as a result of climate change and/or human disturbance.

According to Morgan et al., (2007), ASPA 134 represents the environmental domain "Antarctic Peninsula mid-northern latitudes geologic" and according to Terauds et al., (2012) the area is in the "Northwest of the Antarctic Peninsula" biogeographic region. Also according to "Important Bird Areas in Antarctica 2015" (Harris et al., 2015), Cierva Point and offshore islands (Map 4 - Figure 7) constitute IBA ANT081.

For more details on the characteristics of the area, please refer to point 6 of this document.

2. Aims and objectives

The management of ASPA 134 aims to:

- Preserve the natural ecosystem and prevent unnecessary human disturbance.
- Allow the development of any scientific research providing it does not endanger the values of the area.
- Avoid major changes in the structure and composition of the flora and fauna communities.
- Conserve the flora of the area as reference organisms, free of human impact.
- Prevent or minimise the introduction into the Area of non-native plants, animals and microbes.
- Minimise the possibility of introduction of pathogens that can cause disease in wildlife populations within the area.
- Prevent the introduction, production or dissemination of chemical pollutants that may affect the area.
- Protect the biodiversity of the Area, avoiding major changes in the structure and composition of the fauna and flora communities.
- Prevent unnecessary human disturbance.
- Allow the development of scientific research that cannot be carried out elsewhere, and the continuity of ongoing long-term biological studies established in the area, as well as the development of any other scientific research providing it does not compromise the values on account of which the Area is protected.
- Avoid or minimise the unintentional introduction of seeds, plants, animals or microbes, as well as pathogens that could potentially be harmful to the fauna and flora.
- Allow the development of studies and monitoring tasks to estimate the direct and indirect effects of the activity of the nearby scientific base (Primavera Base).

3. Management Activities

The following management activities will be carried out to protect the values of the area:

- The personnel assigned to Primavera Base (Argentina) and in particular, the personnel authorised to enter the ASPA, will be specifically instructed on the terms and conditions of the Management Plan.
- Copies of the Management Plan for this area will be provided at Primavera Base.
- Movement will be restricted to sectors without vegetation, avoiding proximity to fauna except when the scientific projects so require and if the corresponding harmful interference permits have been obtained.
- Distances from fauna must be respected, except when the scientific projects require otherwise and providing the relevant permits have been issued.

- Collection of samples will be limited to the minimum required for approved scientific research plans.
- Inspection visits will be made to ensure that the management and maintenance measures are adequate.
- All signs, as well as other structures erected in the Area for scientific or management purposes, must be adequately secured and maintained in good condition.
- Pedestrian paths to research sites may be marked in order to limit circulation.
- In accordance with the requirements of Annex III to the Protocol on Environmental Protection to the Antarctic Treaty, any equipment or material abandoned or no longer used must be removed providing its removal does not adversely affect the environment.
- The Management Plan must be reviewed not less than once every five years and updated if necessary.
- All those responsible for aircraft operating in the area must be informed of the location, limits and restrictions that apply to entry and overflight of the area.
- Preventive measures will be implemented to avoid the introduction of non-native species and to control the eradication of the introduced species *Poa pratensis* (blue grass) which is no longer in the ASPA.
- In accordance with Resolution 5 (2019), the Primavera Base staff and all researchers visiting the ASPA will be reminded of the prohibition on using personal care products that contain plastic microbeads.
- The necessary visits will be made (at least once every five years) to determine whether the Area 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 region must consult with each other to ensure the implementation of the above provisions.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Map 1 (Figure 4) shows the general location of ASPA 134. Map 2 (Figure 5) shows the ASPA in relation to the Danco coast. The set of areas that make up ASPA 134 are shaded (the subtidal marine environment between the various continental and island sectors is not included in the ASPA). Map 3 (Figure 6) shows in detail the area around Primavera Base (excluded from ASPA 134). Map 4 (Figure 7) shows in detail the sectors included in ASPA 134, the boundaries of IBA ANT081 and the general location of the various bird colonies within the ASPA.

6. Description of the Area

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

Cierva Point (64°10'1.05"S, 60°56' 38.06"W) is located on the south coast of Cierva Cove, to the north of Hughes Bay, between the Danco and Palmer coasts, in the north-western sector of the Antarctic Peninsula. The site comprises the ice-free area between the southwest coast of Cierva Cove and the northeast coast of Santucci Cove. Also included are Apéndice Island (64°11'41.99"S, 61°1'3.25"W) and José Hernández Island (64°10'10.06"S, 61°6'11.34"W) and the Moss (64°10'2.22"S, (61°1'49.43"W) and Penguin (64°8'35.90"S, 60°59'11.43"W) Islands (Table 1), which are to the west/southwest of Cierva Point. Although the intertidal zone of each of these areas is included in the Area, the subtidal marine environment is not. The Primavera Base (Argentina) and its associated facilities, as well as the beach area used as access to it, are excluded from the Zone.

Table 1: summary of the coordinates of the localities included in the ASPA.

Localidad	*Latitud*	*Longitud*
Punta Cierva	64° 10' 1.05"S	60° 56' 38.06"O
Ite. Pingüino o Mar	64° 8' 35.90"S	60° 59' 11.43"O
Ite. Musgo	64° 10' 2.22"S	61° 1' 49.43"O
I. José Hernández	64° 10' 10.06"S	61° 6' 11.34"O
I. Apéndice	64° 11' 41.99"S	61° 1' 3.25"O

6(ii) Natural features

The Area is rich in species of both animals and vegetation, and in some cases their abundance is exceptional. The Area also has great landscape value due to the diversity of relief and coastal forms, the presence of different kinds of rock and a marked fracture system. Added to the above is an extensive and varied vegetation cover that results in a scenic diversity that is unusual for the Antarctic area.

Cierva Point shows a relatively simple structural design. It is dominated by three summits: The Mojón, Escombrera and Chato hills, aligned in an east-west direction, defining a with steep, South-facing hillside slopes, permanently covered by snow, and the other hillside a moderate to gentle North-facing slope, free of snow during summer. On the latter slopes we observe abundant vegetation, with areas of continuous coverage of bryophytes (liverworts, hornworts and mosses) and associated lichens, and also numerous species of birds, including the settlement of a colony of Gentoo penguins (*Pygoscelis papua)* (Novatti, 1978, Agraz et al., 1994). These features give the area exceptional scientific and aesthetic value.

In previous studies, Agraz et al., (1994) divided Cierva Point into two environmental zones according to the type of substrate and vegetation cover, (1) rocky wall (or coastal zone) and (2) exposed hillside. The rocky wall is a coastal strip with steep slopes, a rocky surface with scree of different sized pieces. In some sectors this substrate is unstable and is crossed by numerous canyons. Most of it is snow-free during the southern summer. The vegetation is very sparse, with lichens and grasses. There are many natural cavities between the rocks. This first zone constitutes the nesting site of five bird species. The second, the exposed hillside, comprises a great variety of environments and features from the coast to the peaks. The slopes are moderate to steep and the rocks of variable size, some loose and some cohering, and the surface is free of ice during the southern summer season. The high areas have glaciers that give rise to numerous little streams in summer. These feed the lower areas, where there is the greatest development of vegetation.

Weather

Long-term meteorological data is not available for the site since there is no permanent weather station installed. However, Quintana (2001) recorded meteorological data at Cierva Point during the summer of 1992/93 with an average monthly temperature that varied from 1.8°C to 2.2°C, while the relative humidity averaged 79% and the average wind speed was 7.9 kph. General data indicate that the maximum and minimum temperatures range between 13 and -20ºC. Such winds as it was possible to record came mainly from the northwest, with an average speed of 45 kph. According to Wilhelm et al., (2016), the climate is cold marine, with an average annual air temperature of approximately -3.2°C and annual precipitation ranging between 400 and 1,100 mm. Winter snow depth may exceed 1 m. However, most of the seasonal snow melts completely during the summer. The study area generally slopes towards the north, exposing it to high inputs of solar radiation during the summer (Wilhelm, Bockheim & Haus, 2016).

Regarding the expected climate change for the area, although there are no specific data, according to Turner et al., (2005) air temperatures over the West Antarctic Peninsula have increased at a rate of 0.56ºC per decade since the 1950s. These increases in temperature have caused a rapid retreat of the glaciers and the consequent exposure of the soil. Surface temperature trends show significant warming in the Antarctic Peninsula and, to a lesser extent, in West Antarctica since the early 1950s, with little change in the rest of the continent. The greatest warming trends occur in the western and northern parts of the Antarctic Peninsula, an area that includes the Cierva Point area. Some data indicate a warming of +0.20°C per decade, and also indicate that the warming of the western peninsula has been greater during the winter, with winter temperatures that increased by +1.03°C per decade from 1950 to 2006.

Geology and soils

The bedrock at Cierva Point is of intrusive igneous origin. The northernmost lowlands are made up of granodiorite with very large dolerite xenoliths (> 1 m). The centre of the peninsula (uphill and to the south) is dominated by crystallised orthoclase feldspar granites. Both granitoid regions contain dolerite dikes. The contact region between the granodiorite and granite shows signs of contact metamorphism. The eastern side of the peninsula, along with the southern peaks, is dominated by basalts containing olivine and quartz crystals.

The polished bedrock striations and chatter marks on bedrock throughout the peninsula indicate that at one time nearly the entire region was glaciated. Based on the current position of the glacier, it is likely that the entire slope was glaciated as recently as a couple of hundred years ago. Currently, most of the peninsula is ice-free. However, the eastern part is dominated by a large, rapidly retreating glacier. The terrain of Cierva Point is rugged, dotted with several natural terraces. Slopes vary from 0 to 20% on banks and from 30 to 60% on rocky cliffs. The terraces contain several permanent ponds and unconsolidated materials with soils derived from the eroded bedrock. These terraces are occupied during much of the year by Gentoo penguins (*Pygoscelis papua*).

Regarding the soils of the ASPA, most information is related to Cierva Point. Wilhelm, Bockheim & Haus (2016) described 27 soils grouped into four soil categories: acidic (pH <5), neutral (pH >5), dominated by moss (high accumulations of organic matter) and ornithogenic (high accumulations of phosphorus). The neutral soils are newly formed and have undergone the least development. They are also located closest to the edge of the glacier. Acidic soils are located furthest from the edge of the glacier, allowing more nutrient leaching to occur. These soils have extremely low pH values (as low as 3.5) but do not have the high accumulations of phosphorus found in ornithogenic soils or the high soil carbon content found in moss-dominated soils. In a region with rapidly retreating glaciers such as the Antarctic Peninsula, proximity to the edge of the glacier becomes an important factor in determining soil properties. Soils furthest from the glacier have had more time to be affected by leaching, penguin activity, and moss build-up.

The soils of the banks occupied by penguins are considered ornithogenic, due to the large number of nesting sites found in the region. The characteristics of ornithogenic soils include high accumulations of P and Ca and extreme acidity. Ornithogenic soils are generally found in regions where penguins can nest and have easy access to food, such as low elevation sites that are far enough inland that guano deposits are not easily washed away (Wilhelm, Bockheim & Haus, 2016).

Some of the thickest moss layers on record on the Antarctic Peninsula are found at Cierva Point. Moss-dominated soils are distinguished by dark horizons with rich accumulations of soil organic matter, especially on the surface (Wilhelm, Bockheim & Haus, 2016).

Regarding permafrost, Ramos Marín (2018) mentions that for Cierva Point the upper part of the permafrost is observed at depths of 0.4, 1 and 5 m and the temperature at these depths is -1.4 ºC, -2.6ºC and 1.2ºC in these places. In the places where the upper part of the permafrost is reached, it is estimated that the depth of the upper part of the permafrost ranges between 0.4 and 5 m with temperatures between -0.2ºC and -2.6ºC. Ramos Martín (2018) mentions that if there were a 1°C increase in the average temperature, close to 50% of the current permafrost in the area would disappear, and concludes that degradation of the permafrost in Cierva Point can generate significant impacts on the local ecosystem.

Flora and fauna

The flora is very abundant and is located in both wet and dry areas. Mosses dominate in wet areas in the form of carpet cover (*Drepanocladus uncinatus*) and turf (*Polytrichum alpestre*). Dry places, on the rocks, are dominated by lichens of the *Usnea* and *Xanthoría* genera. *Deschampsia Antarctica* grass is also abundant.

The cover of mosses, lichens and grasses is very extensive. The most conspicuous plant communities are the associations of dominant lichens, moss turf dominated by *Polytrichum alpestre* and *Chorisodontium aciphillum* and the *Deschampsia colobanthus* subformation. The moss turf covers areas of more than one hundred square metres, with an average depth of about 80 cm. The flora present includes the two Antarctic species of flowering plants, about 18 species of mosses, about 70 of lichens, two liverworts, as well as about 20 species of fungi. Non-marine microalgae, especially in the Moss and Penguin Islands, are very abundant and with unusual records. Terrestrial arthropods (spiders, scorpions, etc.) are also very numerous, sometimes associated with the tidal trenches present in the coastal part of the Area.

A relevant piece of information is the record of a non-native grass, *Poa pratensis* (blue grass). It was inadvertently introduced in Cierva Point during transplantation experiments with the *Nothofagus antarctica* and *N. pupilo* beech varieties between 1954-1955 (Ross et al., 1996, Corte 1961, Smith 1996); starting in 1995, there was an increase in the coverage area of this species. Its expansion was probably due to the environmental changes that occurred in the area. After conducting studies on *Poa pratensis* and the communities with which it was associated, a decision was made on the eradication strategy that would generate the least impact on the ecosystem (see Information Document 13, presented at ATCM XXXV).

In summary, the description of the colonisation status of the non-native plant *Poa pratensis* and the subsequent eradication process is considered in ATCM XXXV IP 13 Colonisation status of the non-native grass *Poa pratensis* at Cierva Point, Danco Coast, Antarctic Peninsula, ATCM XXXVI IP 35 Non-native grass *Poa pratensis* at Cierva Point, Danco Coast, Antarctic Peninsula - Ongoing investigations and future eradication plans and ATCM XXXVIII IP 29 Successful eradication of *Poa pratensis* at Cierva Point, Danco Coast, Antarctic Peninsula.

Finally, during the 2014-2015 southern summer an eradication of the exotic plant was carried out at Cierva Point. More than 500 kg of soil and plant material were extracted during the operation. Then, a year later, in February 2016, a follow-up of the eradication was carried out, where no regrowth of non-native plants was observed. Instead, some small shoots of native Antarctic grass *Deschampsia antarctica* were found at the base of the platform where the non-native plant used to be (Pertierra et al., 2017). These observations allowed it to be concluded that there has been some regeneration of the natural community and that there was no resurgence of *Poa pratensis* from plants not completely extracted and that the presence of a seed bank seems unlikely (Pertierra et al., 2013).

In relation to the site flora, Santos (2014) mentions that the coverage of mosses, lichens and grasses is very extensive. The most conspicuous plant communities are the lichen associations, the moss turf, dominated by *Polytrichum-Chorisodontium* and the subformation of *Deschampsia-Colobanthus*, which cover areas of more than one hundred square metres, with an average depth of 80 cm. At the microalgae level, a total of 61 species have been recorded. The best represented groups are Cyanobacteria (22 species) and Chlorophyta (28 species), the latter largely dominated by flagellate forms. In general, the largest islands (Moss and Penguin) have a high overall species richness (29 and 36 species, respectively) (Mataloni & Pose, 2001).

Regarding marine mammals, the waters around the coasts of ASPA 134 are visited annually, particularly during the summer months, by numerous specimens of whales and seals. Among the recorded cetaceans is the Humpback Whale (*Megaptera novaeangliae*), for which around 40 individuals, including juveniles and offspring, have been identified in a single season (January and February) from the colouration patterns of the ventral face of the tail fin or tail. Also, more than 15 Antarctic Minke whale individuals have been identified in these waters through distinctive characteristics of their dorsal fins (*Balaenoptera bonaerensis*). Groups of killer whales (*Orcinus orca*) have also been observed in these waters, consisting of up to 13 individuals. All these species have been observed occupying both the coves present in the area (Cierva, Santucci and Escondida) as well as in the waters surrounding the islands that are part of the ASPA.

Regarding seals, specimens of Weddell seal (*Leptonychotes weddellii*), Antarctic fur seal (*Arctocephalus gazella*), southern elephant seal (*Mirounga leonina*) crabeater seal (*Lobodon carcinophaga*) and leopard seal (*Hydrurga leptonyx*) have been observed. The three species mentioned are abundant during the southern summer since they find the necessary conditions (unobstructed coasts with sheltered beaches and/or large drifting icebergs in calm waters) for moulting. The studies carried out by the marine mammal programme of the IAA (Argentine Antarctic Institute) have shown that these species frequent the site annually, with confirmed presence in the area for the last 16 consecutive years (Javier Negrete, unpublished data).

In turn, the tagging and recapture programme carried out over the last 10 years has confirmed that both Weddell seals and leopard seals exhibit a high degree of fidelity to this same site, some specimens having been seen to return year after year (Meade et al., 2015, Negrete et al., 2014). This leopard seal population has distinctive eating habits since several specimens found there consume a large percentage of krill (Botta et al., 2018, Guerrero et al., 2014, 2016, Rogers et al., 2014). Considering the high frequency of cetaceans (whales) in the area and the patterns of habitat use by seals, which show that these animals spend much of their time feeding in the water or shedding their fur on the ice floes (Bobinac et al., 2014 and Javier Negrete, in preparation), it is vital that in the near future the marine sector be considered within the protected area, even more so if one takes into account that the increase in tourist ships visiting the area and the number of vessels that deploy once arrived could cause disturbances and/or accidents to these animals.

Regarding the presence of birds in the ASPA, studies have shown that 10 species of birds nest there: Chinstrap Penguin (*Pygoscelis antarctica*), Gentoo Penguin (*P. papua*), Southern Giant Petrel (*Macronectes giganteus*), Cape Petrel (*Daption capense*), Wilson's Storm Petrel (*Oceanites oceanicus*), Blue-eyed shag (*Leucocarbo atriceps bransfieldensis*), Antarctic Shag (*P. bransfieldensis*), Pale-faced Sheathbill (*Chionis alba*), Skuas (predominant species *Catharacta maccormicki*), Kelp Gull (*Larus dominicanus*) and Antarctic Tern (*Sterna vittata*) (Gonzalez et al., 2013). The most numerous colonies correspond to those of Chinstrap Penguins (*Pygoscelis antarctica),* Gentoo Penguins (*P. papua),* Wilson's Storm Petrels (*Oceanites oceanicus),* Polar Skuas (*Catharacta maccormicki)* and *K*elp Gulls (*Larus dominicanus).* According to the latest available surveys, the ASPA colonies (especially those of penguins) show increasing population trends. This situation highlights the importance of the protected area for the protection of its natural values.

The status of seabird populations may provide valuable indicators of the conditions of their foraging and nesting environments in relation to global processes. González et al., (2013) indicate that climate and oceanographic variability and changes have been shown to affect seabirds, often with profound consequences, such as reduced reproductive success and altered reproduction cycles in some species. Specifically, in the case of the ASPA, it has been shown that the area has a high richness of species, both animals and plants, but that the greatest abundance of birds, mainly penguins, is within it. In this regard we can start with the colonies of *Pygoscelis papua* (Gentoo Penguin), which is the most abundant in the ASPA. Table 2 and Figure 1 show that the population is experiencing an increasing trend over time, as is its distribution range.

Table2: Number of breeding pairs per site for Pygoscelis papua (data extracted from González-Zeballos et al., 2013).

Publicación	*Novatti (1978)*		*Poncet & poncet (1987)*	*Quintana et al (1998)*		*Favero et al (2000)*	*Gonzalez Zeballos et al (2013)*	*Juarez (2021)**
Año	1954	1958	1984-1987	1991	1996	1998	2011	2019
Punta Cierva	559	614	600	800	1041	593	2680	7000
Isla Apéndice			450			905	2795	
Total ZAEP	559	614	1050	800	1041	1498	5475	7000

* Datos aproximados del tamaño de las colonias de la ZAEP aún no publicados.

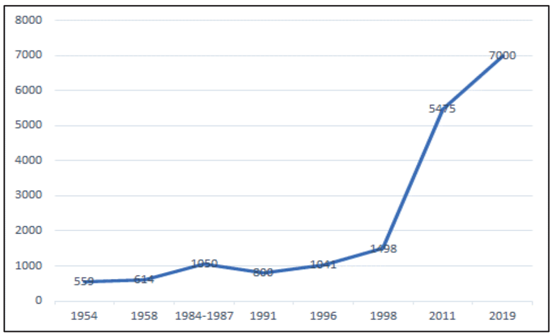


Figure1: time series of the number of Pygoscelis papua breeding pairs for the ASPA. (data extracted from González-Zeballos et al., 2013).

Table3: Number of Pygoscelis antarctica (Chinstrap Penguin) breeding pairs per location. (data extracted from González-Zeballos et al., 2013).

Publicación	*Muller-Schwarze (19759*	*Poncet & poncet (1987)*	*Favero et al (2000)*	*Gonzalez Zeballos et al (2013)*	*Juarez (2021)**
Año	1971	1984-1987	1998	2011	2019
Ite. Pingüino o Mar		500	1553	2763	4000
I. José Hernández	2060	200	546	180	
I. Apéndice		1100	152	33	
Total ZAEP	2060	1800	2251	2976	4000

* Datos aproximados del tamaño de las colonias de la ZAEP aún no publicados.

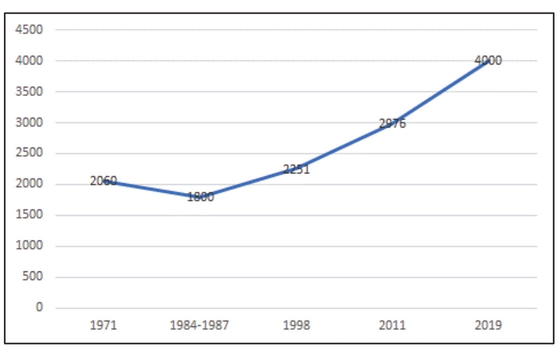


Figure2: Time series of breeding pairs per site for Pygoscelis antarctica. (data extracted from González-Zeballos et al., 2013).

For *Pygoscelis antarctica* (Table 3 and Figure 2), the time series has also registered an increasing trend in the population size of the total number of breeding pairs present in the ASPA. In this specific case, Table 2 shows that although the Penguin or Mar Island colony shows a significant increasing trend, the other colonies are decreasing in number. It will be important in the coming years to determine the causes of this phenomenon. Regarding the other species of seabirds, table 4 and figure 3 show the sites where they are present in the ASPA and the latest data on the number of breeding pairs. According to the latest records, most of them are increasing in population, however, work is being done to have current records to accurately assess the state of the colonies present.

Table4: Number of breeding pairs by species and locality. PB: Antarctic Shag (Phalacrocorax bransfieldensis), MG: Southern Giant Petrel (Macronectes giganteus), DP: Cape Petrel (Daption Capense), CA: Pale-faced Sheathbill (Chionis alba), SM: Sout Polar Skua (Stercorarius maccormicki), LD: Kelp Gull (Larus dominicanus), SV: Antarctic

Especie	PB		MG		DP		CA		SM		LD		SV	
Año	1997-98	2010-11	1997-98	2010-11	1997-98	2010-11	1997-98	2010-11	1997-98	2010-11	1997-98	2010-11	1997-98	2010-11
Punta Cierva	0	0	0	0	7	3	2	1	145	166	158	73	45	57
Ite. Pingüino o Mar	0	0	0	0	1	0	3	1	3	3	8	10	0	3
Ite. Musgo	0	0	35	42	28	17	3	4	10	26	120	70	15	19
I. José Hernández	21	21	0	0	0	0	1	1	0	17	15	9	35	11
I. Apéndice	0	0	5	41	23	11	1	2	2	12	68	12	15	12
Total ZAEP	21	21	40	83	59	31	10	9	160	224	369	174	110	102

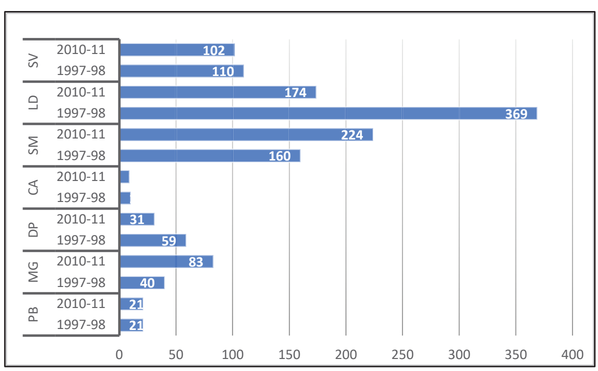


Figure3: comparison of the number of breeding pairs by species and locality. PB: Antarctic Shag (Phalacrocorax bransfieldensis), MG: Southern Giant Petrel (Macronectes giganteus), DP: Cape Petrel (Daption Capense), CA: Pale-faced Sheathbill (Chionis alba), SM: Sout Polar Skua (Stercorarius maccormicki), LD: Kelp Gull (Larus dominicanus), SV: Antarctic Tern (Sterna vittata) (data extracted from González-Zeballos et al., 2013).

Human Activities and Impact

One of the most significant human activities in the area is Tourism. The natural features of the area and the growth and diversification of tourism in the Antarctic continent position the Cierva Cove area among the 20 most visited and chosen sites by tour operators. Although access for tourism and any other recreational activity is forbidden in the area covered by the ASPA, there has been an increase in tourists in the surrounding maritime area for a wide range of activities each year in the tourist season. Among the most popular activities are small boat cruises, kayaking, polar plunge, stand up paddleboarding, snorkelling and scuba diving.

To provide adequate protection to the values identified in the ASPA, visitors and the staff responsible for the tourist contingent must adequately follow the recommendations and limits of the management plan to avoid any interference or disturbance. Although the data are approximate according to IAATO statistics, an average of between 9,500 and 13,000 tourists have been registered in recent seasons in the Cierva Cove area near the ASPA, which represents a significant impact on the area.

6(ii) Access to the area

Access to the area must be on foot from the Primavera Base, and only for authorised exceptions. The adjacent islands will be accessed by smaller boats. This marine access is allowed at any point of the islands included in the Area. Access to the area through the beaches must be avoided whenever animal fauna is present, especially during the breeding season.

For more information see section *7(ii)*.

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

Structures within the Area

There are no structures within the Area.

Structures adjacent to the Area

Adjacent to the ASPA; outside the limits of the Area is the Primavera Base (Argentina, 64º09'S, 60º58'W), located northwest of Cierva Point and adjacent to the Area. It is open only during the summer months. It consists of eight buildings and a delimited area for helicopter landing. The buildings are interconnected by walkways in order to avoid damage to the vegetation.

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

- *ASPA 152, Western sector of the Bransfield Strait (Mar de la Flota), off the coast of Low Island, South Shetland Islands, about 90 kilometres northwest of ASPA 134. It is located off the west and south coast of Low Island between 63°15'S and 63°30'S and between 62°00'W and 62°45'W.*
- *ASPA 153, Eastern sector of Dallmann Bay, off the west coast of Brabant Island, Palmer Archipelago, about 90 km west of ASPA 134. It is located between latitudes 64°00'S and 64°20'S and from 62°50'W eastward to the west coast of Brabant Island, (approximately 520 km^2).*

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 by permission issued by appropriate national Authorities.

The conditions for granting a permit to enter the Area are the following:

- *That entry is granted for a scientific purpose that cannot be carried out elsewhere and is consistent with the objectives of the Management Plan.*
- *The actions allowed do not harm the natural ecological system of the Area.*

- *That entry is granted for any management activity (inspection, maintenance or review), in support of the objectives of this Management Plan.*
- *The actions allowed are in accordance with this Management Plan.*
- *The Permit, or an authorised copy, is carried by the authorised principal investigator upon entering the Area.*
- *A post-visit report is provided to the competent National Authority mentioned in the Permit.*
- *Tourism and any other recreational activity is not allowed.*

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

Any access to the Area will be possible through a permit granted by a competent authority, and will only be granted for activities that are in accordance with this Management Plan.

The only access for helicopters is outside the limits of the Area, in the area adjacent to Primavera Base. Helicopters can land only in the specified area east-south-east of the Base. The flight path to be used is limited to an approach and departure from/to the north. Aircraft shall overfly the Area, as a minimum standard, as established in Resolution 2 (2004), *Guidelines for the Operation of Aircraft near Concentrations of Birds*. As a general rule, no aircraft may fly over the ASPA at a height of less than 610 metres (2,000 feet), except in cases of an emergency or air safety. Movements within the Area will be carried out without disturbing the fauna and flora, especially during the breeding season.

No vehicles of any kind are allowed.

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

- Scientific research activities that cannot be carried out in other places and that do not endanger the Area's ecosystem.
- Essential management activities, including monitoring.
- If access to certain nesting sites for birds and mammal colonies is deemed necessary for scientific or conservation reasons, it could include greater restrictions between late October and early December. This period is considered especially sensitive because it coincides with the egg-laying peaks of nesting birds in the Area.
- The use of RPAs (unmanned aircraft or drones) will not be allowed within the limits of the ASPA, unless previously analysed case by case during the environmental impact assessment process. They may only be used when stated in the entry permit and under the conditions established therein. During the analysis and authorisation process, all Antarctic Treaty directives in force will be taken into account.

7(iv) Installation, modification or removal of structures

No additional structures may be built or equipment installed within the Area, except for essential scientific or management activities and with proper permits.

Any scientific equipment installed in the Area, as well as any research signage, must be approved by permit and clearly labelled, indicating the country, name of the main researcher and year of installation. All materials installed must be of such a nature as to present a minimum risk of contamination in the Area, or of causing damage to vegetation or disturbance to fauna.

Research signage must not remain after the permit expires. If a specific project cannot be concluded within the time allowed, an extension must be requested authorising the permanence of any element in the Area.

7(v) Location of field camps

The Parties that use the Area will normally have the Primavera Base available for their accommodation, subject to prior coordination with the Argentine Antarctic Programme. The installation of tents will be allowed only in order to house scientific instruments or material, or to be used as an observation base.

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

- No live animals or plant material may be deliberately brought into the Area. All necessary recommendations against the intentional introduction of non-native species into the area must be adopted. In this regard, remember that these species are frequently introduced by humans. Clothing, personal equipment or scientific instruments and work tools can introduce insect larvae, seeds, spores, etc. For more information see the Non-Native Species Manual - CEP 2011.
- Uncooked farm products may not be introduced.
- No herbicides or pesticides may be brought into the Area. Any other chemical product, which must be introduced with the corresponding permit, will have to be removed from the Area at the end of the activity carried out with the appropriate permit. The use and type of chemical products must be documented in the best possible way for the knowledge of other researchers.
- Fuel, food and other materials must not be deposited within the Area unless they are required in an essential way by the activity authorised in the corresponding Permit.

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

Any taking or harmful interference is prohibited, except in accordance with a Permit. When an activity authorised by a permit involves taking of or harmful interference with flora or fauna, it must be consistent with the *SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica* as a minimum standard.

Information on the taking of and interference with flora and fauna will be duly exchanged through the Antarctic Treaty Information Exchange System and its record must be incorporated, at least, in the *Antarctic Master Directory* or, in Argentina, in the *National Antarctic Data Centre*.

Scientists taking samples of any kind must consult the Antarctic Treaty Electronic Information Exchange System (EIES) and/or contact the corresponding national Antarctic programmes that may be involved in taking samples in the Area, in order to minimise the risk of possible duplication.

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

Any material from the Area may be collected or removed from the Area only with the proper Permit. The collection of dead specimens for scientific purposes must not exceed a level such that it deteriorates the nutritional base of local scavenger species. The latter depends on the species to be collected and, if necessary, expert advice will be requested prior to granting of the permit.

7(ix) Disposal of waste

Any non-physiological waste must be removed from the Area.

In the case of sewage and domestic liquid waste, the sanitary facilities of the Primavera Base (Argentina) will be available, provided that it is open. In the case of tasks being carried out on the adjacent islands, waste water may be discharged into the sea in accordance with the provisions of Article 5 of Annex III to the Madrid Protocol.

Waste resulting from research activities in the Area may be temporarily stored at Primavera Base, pending removal. Said storage must be carried out in accordance with the provisions of Annex III to the Madrid Protocol, marked as waste and duly closed to avoid accidental leaks.

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

Permits to enter the Area may be granted for biological monitoring and inspection activities, which may include the taking of samples of vegetation or animals for research purposes as well as the erection and maintenance of signs or any other management measure. All structures and markings installed in the Area for scientific purposes, including signs, must be approved in the Permit and clearly identified by country, indicating the name of the main researcher and year of installation.

7(xi) Requirements for reports on visits to the Area

The main holder of the Permit must submit a report on the tasks carried out in the Area using the format previously delivered together with the Permit. This must be done for each Permit and once the activity has ended. This report must be sent to the permitting authority.

The records of permits and post-visit reports related to the ASPA will be exchanged with the other Consultative Parties, as part of the Information Exchange System, as established in Art. 10.1 of Annex V.

The permits and reports must be filed for free access by any interested Party, SCAR, CCAMLR and COMNAP, in order to provide the necessary information on human activities in the Area to ensure proper management.

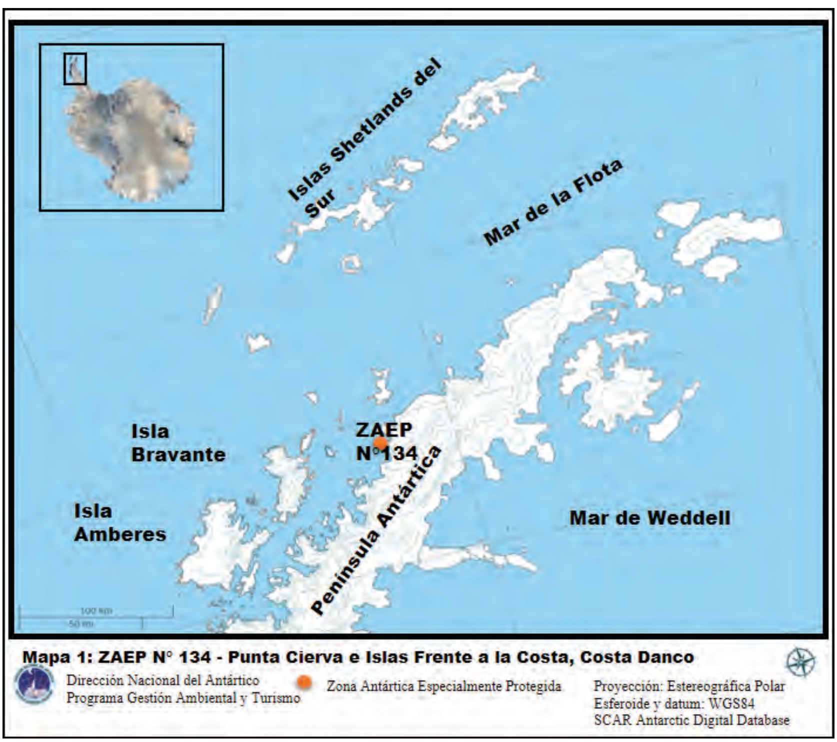


Figure 4: General location of Antarctic Specially Protected Area No. 134, Cierva Point and Offshore Islands, Danco Coast, Antarctic Peninsula.

Figure 5: Antarctic Specially Protected Area No. 134, Cierva Point and Offshore Islands, Danco Coast, Antarctic Peninsula. The set of areas that make up ASPA 134 are shaded (the subtidal marine environment between the various continental and island sectors is not included in the ASPA).

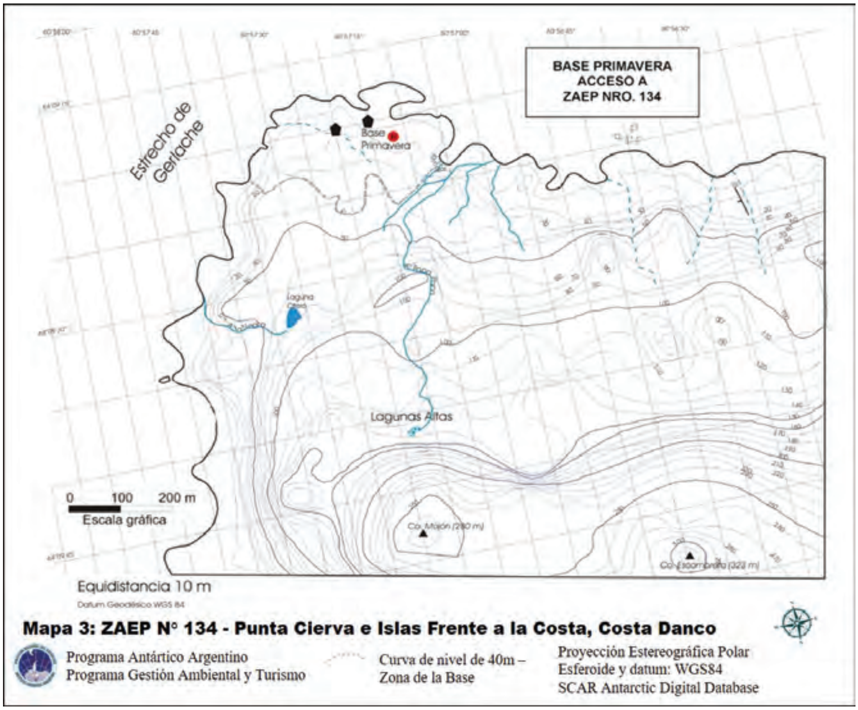


Figure 6: Cierva Point sector that includes the Primavera Base (the grey dotted line on the 40 m contour line indicates the area of the base, excluded from ASPA 134).

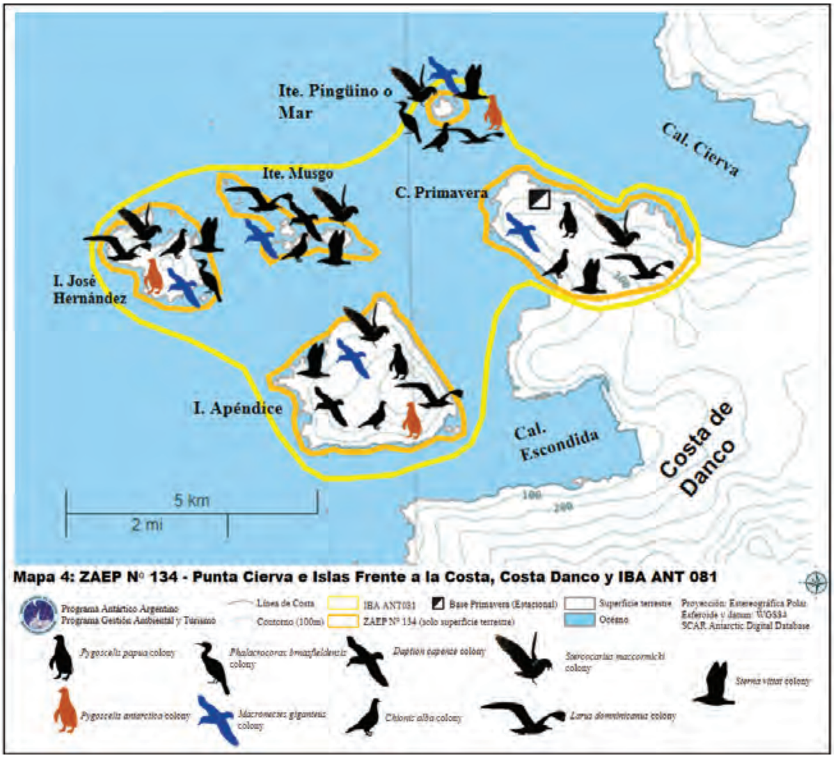


Figure 7: Detail of the limits of the sectors that make up ASPA 134 and IBA ANT081. Also shown is the general location of the different colonies of birds located in the reserve.

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Management Plan for Antarctic Specially Protected Area No. 148

MOUNT FLORA, HOPE BAY, ANTARCTIC PENINSULA

Introduction

The primary reason for the designation of Mount Flora, Hope Bay, Antarctic Peninsula (Latitude 63°25' S, Longitude 57°01' W, 0.3 km^2) as an Antarctic Specially Protected Area (ASPA) is to protect scientific values associated with the rich fossil flora present within the Area.

Mount Flora was originally designated as a Site of Special Scientific Interest through Recommendation XV-6 (1989, SSSI No. 31) after a proposal by the United Kingdom. It was designated on the grounds that 'the site is of exceptional scientific importance for its rich fossil flora'. It was one of the first fossil floras discovered in Antarctica and has played a significant role in deducing the geological history of the Antarctic Peninsula. Its long history as an easily accessible site and the large amount of fossiliferous debris occurring in scree has made it vulnerable to souvenir collectors, and the amount of material available for serious research has been considerably depleted. The Management Plan underwent a major revision in 2002 (Measure 1) including changes to the boundary. The last review of the plan was undertaken in 2015 (Measure 8), in which minor changes or amendments were made.

Geologist Johann Gunnar Andersson discovered Mount Flora during the Swedish South Polar Expedition (1901-04)[1], whose original stone hut (Historic Site and Monument No. 39) remains nearby at Seal Point, Hope Bay. Otto Nordenskjöld, the leader of the expedition, named Mount Flora (as 'Flora-Berg') following the geological observations of Andersson, recognising it as the first significant fossil locality discovered in Antarctica. The Area subsequently became of great scientific importance for interpreting key geological relationships in the region.

The Area is approximately three kilometres southeast of Esperanza Station (Argentina) and Teniente de Navio Ruperto Elichiribehety Station (Uruguay). Among the scientific research currently in progress within the Area is the project "Stratigraphy and Paleobotany of the Jurassic of the northern Antarctic Peninsula", carried out by the Argentine Antarctic Institute, which aims to conduct detailed petrographic and paleobotanical studies in Jurassic sedimentary and/or volcanic outcrops in the northern Antarctic Peninsula.

The Area fits into the wider context of the Antarctic Protected Area system as one of the few ASPAs protecting primarily geological values. 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 of the Protocol (see also Morgan et al., 2007). Using this model, ASPA No. 148 is contained within Environment Domain A: Antarctic Peninsula northern geologic (Morgan et al., 2007). ASPA No. 148 sits within Antarctic Conservation Biogeographic Region (ACBR) 1 Northeast Antarctic Peninsula. Through Resolution 5 (2015) Parties recognised the usefulness of the list of Antarctic Important Bird Areas (IBAs) in planning and conducting activities in Antarctica. Important Bird Area ANT074 Hope Bay comprises ice-free ground on the eastern side of

[1] Led by Otto Nordenskjöld, and under the command of Carl Anton Larsen, the expedition party included geologist Johan Gunnar Andersson, botanist Carl Skottsberg, zoologist Axel Ohlin, naval scientist José María Sobral, and artist Frank Wilbert Stokes.

Hope Bay, to the north of ASPA No. 148. The IBA qualifies on the basis of the large Adélie Penguin (*Pygoscelis adeliae*) colony present.

1. Description of values to be protected

Following a visit to the ASPA by environmental managers from Argentina in January 2011 and January 2013 the values specified in the earlier designation were reviewed and re-confirmed. Similarly, the scientific staff who made visits to Mount Flora in 2017 and 2019 re-confirmed the specific ASPA values and also mentioned the future need to evaluate new areas close to the Area with visible outcrops exposed following glacial retreat. Values within the Area are set out as follows:

- Mount Flora has important scientific and historical values associated with this significant heritage of geological discovery in Antarctica.
- Mount Flora is characterised by three distinct geological formations: the Hope Bay Formation (Trinity Peninsula Group), which is separated by an unconformity from the overlying gently tilted plant beds of the Mount Flora Formation (Botany Bay Group), which in turn are overlaid by ignimbrites and welded tuffs of the Kenney Glacier Formation (Antarctic Peninsula Volcanic Group). The relationships between these formations have been fundamental for determining the age of the plant beds, which has been vital to the interpretation of the geology of the Antarctic Peninsula.
- Historically, the site has played an important role in comparisons with other Southern Hemisphere floras.
- The fossil flora has been important for providing Mesozoic palaeoclimate data from a region where such information is otherwise sparse.
- Mount Flora holds one of the few Jurassic floras known from Antarctica and it is the only site that has been relatively well studied and documented. The Mesozoic plant assemblages from Mount Flora include members of the sphenophytes, ferns, cycadophytes (cycads and bennetites), pteridosperms and conifers. Samples of the fossils have served as a major reference source for many studies of Jurassic and Cretaceous palaeobotany.
- In addition to the important fossil flora, recent work has resurfaced discoveries confirming the presence of Jurassic freshwater bivalve fossils in Monte Flora.

2. Aims and objectives

Management at Mount Flora aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance and sampling in the Area through uncontrolled access and inappropriate collections of geological material;
- allow scientific geological and palaeontological research, 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 scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere;
- 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 at Esperanza Station (Argentina) and Teniente de Navio Ruperto Elichiribehety Station (Uruguay), where copies of this Management Plan shall be made available.

- Persons wishing to make the ascent of Mount Flora shall be instructed not to enter the Area without a Permit issued by the appropriate authority.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition.
- Abandoned equipment or materials shall be removed to the maximum extent possible provided that doing so does not adversely impact on the values of the Area.
- The area shall be visited by experts as necessary to assess whether it continues to serve the purposes for which it was designated and to ensure that management and maintenance activities are adequate. A desk assessment shall also be undertaken to consider the ASPA post-visits reports and available information on fossil collection within the Area.
- The retreat of glacial ice in recent years has exposed new outcrops of fossiliferous rocks in the vicinity of Mount Flora. A periodic update of the boundaries is needed to ensure that these exposed fossiliferous rocks are included within the ASPA if scientific research demonstrates their paleontological value. This may require a revision of the Management Plan within the next few years.
- A record of fossils collections from Mount Flora will be maintained based on post visit reports, in order to better assess the issuance of permits and to minimize over-sampling. (see sections *7(iii)*, *(x)* and *(xi)*).

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: Mount Flora ASPA No. 148 in relation to Hope Bay, Trinity Peninsula, and the South Shetland Islands, showing the location of the nearest protected areas. The location of Esperanza Station (Argentina) and Teniente de Navio Ruperto Elichiribehety Station (Uruguay) are also shown. Inset: the location of Mount Flora on the Antarctic Peninsula.

Map 2: Mount Flora ASPA No. 148, Hope Bay, topographic map. Map specifications: Projection: Lambert Conformal Conic: Standard parallels: 1st 76° 40’ S; 2nd 63° 20’ S Central Meridian: 57° 02’ W; Latitude of Origin: 70° 00’ S; Spheroid: WGS84. Vertical datum: mean sea level. Vertical contour interval 25 m. Horizontal and vertical accuracy unknown. Note: topography and positions are based on original 1950s survey data, and true positions are known to be in error by up to 500 m. Ice margins are provided based upon 1999 aerial photography.

Map 3: Mount Flora ASPA No. 148 geological map, adapted from the ‘Mapa Geológico de Bahía Esperanza Antártida’ published by the Intituto Geológico y Minero de España and Instituto Antártico Argentino (Scale 1:10,000).

6. Description of the Area

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

GENERAL DESCRIPTION
Mount Flora (latitude 63°25’ S, longitude 57°01’ W, 0.3 km^2) is situated on the southeastern flank of Hope Bay, at the northern end of Trinity Peninsula, Antarctic Peninsula (Map 1). The summit of Mount Flora (520 m) is approximately 1 km from the southern shore of Hope Bay. Four glaciers surround Mount Flora. The Flora Glacier extends from the cirque below the summit of Mount Flora in a northeasterly direction for one kilometre before it flows into a larger glacier that flanks the eastern and southern slopes of Mount Flora, extending northeast from The Pyramid (565 m) (Map 2). The western slopes of Mount Flora are bounded by the Kenney Glacier, which joins Depot Glacier before flowing

into the head of Hope Bay. The Pyramid is a distinctive peak 1.5 km to the SSE of Mount Flora. To the north of the Area is the ice-free Five Lakes Valley and Scar Hills, and to the northeast is Lake Boeckella.

BOUNDARIES

The boundaries designated in the original Management Plan were amended during the 2002 Management Plan revision to include most of the known exposed fossiliferous strata on the northern slopes of Mount Flora. The ASPA boundary was amended again in 2021 to include all the strata of the Mount Flora Formation to the north of the Area. The summit ridge and highest peak of Mount Flora (520 m), which were formerly within the boundary, are comprised of non-fossiliferous volcanic rocks and have been excluded from the Area. The boundary runs from the north summit of Mount Flora (516 m) – the highest point of the boundary – westward down the ridge to Kenney Glacier. The boundary then follows the eastern margin of Kenney Glacier northward to the 100 m contour, then eastward across scree slopes along the 100 m contour for 1200 m. At this point, the boundary runs south-southwest for 100 m towards the north-western margin of the Flora Glacier. From here the southern boundary of the Area follows the north-western margin of the Flora Glacier southwestward to the ridge leading westward to the north summit of Mount Flora (see Map 3). Where present, the glacier margins, lower outcrops, western ridge and northern summit of Mount Flora form visually obvious features that indicate the boundaries. The Area remains otherwise unmarked.

The boundary co-ordinates of the Area, starting with the north summit of Mt Flora and moving clockwise, are shown in Table 1.

Table 1. Boundary co-ordinates of ASPA No. 148 Mt Flora, Hope Bay, Antarctic Peninsula

Number	Latitude	Longitude
1	63º 24’ 53’’ S	057º 01’ 26’’ W
2	63º 24’ 56’’ S	057º 02’ 02’’ W
3	63º 24’ 49’’ S	057º 02’ 10’’ W
4	63º 24’ 38’’ S	057º 00’ 50’’ W
5	63º 24’ 41’’ S	057º 00’ 47’’ W
6	63º 24’ 45’’ S	057º 01’ 05’’ W
7	63º 24’ 51’’ S	057º 01’ 10’’ W

CLIMATE

No climate data are available for Mount Flora but local conditions are indicated by those at Esperanza Station. In summer (December, January and February), the average maximum temperature ranges between 2.6 ºC and 3.2 ºC, while the average minimum temperature ranges between -2.9 ºC and -1.8 ºC. During this season the temperature can reach as high as 18.4 ºC, as in 2020, or as low as -12.0 ºC, as in 1985. In winter, average maximum temperatures are around -6.0 ºC, while the minimum averages are about -15.0 ºC. Exceptionally, the temperature may rise to 13.0 ºC, or fall to -32.3 ºC, as in 1975. Temperatures at Mount Flora are likely to be lower owing to its greater elevation. The least windy months are December and January (mean wind speed 20-22 km h^{-1}), compared to May, July, August and September when winds are stronger (mean wind speed >30 km h^{-1}). During April and May gusts of more than 380 km h^{-1} have been recorded, resulting from katabatic winds from the local glacier. Strong winds (at or above 43 km h^{-1}) have been observed throughout the year, with an average frequency of c. 15 days per month. The average annual frequency of days with snow is 181 days per year. Throughout the year, snow fall occurs, on average, on 13-16 days each month, with a minimum average of 13 days in June. The average frequency of days with overcast skies is high in summer (23 days in January) but lower during the winter months (c. 13 days per month). The frequency of days with clear skies it is low throughout the year, ranging between 1 and 5 days per month. (Servicio Meteorológico Nacional, Argentina).

GEOLOGY, SOILS AND PALAEONTOLOGY

The geology of the Area comprises three main formations: the Hope Bay Formation, the Mount Flora Formation and the Kenney Glacier Formation. At the base, the Hope Bay Formation (Trinity Peninsula Group) is more than 1200 m thick and is characterised by marine siliciclastic turbidite and sandstone. It has an inferred Permo-Carboniferous age based on supposed Carboniferous spores (Grikurov and Dibner 1968) and Rb-Sr isotopic dating of 'grits' and mudstones (281 ±16 Ma; Pankhurst 1983) but the age evidence is sparse and open to ambiguous interpretation (Smellie and Millar 1995). The Hope Bay Formation is separated by an angular unconformity and a long stratigraphic gap from the overlying Mount Flora Formation. The Mount Flora Formation (Botany Bay Group) is composed mainly of sandstones, conglomerates and shale, and contains the most significant fossil strata. The overlying Kenney Glacier Formation (Antarctic Peninsula Volcanic Group), which is also separated from the Mount Flora Formation by an angular unconformity, is composed of ignimbrites and welded tuffs. There has been debate over the age of the Mount Flora Formation (Andersson 1906, Halle 1913, Bibby 1966, Thomson 1977, Farquharson 1984, Francis 1986, Gee 1989, Rees 1990); the most recent palaeobotanical and radiometric data available support an age of Early to Middle Jurassic (Rees 1993a, b, Rees and Cleal 1993, Riley and Leat 1999). Faults have been observed in the northern face of Mount Flora (Birkenmajer 1993a) and mapped separating the Trinity Peninsula Group and Mount Flora Formation (Smellie pers. comm. 2000).

The Mount Flora Formation is about 230-270 m thick and may be subdivided into an older Five Lakes Member and an upper Flora Glacier Member, which contains the most important fossil deposits. The Five Lakes Member is about 170 m thick and consists of plant-bearing coarse sedimentary breccias, conglomerates and sandstones. The dominant lithology, particularly in the lower part of the succession, is clast-supported cobble to boulder conglomerate (Farquharson 1984). It is well-exposed on the northern and northeastern slopes of Mount Flora between the Flora Glacier and Five Lakes Valley. The lower boundary of this member is an angular unconformity against the Hope Bay Formation. The contact between the Mount Flora Formation and the Hope Bay Formation is covered by scree. Some 50 m of basal beds of the Five Lakes Member are presumed unexposed. A higher section of the Five Lakes Member is well-exposed at a buttress which separates Flora Glacier from Five Lakes Valley (Martín Serrano et al. 2005, Montes et al. 2004).

The Flora Glacier Member comprises a sandstone-conglomerate complex 60-100 m thick, locally overlain by a shale complex up to 10 m thick, which is the main fossiliferous zone. It is best exposed at a buttress that divides the Flora Glacier cirque from Five Lakes Valley at approximately 350 m. A one metre-thick sill occurs in the upper section of the shale, close to the contact with the Kenney Glacier Formation. The sandstone association is dominated by fining upward cycles (characterised by decreasing grain size) that range in thickness from 2.5 to 11.5 m (Farquharson 1984). Although mostly inaccessible, good exposures of the Flora Glacier Member continue in the steep slopes of Mount Flora above Five Lakes Valley, extending westward to the margin of the Kenney Glacier. The thickness of the unit increases from 50-60 m at the buttress to about 100 m at the glacier margin. Volcanogenic deposits form a small but significant part of the Mount Flora Formation. A single ignimbrite 26 m thick forms a pale band across the north face of Mount Flora, approximately halfway up the sedimentary sequence (Farquharson 1984). The Kenney Glacier Formation volcanic rocks overlie the Mount Flora Formation, exposed in the highest part of Mount Flora. It also unconformably overlies the Hope Bay Formation on the eastern spur of the Pyramid (Smellie, pers. comm. 2000). The incomplete formation is a complex of predominantly evolved, rhyolite-dacite lavas, ignimbrites, agglomerates and tuffs (Birkenmajer 1993a & b). Farquharson (1984) identified the presence of tuffs, fine-grained agglomerates and welded tuffs. The most significant fossil exposures are found on the northern and northwestern faces of Mount Flora.

Most research has been conducted on samples from the relatively accessible northern face. The fossil flora was first comprehensively described by Halle (1913) and since then has been considered a standard for Mesozoic gondwanan floristic and biostratigraphic studies (Rees and Cleal 1993). Halle (1913) originally described 61 species from the fossils; this was revised to 43 species (Gee 1989), then to 38 species (Rees 1990) and, later still, to 32 species (Baldoni, 1986, Morel et al. 1994; Rees and Cleal

2004). More recently, 41 taxa have been described (Ociepa 2007; Birkenmajer and Ociepa 2008; Ociepa and Barbacka 2011). Fossil wood from the ASPA has also been studied (Torres et al. 2000).

The flora is represented typically by small scale-like leaves of Hepatophyta, stems and cone fragments of sphenophytes (Equisetaceae, *Equisetum*), as well as foliage of several ferns families (Dipteridaceae, Matoniaceae, Dicksoniaceae, Osmundaceae) and leaves and wood of gymnosperms (Caytoniales, Cycadales, Bennettitales, pteridosperms and conifers). Cycadophyte and conifer cone scales, seeds and other unidentifiable stems, leaves and foliage branches are also preserved (Taylor, no date; Rees pers. comm. 1999). Other floral fragments have been interpreted as fertile fern fronds or pollen organs of conifers but it remains uncertain how this species is related to other taxa because no spores or pollen have been obtained from the material to date (Ociepa and Barbacka, 2011). More generally, identifiable palynomorphs from the plant beds of Mount Flora Formation could not be recovered (Rees and Cleal 2004; Ociepa and Barbacka 2011). Four beetle (Order: Coleoptera) elytra (exoskeletons) have been identified from a small sample of shale, also containing plant fossils, from Mount Flora (Zeuner 1959). These were identified as *Grahamelytron crofti* and *Ademosynoides antarctica*. *G. crofti* is possibly a Carabidae, although it resembles a Chrysomelidae, while *A. antarctica* has been referred to as a Carabidae, Tenebrionidae, Elateridae or the fossil family Permosinidae (Zeuner, 1959). Recent research has confirmed the presence of the oldest freshwater mollusk fossil from Antarctica, *Antediplodon esperanzaensis*, in Jurassic outcrops exposed by the retreat glaciers to the east of the Area (Martinez et al, 2019). No other examples of fossil fauna have been recorded. There are no known marine fossil floral or faunal deposits in the Area.

Climate warming has resulted in widespread glacial retreat in the northern Antarctic Peninsula region. For example, in the northern Trinity Peninsula the area of ice-free ground has increased by c. 40 km^2. More specifically, in the Hope Bay area, which encompasses ASPA No. 148, the ice-free area has increased by c. 4.5 km^2 (Sotille, 2015). As a result, the formation of soil and colonisation of vegetation has increased throughout the area, revealing the dynamic process occurring in the region , which are of important scientific value (Poeiras, 2011).

TERRESTRIAL AND FRESHWATER BIOLOGY

The living flora within the Area is sparse and patchily distributed. Although a full floristic survey has not been made, a number of moss and lichen species have been identified as present. Moss species identified are: *Andreaea gainii, Bryum argenteum, Ceratodon purpureus, Hennediella heimii, Pohlia nutans, Sanionia uncinata, Schistidium antarctici* and *Syntrichia princeps*. Lichen species identified are: *Acarospora macrocyclos, Buellia anisomera, Buellia* spp., *Caloplaca* spp*., Candelariella vitellina, Cladonia pocillum, Haematomma erythromma, Physcia caesia, Pleopsidium chlorophanum, Pseudephebe minuscula, Rhizocarpon geographicum, Rhizoplaca aspidophora, Stereocaulon antarcticum, Tremolecia atrata, Umbilicaria antarctica, Umbilicaria decussata, Umbilicaria kappeni, Usnea antarctica, Xanthoria candelaria* and *Xanthoria elegans*. There are no permanent streams or lakes within the Area. No information is available on the invertebrate fauna or microbial communities present at Mount Flora.

BREEDING BIRDS

Little information is available on bird communities present at Mount Flora, although a report on the exact nesting sites of some species suggested that birds are unlikely to breed within the Area (Marshall 1945). However, the breeding birds of Hope Bay generally have been well-studied, for instance, Argentina has been monitoring the penguins colonies within IBA ANT074 since the early 1990s. Part of one of the largest colonies of Adélie penguin (*Pygoscelis adeliae*) on the Antarctic Peninsula, numbering c. 104,139 pairs, is situated about 500 m northeast of the Area (Santos et al. 2018) (Map 2). Other birds breeding at Hope Bay include around 500 pairs of gentoo penguins (*Pygoscelis papua*) (Argentina Monitoring Program), brown skua (*Catharacta loennbergi*), south polar skua (*Catharacta maccormicki)*, Antarctic tern (*Sterna vittata*), Wilson's storm petrel (*Oceanites oceanicus*), kelp gull (*Larus dominicanus*), and sheathbill (*Chionis alba*). Further information on the number of breeding birds in the vicinity of Mount Flora can be found in Argentina (1997), Santos et al. (2013) and Coria and Montalti (1993).

HUMAN ACTIVITIES AND IMPACTS

Mount Flora was discovered in 1903 by Johann Gunnar Andersson, a member of the Swedish South Polar Expedition of 1901-04, which explored and mapped much of the northern Antarctic Peninsula. Andersson collected fossil and mineralogical specimens from Mount Flora while stranded and awaiting rescue at Hope Bay over the winter of 1903. Andersson and his companions over-wintered in a stone hut (Historic Site and Monument No. 39). The leader of the expedition was Otto Nordenskjöld, who named Mount Flora because of the geological findings of Andersson. The United Kingdom established Base 'D' at Hope Bay in 1945 as part of 'Operation Tabarin'. The station was operational until February 1964 with a winter complement of 7-19 personnel. Base 'D' was transferred from the United Kingdom to Uruguay in 1997 and renamed as Teniente de Navio Ruperto Elichiribehety Station. Argentina established Esperanza Station on 31 December 1951 and has operated the station continuously since, with approximately 50 winter and up to 70 summer personnel, devoted to the study of different scientific disciplines such as seismology, geology, geomorphology, and the monitoring of different parameters of the ecosystem and contamination.

The Hope Bay area is subject to tourist visitation, with between 1,500 and 3,000 tourists per year visiting local sites including Esperanza Station and the nearby penguin colony at Eagle Cove (IBA Ant074). Mount Flora was designated as a Site of Special Scientific Interest in 1989 as a result of concern that the best examples of fossils were being collected by casual visitors and might therefore be lost to science. Tourism and any other recreational activity is not permitted within the Area, albeit access to the sites is considered difficult making such visits unlikely.

6(ii) Access to the Area

All access to the areas shall be on foot. The lower slopes of Mount Flora are easily accessible by foot from both the local research stations and from Hope Bay. However, reaching the boundary of the ASPA, and moving within it, requires a demanding hike, due to the steep nature of the local terrain. To access the area, follow the relatively flat ground south of Esperanza Station to Boeckella Lake. From there, follow a trail that heads southward towards the eastern end of the ASPA, which allows access via the least steep ground (see Map 2). Helicopter landings within the Area are prohibited, except under emergency conditions when the use of helicopters may be considered under the conditions set out in section *7 (ii) Access to and movement within or over the Area*.

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

There are no structures present within the Area. The nearest scientific research stations are Esperanza Station (Argentina) (latitude 63°24'S, longitude 56°59'W) and Teniente de Navio Ruperto Elichiribehety Station (Uruguay) (latitude 63°24'S, longitude 56°59'W), both approximately 1.5 kilometres northeast of the Area. The remains of a British Base, which burnt down in 1948, are situated 300 m to the northeast of the Uruguayan base. The graves of two British men who died in the above fire are located on a small promontory some 300 m to the north of the Uruguayan base. Two shelters, run by Argentina, are situated east of Mount Flora (latitude 63º25'10" S, longitude 56º59'50"W and latitude 63º27'36" S, longitude 57º11'14"W).

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

The nearest protected areas to Mount Flora are Potter Peninsula (ASPA No. 132), Western Shore of Admiralty Bay (ASPA No. 128), Lions Rump (ASPA No. 151), and Narębski Point, Barton Peninsula (ASPA No. 171), all of which are located on King George Island, South Shetland Islands, lying approximately 150 km to the west (Map 1). A stone hut (Historic Site and Monument No. 39) built by members of the Swedish South Polar Expedition and a bust of General San Martin, grotto with a statue of the Virgin of Lujan, and a flag mast erected by Argentina in 1955, together with a graveyard with stele in memory of members of Argentine expeditions who died in the area (Historic Site and Monument No. 40) are present within the vicinity of Esperanza Station (Map 2).

6(v) Special zones within the Area

None.

7. Terms and condition 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 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 for compelling scientific reasons which cannot be served elsewhere, or for reasons essential to the management 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 activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the scientific and historic values of the Area;
- should the applicant for a Permit propose to make rock collections, the applicant shall demonstrate to an appropriate national authority that the research proposed cannot be adequately served by samples already collected and held in the various collections worldwide, before a Permit is granted;
- the Permit, or an authorised copy, shall be carried when in the Area;
- a visit report shall be supplied to the authority named in the Permit;
- the Permits shall be issued for a finite period;
- 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 to and movement within the Area shall be on foot.
- Due to the steepness of the ground, which makes it technically difficult to land a helicopter within the Area, access to the Area by helicopter is not permitted, except in the event of an emergency. In an emergency, and if wind conditions allow, a helicopter can enter the ASPA, preferably without landing, to perform a rescue. If necessary or useful for the type of emergency in question, the helicopter may land on Flora Glacier. Should an emergency arise which necessitates the use of a helicopter, the helicopter flight paths shown in Map 2 are recommended. Furthermore, helicopter lands in the surrounding area are not recommended due to the high concentration of birds nesting in the vicinity of Mount Flora. The recommended helicopter landing site is the Esperanza Station helicopter pad (see Map 2). The ‘Guidelines for the Operation of Aircraft near Concentrations of Birds’ contained in Resolution 2 (2004) should also be consulted.
- Land vehicles are prohibited within the Area.
- Pedestrian traffic should be kept to the minimum necessary to undertake permitted activities and every reasonable effort should be made to minimise trampling effects, such as breakage of rocks, especially of rocks *in situ*.
- Overflight of 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.

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;
- Scientific research that will not jeopardise the scientific values of the Area.
- Essential management activities, including monitoring.

Where geological sampling is involved this should, as a minimum standard, be in accordance with the following principles:

1. Sampling should be done with the minimum disturbance practical.
2. Sampling should be kept to the minimum necessary to achieve the research objectives.
3. Enough material/specimens should be left to allow future workers to understand the context of the material.
4. Sample sites should be left free of markings (paint, labels, etc.).
5. Specimens should be retained in a recognised repository after the project finishes.
6. Details of the GPS location of collection sites, volume/weight, sample orientation, type of material collected, and where the removed material will be housed, should be detailed in visit reports submitted to the appropriate national authority.
7. A copy of these details should also be provided to the Proponent Parties to facilitate the review of the Management Plan and to facilitate the provision of advice to other Parties regarding the existence of materials in geological repositories, with a view to minimising unnecessary new or additional sampling.

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 and for a pre-established period, as specified in a permit. Permanent structures or installations are prohibited. 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. Removal of specific equipment for which the Permit has expired shall be a condition of the Permit.

7(v) Location of field camps

Camping is prohibited 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 which may be brought into the area are:

- The deliberate introduction of animals, plant material, microorganisms and non-sterile soil into the Area shall not be permitted. Precautions shall be taken to prevent the accidental introduction of animals, plant material, microorganisms and non-sterile soil from other biologically distinct regions (within or beyond the Antarctic Treaty area). Furthermore, all tools (drills, picks, shovels, geological hammers, etc.) should be thoroughly cleaned before being taken to Antarctica, particularly those tools which have been used previously in high altitude and high latitude areas outside the Antarctic Treaty area.
- No herbicides or other 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 specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental introduction into the environment.
- 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 shall be notified of any materials released and not removed that were not included in the authorised Permit.

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) 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 (see sections *7(iii) Activities which may be conducted in the Area* and *7(x) Measures that may be necessary to continue to meet the aims of the management plan*). Permits shall not be granted if there is a reasonable concern that the sampling proposed would take, remove or damage such quantities of fossiliferous rocks that their abundance on Mount Flora would be significantly affected. Other 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 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 in accordance with Annex III (Waste disposal and waste management) to the Protocol on Environmental Protection to the Antarctic Treaty (1998).

7(x) Measures that may be necessary to continue to meet the aims of the Management Plan
In view of the fact that geological sampling is both permanent and results in cumulative impact the following measures shall be taken to safeguard the scientific values of the Area:

- Visitors removing geological samples from the Area shall complete a record describing the geological type, quantity and location of samples taken, which should, at a minimum, be deposited with their National Antarctic Data Centre and/or with the Antarctic Master Directory.
- Visitors planning to sample within the Area shall demonstrate that they have familiarised themselves with earlier collections to minimise duplication. Sample collections exist in repositories around the world including:

Repositories	***Information/repository website***
Museum of Natural Sciences, B. Rivadavia, Buenos Aires, Argentina	http://wander-argentina.com/natural-sciences-museum-buenos-aires/
Museum of Natural Sciences, La Plata, Argentina	http://www.welcomeargentina.com/laplata/museum-natural-sciences.html
Natural History Museum, London, UK	https://www.nhm.ac.uk/our-science/collections/palaeontology-collections.html
British Antarctic Survey, Cambridge, UK	https://www.bas.ac.uk/data/our-data/collections/geological-collections/
Swedish Natural History Museum, Stockholm	http://www.nrm.se/english.16_en.html
Byrd Polar Research Center Polar Rock Repository, Ohio, USA	http://bprc.osu.edu/rr/
Institute of Geological Sciences, Polish Academy of Sciences, Krakow, Poland	https://www.ing.pan.pl/en/
Department of Geology, Institute of Geosciences, Federal University of Rio de Janeiro, Brazil	http://www.ufrgs.br/english/the-university/institutes-faculties-and-schools/institute-of-geoscience

Antarctic Repository of Paleontological and Geological Collections of the Argentine Antarctic Institute, Buenos Aires, Argentina	https://www.cancilleria.gob.ar/es/iniciativas/dna/instituto-antartico-argentino/repositorio-de-fosiles

7(xi) Requirements for reports

The principal permit holder for each visit to the Area shall submit a visit 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 *Antarctic Specially Protected Area visit report form* contained in the *Revised Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas* (Appendix 2). Amongst other details, the visit report should include the information requested in bullet point 6 of section *7(iii) Activities which may be conducted in the Area* of this Management Plan. Wherever possible, the national authority should also forward a copy of the visit report to the Proponent Parties, 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, to be used both in any review of the Management Plan and in organising the scientific use of the Area.

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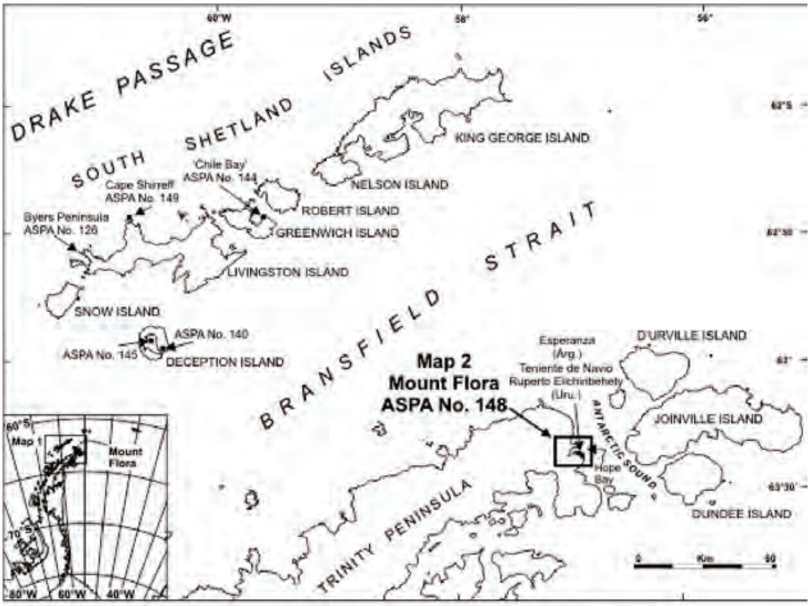
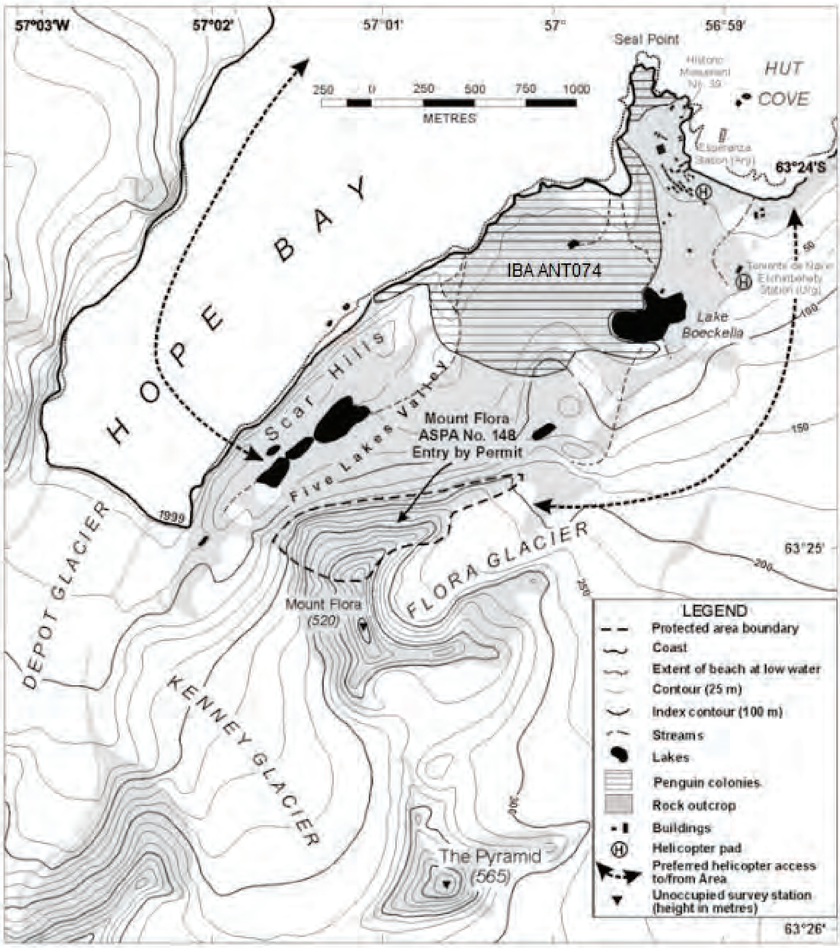
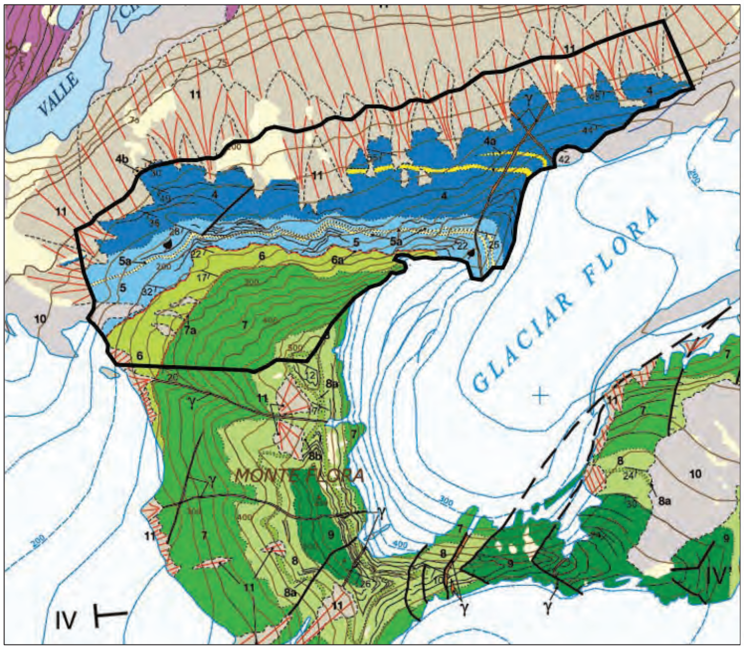


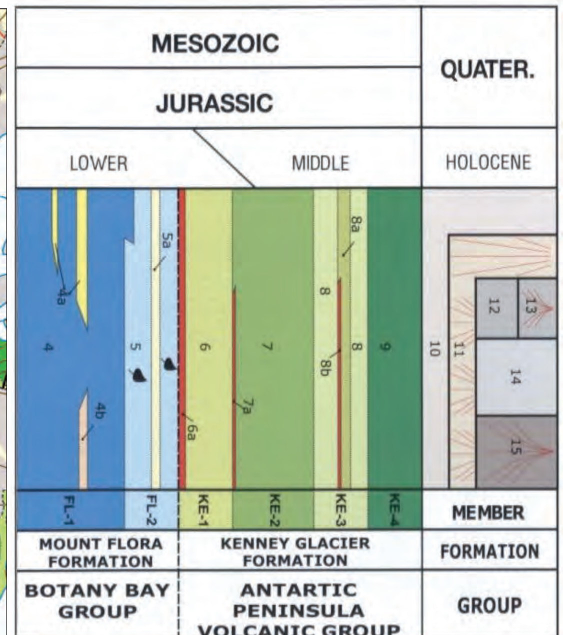
Map 1. Mount Flora (ASPA No. 148), Hope Bay, Antarctic Peninsula, location map.
Inset: location of Mount Flora on the Antarctic Peninsula



Map 2. Mount Flora (ASPA No. 148), Hope Bay, topographic map

Map 3: Mount Flora ASPA No. 148 geological map, adapted from the 'Mapa Geológico de Bahía Esperanza Antártida' published by the Intituto Geológico y Minero de España and Instituto Antártico Argentino (Scale 1:10,000). The sketch map is orientated with north to the top of the map. The area depicted is approximately 1.5 km across. Legend: 4. Massive conglomerates of different thicknesses. 5. Sandstones, conglomerates and black shales with plant remains. 5a. Fragmented volcanic rocks. 6. Welded tuffs with interbedded sandstones, volcanic breccias and welded ignimbrite beds. 6a. Reddish thermal contact. 7. Breccias, sandstones and siltstones with interbedded volcanic ignimbrites. 8. Welded tuffs, interbedded with welded ignimbrites and beds of breccia and sandstone. 8a. volcanic laminated siltstones, sandstones and volcanic basaltic lava layers. 8b. Reddish thermal contact. 9. Breccias and sandstones with interbedded volcanic ignimbrites. 10. Angular boulders with a sandy-silty matrix. Background till and moraines. 11. Angular boulders. Slopes and debris cones. γ: dyke ◆: palaeobotanical remains.





Management Plan for

Antarctic Specially Protected Area No. 155

CAPE EVANS, ROSS ISLAND

(including Historic Sites and Monuments Nos. 16 and 17, the historic Terra Nova hut of Captain Robert Falcon Scott and its precincts and the cross on Wind Vane Hill)

Introduction

The Area is located on the northwestern coast of Cape Evans, Ross Island, at 77° 38' 12"S, 166° 25' 15"E, and comprises an area of ~5.5 ha lying between Wind Vane Hill, Skua Lake and Home Beach. The Area was originally designated for the significant historic values of the hut built by the British Antarctic (*Terra Nova)* Expedition of 1910-13 led by Captain Robert Falcon Scott, listed as Historic Site and Monument (HSM) No. 16, and of the cross erected at Wind Vane Hill listed as HSM No. 17, both of which were designated in Recommendation VII-9 (1972). The Area was designated as Specially Protected Area No. 25 through Measure 2 (1997) and renamed and renumbered as Antarctic Specially Protected Area (ASPA) No. 155 by Decision 1 (2002). Revisions to the Management Plan were adopted through Measure 2 (2005), Measure 12 (2008), Measure 8 (2010), and Measure 11 (2015).

1. Description of values to be protected

The *Terra Nova* hut (HSM No. 16) at Cape Evans (Map 1) is the largest of the historic huts in the Ross Sea region. It was built in January 1911 by the British Antarctic (*Terra Nova)* Expedition of 1910-13, led by Captain Robert Falcon Scott, Royal Navy. It was subsequently used as a base by the Ross Sea party of Sir Ernest Shackleton's Imperial Trans-Antarctic Expedition of 1914-17.

The cross on Wind Vane Hill (HSM No. 17) was erected in memory of three members of Shackleton's Ross Sea party who died in 1916, Aeneas Mackintosh, Victor Hayward, and Arnold Spencer-Smith. In addition to this, two anchors from the ship Aurora of the Imperial Trans-Antarctic Expedition, two instrument shelters (one on Wind Vane Hill and the other near the *Terra Nova* hut), several supply dumps and numerous artefacts are distributed around the site (Map 2).

Cape Evans is one of the principal sites of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, flora and fauna in Antarctica are associated with the *Terra Nova* Expedition based at this site. The data collected can provide a bench mark against which to compare current measurements. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica give this Area significant historic, scientific, and aesthetic value.

Cape Evans 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)).

2. Aims and objectives

The aim of the Management Plan is to provide protection for the Area and its features so that its values can be preserved. The objectives of the Management Plan are to:

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:
    a) an annual ‘on-site’ maintenance programme;
    b) a programme of monitoring the condition of artefacts and structures, and the factors that affect them;
    c) a programme of site, building and artefact conservation which may occur on or off site;
    d) mapping and otherwise recording the disposition of historic items in the hut environs; and
    e) recording other relevant historic data.
- minimise human disturbance to the Area, its features and artefacts whilst allowing for managed access to Scott’s *Terra Nova* hut and other parts of 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:

- 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 on Ross Island;
- Copies of this management plan shall be made available to the principal permit holder of all groups visiting the Area and/or the leader of any groups operating in the adjacent vicinity at Cape Evans;
- National Antarctic Programmes 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;
- Personnel (national programme staff, field expeditions, tourist expedition leaders and pilots) operating in the adjacent vicinity of, accessing or flying over the Area shall be specifically instructed by their national programme, tour operator or appropriate national authority to observe the provisions and contents of the Management Plan, including on the location, boundaries and restrictions applying to access and landings within the Area;
- Markers or signs erected within or near the boundary of the Area or in nearby facilities shall be secured and maintained in good condition, and removed when no longer required;
- A regular programme of conservation work shall be undertaken on Scott’s *Terra Nova* hut and associated artefacts within the Area;
- Systematic monitoring shall be carried out to assess the impacts of visitors and the results, and any related management recommendations on limits to the number of visitors allowed at any one time or in any given period, shall be included in reviews of this Management Plan.
- Interested National Antarctic Programmes and relevant groups and organisations should consult together and coordinate to ensure:
    a) skills and resources, particularly those related to conservation techniques, are developed and deployed to assist with protection of the historic values of the Area;
    b) the defined limits on visitor numbers are not exceeded; and
    c) the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: ASPA No. 155 Cape Evans, topographic map.

Projection: Lambert Conformal Conic; Standard parallels: 1st 77° 38' S, 2nd 77° 39' S: Central Meridian: 166° 25' 30"E; Latitude of origin: 78° 00' 00"S: Spheroid: WGS84. Contour interval 5 m.

Data sources: Coastline, topography, and infrastructure supplied by Antarctica New Zealand (2019). Historic features surveyed by Land Information New Zealand (LINZ).

Inset 1: Ross Sea region, showing location of Inset 2.

Inset 2: Ross Island region, showing location of Map 1, Cape Evans and McMurdo Station (US) and Scott Base (NZ).

Map 2: ASPA No. 155 Cape Evans, historic features. Map specifications as per Map 1.

6. Description of the Area

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

Overview

Cape Evans is a small, triangular shaped, ice-free area of approximately 125 ha on the southwestern coast of Ross Island, ~10 km to the south of Cape Royds and 24 km to the north of Hut Point on Ross Island (Map 1).

The ice-free area is composed of till-covered basalt bedrock. The designated Area is located on the northwestern coast of Cape Evans adjacent to Home Beach and is focussed on Scott's *Terra Nova* hut (Map 2).

South polar skuas (*Stercorarius maccormicki*) nest at Cape Evans and Adélie penguins (*Pygoscelis adeliae*) occasionally transit the Area. Weddell seals (*Leptonychotes weddellii*) occasionally haul out on Home Beach.

Boundaries

The boundaries of the Area, described in a clockwise direction from the southwestern corner on Wind Vane Hill, are:

Southwest: a line extending ~182 m northwest from the southwestern corner of the Area at 77º 38' 15.47"S, 166º 25' 9.48"E, which lies ~20 m south of the cross on Wind Vane Hill, following the crest of the small ridge descending to the western corner near the shoreline at 77º 38' 11.50" S, 166º 24' 49.47" E;

Northwest: a line extending ~188 m northeast from the western corner of the Area following the shoreline of Home Beach to the northwestern corner at 77º 38' 7.5" S, 166º 25' 9.1" E;

Northeast: a line extending ~186 m southeast from the northwestern corner of the Area to the outlet stream from Skua Lake at the northeastern corner at 77º 38' 9.37" S, 166º 25' 35.74" E;

East: a line extending ~ 193 m due south from the northeastern corner of the Area to the southeastern corner at 77º 38' 15.6" S, 166º 25' 35.68" E; and

South: a line extending ~174 m due west from the southeastern corner of the Area to the southwestern corner on Wind Vane Hill.

Human activities

A regular and multi-year programme of conservation has been carried out on Scott's *Terra Nova* hut by New Zealand since the 1950s. The New Zealand based non-governmental organisation Antarctic Heritage Trust has undertaken conservation of Scott's *Terra Nova* hut and associated artefacts for over 30 years in coordination with National Antarctic Programmes operating in the region.

National programme personnel from nearby McMurdo Station (US) and Scott Base (NZ), and tourist groups, regularly visit Scott's *Terra Nova* hut and the nearby vicinity. The numbers of visitors may fluctuate depending on a range of factors, including sea ice and weather conditions, available logistics, and the number of tour operators in any given year.

6(ii) Access to the Area

The Area may be accessed by first travelling to locations adjacent to but outside of the boundaries by either helicopter, vehicle, small boat, or on foot. Access into and within the Area is generally made on foot, although vehicles may be used for purposes authorised by permit. Particular routes for access to the Area have not been designated. The specific conditions for access by pedestrians, small boats, vehicles, overflight and aircraft landings are set out in Section 7(ii).

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

All structures located within the Area are of historic origin, apart from a brass plaque installed ~15m west of the hut to commemorate HSM No. 16, a plaque on Wind Vane Hill detailing the intended inscription for the memorial cross and a temporary, modern protective enclosure that has been placed around the magnetic hut as a safety precaution because the hut contains friable asbestos. A major feature of the Area is Scott's *Terra Nova* hut (HSM No. 16) located on the northwestern coast of Cape Evans on Home Beach (Map 2). The hut is surrounded by many historic relics including the two anchors from the Aurora, dog and seal skeletons, an instrument shelter, two dog lines, a pony line, meteorological screen, fuel dump, magnetic hut, coal stores, and a flag pole. The experimental rock hut / rubbish dump is an historic rock structure associated with the 'Worst Journey in the World' to Cape Crozier in the winter of 1911 (Cherry-Garrard 1922), which contains a small collection of artefacts. A memorial cross to three members of Shackleton's Ross Sea party of 1914-17 stands on Wind Vane Hill (HSM No. 17). All these features are included within the boundaries of the Area.

A New Zealand refuge hut, camp site and helicopter landing site are situated approximately 250 m to the southwest of the Area.

The former Greenpeace year-round 'World Park Base' was sited to the northeast of Scott's *Terra Nova* hut from 1987 to 1992. No visible evidence of the base remains.

The nearest permanent scientific stations to the Area are McMurdo (US) and Scott Base (NZ), which are located ~24 km south of the Area (Map 1, Inset 2).

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

Nearby protected areas, all located on Ross Island (Map 1, Inset 2), are:

- ASPA No. 121 Cape Royds and ASPA No. 157 Backdoor Bay, Cape Royds, ~11 km north of Cape Evans; and
- ASPA No. 158 Hut Point and ASPA No. 122 Arrival Heights, on Hut Point Peninsula, ~24 km south of Cape Evans.

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. A permit may be issued by a national authority to cover a number of visits in a season. Conditions for issuing a permit for entry to the Area are that:

- The activities are related to conservation, research and/or monitoring purposes, or are for reasons essential to the management of the Area, or are activities related to education, outreach or recreation, including tourism, provided they do not conflict with the objectives of this Management Plan;
- The activities 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 historic values of the Area;
- The permit shall be issued for a finite period; and
- The permit, or a copy, shall be carried by the principal permit holder, or their designated representative, when visiting the Area.

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

Access into the Area shall be on foot or by vehicle. Aircraft landings are prohibited within the Area.

Foot access and movement within the Area

1) Access into the Area should generally be on foot.
2) Specific paths or routes of access have not been defined (Maps 1 and 2).
3) Movement within the Area shall be in accordance with the Code of Conduct in Section 7(iii).
4) Care should be exercised when walking around Scott's *Terra Nova* hut or nearby, as delicate artefacts may be present on the ground, perhaps obscured by a thin snow covering, and may be difficult to see.

Small boat access

1) Access by small boat (when there is open water) should be made to the Cape Evans coastline, and thence access should be made on foot (Maps 1 and 2).

Vehicle access

1) Access by vehicles to the Area is prohibited unless specifically authorised by permit for conservation or management purposes;
2) Where a permit for vehicle access to the Area has been issued, which may include, but is not limited to, activities such as clearing snow and ice that is judged to be a threat to the historic hut or other artefacts, consideration should be given to:
    a) using a vehicle that is the minimum size required for the job;
    b) ensuring the vehicle operator is fully trained and aware of the provisions of this Management Plan and of the site sensitivities; and
    c) careful planning and monitoring of all vehicle movements within the site so as to avoid damage to either the hut or artefacts buried beneath accumulated snow and ice.
3) Vehicles without permits for entry into the Area may approach the Cape Evans coastline at either South Bay or North Bay, where they may be parked on sea ice and should not be taken onto land (Map 1).

Aircraft access and overflight

Taking into account the historic values, aircraft within and near the Area shall operate according to strict observance of the following conditions:

1) Helicopter landings within the Area are prohibited. Helicopter landings result in rotor wash, which can cause damage to the historic features;
2) 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.
3) Helicopters should land outside of the Area at the Primary landing site (77° 38.32' S, 166° 24.45' E) (Map 1), ~50 m south of the New Zealand refuge huts. A Secondary landing site is located at 77° 38.11' S, 166° 25.22' E, ~110 m northeast of Scott's *Terra Nova* hut, and ~30 m beyond the northeastern

boundary of the Area (Maps 1 and 2). The Secondary helicopter landing site should be used to support conservation and management only.

4) Overflight below 2,000 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)).

Limits to the number of people allowed within the Area

Control of the number of people and movement within the Area, both at any given time and cumulatively over time, is necessary to minimise damage and deterioration precipitated by:

a) physical foot traffic of visitors across the vulnerable features of the Area and inside Scott's *Terra Nova* hut in particular; and
b) measurable changes in ambient conditions (i.e. temperature and humidity) inside Scott's *Terra Nova* hut.

- The maximum number in the Area at any time (including guides and those within the hut) shall be: **40 people.**
- The maximum number within the hut at any time (including guides) shall be: **8 people.**
- The annual maximum number of visitors to the Area shall be limited to: **2,000 people.**
- The observed effects of monitored visitor levels suggest that significant adverse impacts could be caused by exceeding the maximums specified above.
- These limits have been set based on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). These limits shall be reconsidered at each management plan review, when the limit may be adjusted based on monitored impacts at the site.
- All educational, outreach and recreational (including tourism) visits shall be supervised by a trained guide nominated by the operator (refer Section 7(x)). Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct in Section 7(iii).

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

- Visits for conservation or management purposes;
- Educational, outreach and/or recreational visits, including tourism; and
- Scientific activity that does not detract from or damage the values of the Area.

Visitors shall adhere to the following Mandatory Code of Conduct for site visits, except where conservation, research, monitoring or management activities specified in the permit require otherwise:

Mandatory Code of Conduct

- Smoking or the use of any naked flames in the Area, and particularly in or around Scott's *Terra Nova* hut, is strictly prohibited, as fire is a major risk;
- Hazardous materials, such as asbestos, chemicals, mould, etc., are present on site. Avoid handling anything within the protected area and huts.
- Thoroughly clean grit, dirt, guano, ice and snow from boots using the brushes provided before entering Scott's *Terra Nova* hut to reduce floor abrasion. Larger groups are recommended to lay the tarpaulin provided outside to keep footwear and personal items clean whilst waiting to enter the building;
- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;
- Do not touch, move or sit on any items or furniture in the huts – handling artefacts causes damage;

- As many areas are cramped and artefacts can be accidentally bumped, do not take bags or wear packs inside, do not use 'selfie' sticks for photos, and avoid tripods or monopods when the maximum number of visitors (8) are in the hut at one time;
- Only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the hut floor;
- When moving around the site, take great care not to tread on any artefacts, which may be difficult to see; and
- Visits should be recorded in the visitor book provided. This allows data on times and numbers of visitors to be correlated with temperature and humidity data automatically logged inside the hut.

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

- Existing structures shall not be altered, and new structures shall not be erected in the Area, or scientific equipment installed, except when authorised by permit for conservation, educational or scientific purposes that do not detract from or damage the values of the Area as specified in Section 1.
- Historic items shall not be removed from the Area, unless specified in a permit issued in accordance with the provisions of Section 7(viii).

7(v) Location of field camps

- Scott's *Terra Nova* hut, or other huts within the Area, shall not be used for living purposes.
- Camping is prohibited within the Area.
- Camping is permitted at the location of the two New Zealand field shelters ~250 m southwest of the Area, which is the preferred camp site (Map 1). An alternative field camp site is located ~30 m north of the Area near the Secondary helicopter landing site near Home Beach (Maps 1 and 2).

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

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

- Deliberate introduction of animals, plant material, micro-organisms or soils into the Area is prohibited;
- Visitors shall take precautions to prevent the accidental introduction of animals, plant material, micro-organisms and soils by ensuring that their equipment brought into the Area is 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;
- Food shall not be consumed within the Area;
- Fuel, food, chemicals, and other materials shall not be introduced or stored within the Area, unless specifically authorised by permit for essential purposes connected with the conservation of the historic structures or the associated relics, 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;
- The introduction of materials for heritage purposes may be introduced and incorporated into the values of the Area, by parties with appropriate heritage conservation expertise that have determined the introduced materials are in line with the aims and objectives of the management plan and the overall plan for conservation work at the site; 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 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 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 of anything not imported by the permit holder

1) Material may be collected and removed from the Area for conservation or scientific reasons consistent with the objectives of this Management Plan only in accordance with a permit issued by an appropriate national authority.
2) Materials that pose a threat to the historic values of the Area, environment or human health may be removed from the Area for disposal in accordance with a permit where they meet one or more of the following criteria:
   i. the artefact presents a threat to the historic values, environment, wildlife or human health and safety;
   ii. it is in such poor condition that it is not reasonably possible to conserve it;
   iii. it does not contribute in any significant way to our understanding of the hut, its occupants, other artefacts, or the history of Antarctica;
   iv. it does not contribute to, or it detracts from, the visual qualities of the site or the hut; and/or
   v. it is not a unique or rare item;

and where such action is:

   vi. undertaken by parties with appropriate heritage conservation expertise; and
   vii. part of an overall plan for conservation work at the site.

3) National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.
4) Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a permit for storage in a controlled environment until such time as they can safely be returned to the Area, which should be the preferred outcome unless there is a high risk that return would be likely to damage or destroy the integrity of the artefact(s).
5) Samples of soil and other natural materials may be removed for scientific purposes only in accordance with a permit issued by an appropriate national authority.

7(ix) Disposal of waste

All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

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

- Information on the requirements of this Management Plan shall be provided to all visitors.
- The Code of Conduct set out in Section 7(iii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational, outreach and recreational visits (including tourism) to the Area shall, prior to commencement of the summer season, nominate people with a working knowledge of both the site and this Management Plan to act as guides during visits and provide training appropriate to ensure they are capable of fulfilling their roles.
- All educational, outreach and recreational visits, including tourism, shall be supervised by a nominated guide, who is responsible for briefing visitors on the Code of Conduct and the requirements of this Management Plan and for ensuring their full compliance. The guide(s) shall actively monitor visitor activity within the Area, and in particular within *Terra Nova* hut, and take corrective actions against any potential or actual breaches of the Management Plan and Code of Conduct.

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 the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). The national authority should also forward a copy of the visit report and confirmation of site visitor numbers to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Any removal of materials in accordance with Section 7(viii) shall be detailed, including the reason for removal and the current location of the items or the date of disposal. Any return of such items to the Area shall also be reported.
- 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 undertaken, and / or of any materials released and not removed, that were not included in the authorised permit.

8. Supporting documentation

Antarctic Heritage Trust 2018. *Antarctic historic huts of the Ross Sea region*. NZ Antarctic Heritage Trust, Christchurch.

Antarctic Treaty Parties. Guidelines for handling of pre-1958 historic remains whose existence or present location is not known. Resolution 5 (2001).

Antarctic Treaty Parties. Guidelines for the designation and protection of Historic Sites and Monuments. Resolution 3 (2009)

Antarctic Treaty Parties. Guidelines for the assessment and management of heritage in Antarctica. Resolution 2 (2018).

Cherry-Garrard, A. 1922. The worst journey in the world: Antarctic 1910-13. Penguin Books, London.

List of boundary coordinates

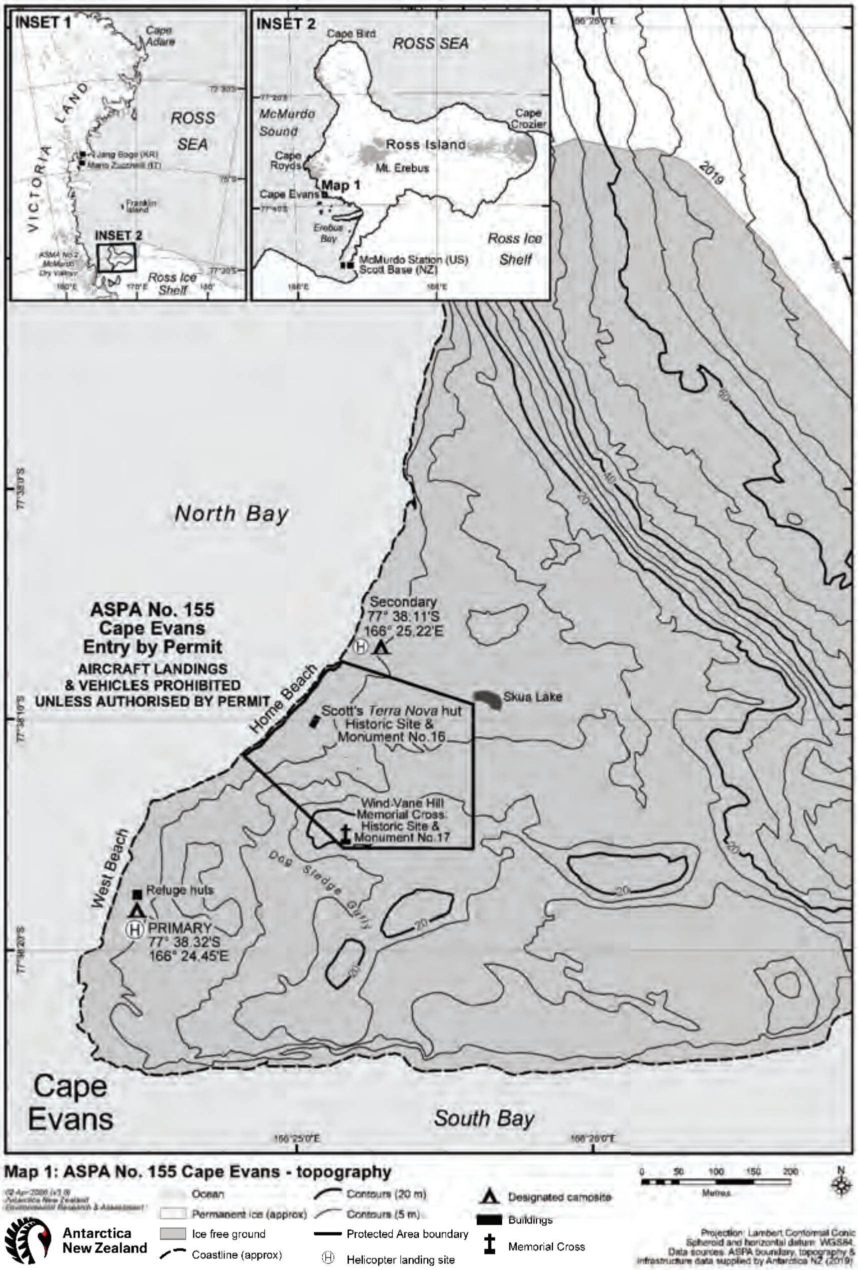
Southwestern corner: 77º 38' 15.47"S, 166º 25' 9.48"E;

Western corner: 77º 38' 11.50" S, 166º 24' 49.47" E;

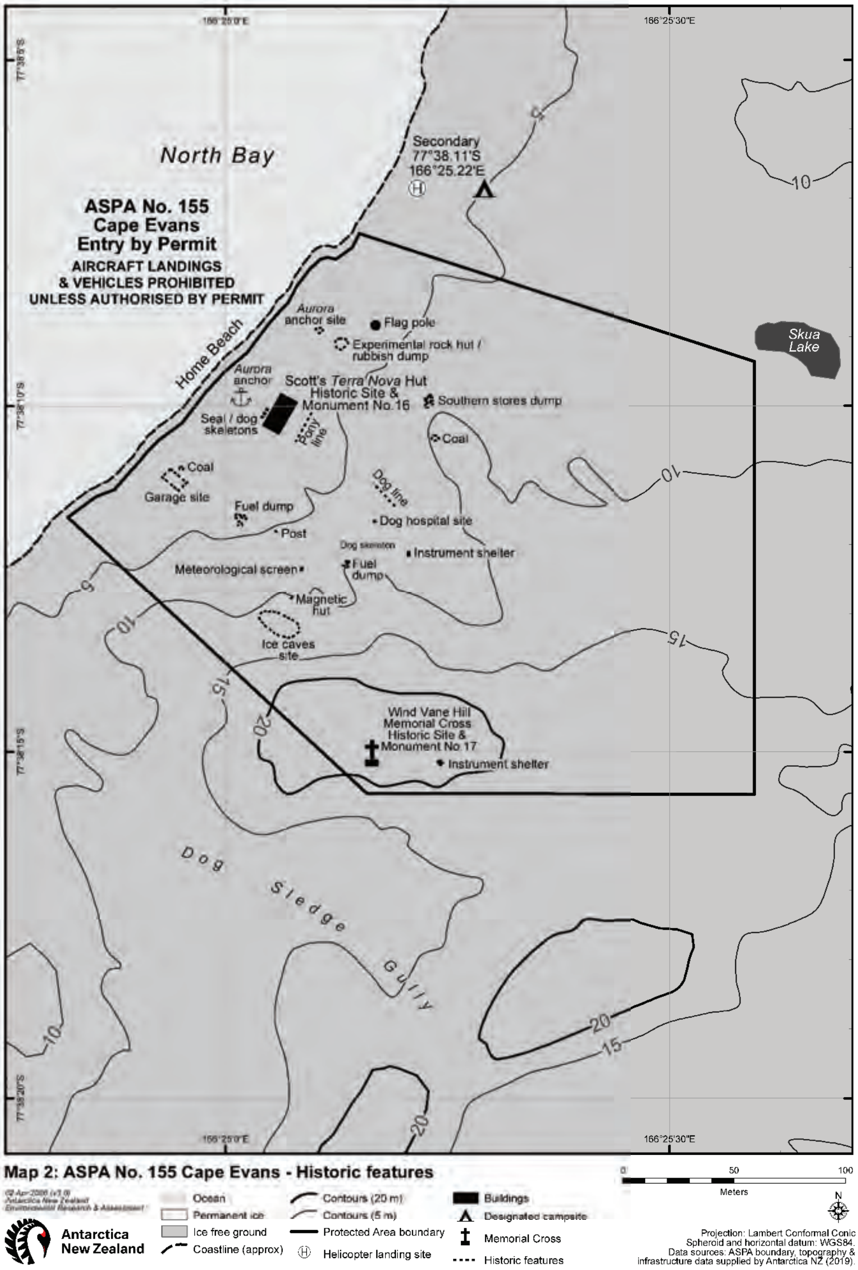
Northwestern corner: 77º 38' 7.5" S, 166º 25' 9.1" E;

Northeastern corner: 77º 38' 9.37" S, 166º 25' 35.74" E;

Southeastern corner: 77º 38' 15.6" S, 166º 25' 35.68" E.



Map 1: ASPA No. 155 Cape Evans - topography



Map 2: ASPA No. 155 Cape Evans - Historic features

Management Plan for

Antarctic Specially Protected Area No. 157

BACKDOOR BAY, CAPE ROYDS, ROSS ISLAND

(including Historic Site and Monument No. 15, the historic Nimrod hut of Sir Ernest Shackleton and its precincts)

Introduction

The Area is located at Backdoor Bay, Cape Royds, Ross Island, and covers an area of ~4 ha centred at 166° 10' 16"E, 77° 33' 11"S. The Area was originally designated for its significant historic values associated with the hut built by the British Antarctic (*Nimrod)* Expedition of 1907-09 led by Sir Ernest Shackleton, which was listed as Historic Site and Monument No. 15 in Recommendation 9 (1972). The Area was designated as Specially Protected Area No. 27 through Measure 1 (1998) and renamed and renumbered as Antarctic Specially Protected Area (ASPA) No. 157 by Decision 1 (2002). Revisions to the Management Plan were adopted through Measure 1 (2002), Measure 2 (2005), Measure 9 (2010), and Measure 12 (2015).

1. Description of values to be protected

The hut (Historic Site and Monument (HSM) No. 15) on which the Area is focussed was built at Cape Royds (Maps 1 and 2) in February 1908 by the British Antarctic (*Nimrod)* Expedition of 1907-09 which was led by Sir Ernest Shackleton. It was also periodically used by the Ross Sea party of Shackleton's Imperial Trans-Antarctic Expedition of 1914-17.

Structures associated with the hut include stables, kennels, a latrine and a garage created for the first motor vehicle in Antarctica. Other significant relics in the Area include an instrument shelter, supply depots, and a rubbish site. Numerous additional artefacts are distributed around the Area.

Cape Royds is one of the principal areas of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, flora and fauna in Antarctica are associated with the *Nimrod* Expedition which was based at this site. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica give this Area significant scientific, aesthetic and historic value.

Cape Royds 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)).

2. Aims and objectives

The aim of the Management Plan is to provide protection for the Area and its features so that its values can be preserved. The objectives of the Management Plan are to:

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:
    a. an annual 'on-site' maintenance programme;
    b. a programme of monitoring the condition of artefacts and structures, and the factors that affect them;

   c. a programme of site, building and artefact conservation which may occur on or off site;
   d. mapping and otherwise recording the disposition of historic items in the hut environs; and
   e. recording other relevant historic data.

- minimise human disturbance to the Area, its features and artefacts whilst allowing for managed access to Shackleton's *Nimrod* Hut and other parts of 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:

- 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 on Ross Island;
- Copies of this management plan shall be made available to the principal permit holder of all groups visiting the Area and/or the leader of any groups operating in the adjacent vicinity at Cape Royds;
- National Antarctic Programmes 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;
- Personnel (national program staff, field expeditions, tourist expedition leaders and pilots) operating in the adjacent vicinity of, accessing or flying over the Area shall be specifically instructed by their national programme, tour operator or appropriate national authority to observe the provisions and contents of the Management Plan, including on the location, boundaries and restrictions applying to access and landings within the Area;
- Markers or signs erected within or near the boundary of the Area or in nearby facilities shall be secured and maintained in good condition, and removed when no longer required;
- A regular programme of conservation work shall be undertaken on Shackleton's *Nimrod* hut and associated artefacts within the Area;
- Systematic monitoring shall be carried out to assess the impacts of visits, and the results and any related management recommendations on limits to the number of visitors allowed over any given period shall be included in reviews of this Management Plan;
- Interested National Antarctic Programmes and relevant interested groups and organisations should consult together and coordinate to ensure:
   a) skills and resources, particularly those related to conservation techniques, are developed and deployed to assist with protection of the historic values of the Area;
   b) the defined limits on visitor numbers are not exceeded; and
   c) the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: ASPA No. 157 Backdoor Bay: overview.

Projection: Lambert Conformal Conic; Standard parallels: 1st 77° 33' 10"S, 2nd 77° 33' 30"S: Central Meridian: 166° 10' 00"E; Latitude of origin: 78° 00' 00"S: Spheroid: WGS84.

Data sources: The base map and contours are derived from an orthophotograph using aerial imagery acquired by USGS/DoSLI (SN7847) 16 November 1993 prepared at 1:2500 with a positional accuracy of ±1.25 m (horizontal) and ±2.5 m (vertical) and an on-ground pixel resolution of 0.4 m. Signposts: UNAVCO (Jan 2014). ASPA boundary: ERA (Jan 2014). Survey markers: LINZ (2011). Viewing areas and AWS (approx.): ERA (Jan 2014). Approximate penguin nesting area digitized from georeferenced aerial image acquired 19

Jan 2005 and supplied by P. Lyver pers. comm. 2014, updated D. Ainley pers. comm. 2019. Contours (interval 10 m) and other infrastructure supplied by Gateway Antarctica (2009).

Inset 1: Ross Sea region, showing location of Inset 2.

Inset 2: Ross Island region, showing location of Map 1, Cape Royds and McMurdo Station (US) and Scott Base (NZ).

Map 2: ASPA No. 157 Backdoor Bay: air access.

Map 3: ASPA No. 157 Backdoor Bay: topography. Map specifications as per Map 1, except the contour interval is 2 m.

6. Description of the Area

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

Overview

Cape Royds is an ice-free area at the western extremity of Ross Island, approximately 40 km to the south of Cape Bird and 35 km to the north of Hut Point Peninsula. The ice-free area is composed of till covered basalt bedrock. The designated Area is located to the northeast of Cape Royds adjacent to Backdoor Bay. It is immediately to the east of ASPA No. 121, an Adélie penguin colony. Shackleton's *Nimrod* Expedition hut lies ~30 m from the western boundary of the Area.

South polar skuas (*Stercorarius maccormicki*) nest in the vicinity of the Area and Adélie penguins (*Pygoscelis adeliae*) from the adjacent colony at Cape Royds often transit the Area.

Boundaries

The eastern and southern boundary consists of the shoreline of the eastern coast of Cape Royds from an unmarked point in Backdoor Bay (77° 33' 07.5"S, 166° 10' 32.6"E) to an unmarked point in Arrival Bay (77° 33' 15.8"S, 166° 10' 06.6"E).

The western boundary follows the boundary of ASPA 121 from the coastline at Arrival Bay (77° 33' 15.8"S, 166° 10' 06.6"E) 18 m northwest to a signpost at the southern end of the penguin viewing area (77° 33´ 15.2" S, 166° 10´ 05.7" E), a further 74 m to a signpost (77° 33' 12.9"S, 166° 10' 01.9"E) on the northern end of the penguin viewing area and a further 42 m to a signpost (77° 33' 11.8"S, 166° 09' 59.0"E) east of Pony Lake.

The boundary then extends northwest from the signpost east of Pony Lake (77° 33' 11.8"S, 166° 09' 59.0"E) along a gully leading to an unmarked point (77° 33' 07.5" S, 166° 10' 12.9" E) adjacent to the New Zealand refuge hut.

The northern boundary extends due east from the New Zealand shelter (from the unmarked point at 77° 33' 07.5" S) to the coastline of Backdoor Bay (77° 33' 07.5"S, 166° 10' 32.6"E).

Human activities

A regular and multi-year programme of conservation has been carried out on Shackleton's *Nimrod* hut by New Zealand since the 1950s. The New Zealand based non-governmental organisation Antarctic Heritage Trust has undertaken conservation of Shackleton's *Nimrod* hut and associated artefacts for over 30 years in coordination with National Antarctic Programmes operating in the region.

National programme personnel from nearby McMurdo Station (US) and Scott Base (NZ) and tourist groups regularly visit Shackleton's *Nimrod* hut and the nearby vicinity. Numbers of visitors may fluctuate depending on a range of factors, including sea ice and weather conditions, available logistics, and the number of tour operators in any given year.

6(ii) Access to the Area

The Area may be accessed by first travelling to locations adjacent to but outside of the boundaries by either helicopter, vehicle, small boat, or on foot. All access into and within the Area is on foot. Particular routes have been designated for access to the Area. The specific conditions for access by pedestrians, vehicles, small boats, and aircraft are set out in Section 7(ii).

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

A major feature of the Area is Shackleton's *Nimrod* Expedition hut located in a sheltered basin near the western boundary at 77° 33' 10.68"S, 166° 10' 6.37"E. The hut is surrounded by many other historic relics including an instrument shelter, supply depots, and a dump site. Numerous additional artefacts are distributed around the site. All structures within the Area are of historic origin, apart from a plaque erected to commemorate HSM No.15, which is located ~35 m east of Shackleton's *Nimrod* hut at 77° 33' 10.87"S, 166° 10' 12.54"E.

A New Zealand refuge hut and camp site are located near the northwest boundary corner of the Area and lie outside of the Area (Map 3).

The nearest permanent scientific stations to the Area are McMurdo (US) and Scott Base (NZ), which are located ~35 km south of the Area (Map 1, Inset 2).

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

Nearby protected areas, all located on Ross Island (Map 1, Inset 2), are:

- ASPA No. 121 Cape Royds, immediately adjacent to the Area and designated to protect the penguin colony.
- ASPA No. 155 Cape Evans, 11 km south of Cape Royds.
- ASPA No. 158 Hut Point and ASPA No. 122 Arrival Heights, which lie on Hut Point Peninsula, ~35 km south of Cape Royds.

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. A permit may be issued by a national authority to cover a number of visits in a season. Conditions for issuing a permit for entry to the Area are that:

- The activities are related to conservation, research and/or monitoring purposes, or are for reasons essential to the management of the Area, or are activities related to education, outreach or recreation, including tourism, provided they do not conflict with the objectives of this Management Plan;
- The activities 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 historic values of the Area;
- The permit shall be issued for a finite period; and
- The permit, or a copy, shall be carried by the principal permit holder, or their designated representative, when visiting the Area.

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

Access into the Area shall be on foot. Vehicles and aircraft landings are prohibited within the Area.

Foot access and movement within the Area

1) Pedestrian access into the Area should proceed from the north of the Area, and follow the established path or route from the designated helicopter landing sites, or from the designated small boat landing site in Backdoor Bay (Maps 1 and 3). The path or route proceeds from this elevated location past the shelter hut (NZ) and preferred campsite, ~100 m down a shallow valley parallel to the western boundary of the Area, to the access point northeast of Pony Lake, approximately 30 m northwest from Shackleton's *Nimrod* hut.
2) Movement within the Area shall be in accordance with the Code of Conduct in Section 7(iii).
3) Access to Shackleton's *Nimrod* hut should be made from the front of the building. Care should be exercised when walking around the hut or nearby, as delicate artefacts may be present on the ground, perhaps obscured by a thin snow covering, and may be difficult to see.
4) Pedestrians may follow the designated path extending southward past Shackleton's *Nimrod* Hut to the designated penguin viewing area lying on the boundary with ASPA No. 121 (Map 3).
5) Alternative pedestrian access to / from Backdoor Bay may be made following the designated path extending over the southern slopes of the low hill to the southeast and above Shackleton's *Nimrod* hut (Map 3), approaching near Derrick Point and to the coast at Backdoor Bay ~100 m south of the designated small boat landing site.
6) Alternative pedestrian access to / from the northwest of the Area should conditions dictate that small boat landings are made to the McMurdo Sound coastline north ASPA No. 121 (Map 1). The Area should be accessed using the designated path extending from the penguin viewing area situated to the north of ASPA No. 121 (Map 3).

Small boat and vehicle access

1) Access by small boat (when there is open water), or vehicle (when safe sea ice conditions exist), may be made to the coastline in Backdoor Bay at 77° 33.106' S, 166° 10.59' E, which lies outside of the Area, and thence access shall be made on foot following the designated routes (Maps 1 and 3).
2) An alternative small boat landing site is located at 77° 33.14' S 166° 09. 35' E on the western shoreline of Cape Royds, ~100 m north of the northern boundary of ASPA No. 121 Cape Royds.
3) Small boats may be beached or moored in Backdoor Bay or at the alternative landing site on the western shoreline of Cape Royds, and shall not be taken into the marine area of ASPA No. 121 unless authorised by permit (Map 1).
4) On occasions when sea ice conditions dictate that the recommended landing sites cannot be used, access may be made to an alternate access site in Backdoor Bay ~100 m to the south. A designated walking path extends from the location: see item (5) above on pedestrian access to the Area. On the western shore of the Cape Royds coastline, alternate landing sites may be sought further to the north of the recommended site indicated on Map 1.
5) Vehicles shall not be taken onto land and shall be parked on sea ice in Backdoor Bay, except when necessary for essential management purposes. Vehicles shall not be taken into the marine area of ASPA No. 121 even when sea ice is present unless authorised by permit (Map 1).

Aircraft access and overflight

Taking into account the historic values as well as local concentrations of breeding birds, aircraft within and near the Area shall operate according to strict observance of the following conditions (refer Map 2):

1) Helicopter landings within the Area are prohibited. Helicopter landings result in rotor wash, which can cause damage to the historic features.
2) Overflight of the Area by piloted aircraft below 2000 ft (~610 m) Above Ground Level is prohibited, except in accordance with a permit issued by an appropriate national authority.
3) Overflight / landings of all aircraft within ½ nautical mile (~930 m) of ASPA No. 121 are strongly discouraged, except for scientific or management purposes (Map 2).

4) Helicopters should land at the Primary landing site (77° 33.06' S 166° 10.38' E) (Maps 1 - 3) 250 m northeast of Shackleton's *Nimrod* hut, and ~125 m north of the New Zealand refuge hut.
5) A Secondary landing site is located at 77° 33.11'S, 166° 10.24'E, ~100 m SW of the Primary landing site (Maps 2 and 3), which should be avoided when the penguin colony is occupied (01 November through 01 March). Another Secondary landing site, which may be used year-round, is located adjacent to the seasonal field camp (US) ~200 m north of the Primary landing site.
6) 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)).

Limits to the number of people allowed within the Area

Control of the number of people and movement within the Area, both at any given time and cumulatively over time, is necessary to minimise damage and deterioration precipitated by:

a) physical foot traffic of visitors across the vulnerable features of the Area and inside Shackleton's *Nimrod* hut in particular; and
b) measurable changes in ambient conditions (i.e. temperature and humidity) inside Shackleton's *Nimrod* hut.

- The maximum number in the Area at any time (including guides and those within the hut) shall be: **40 people.**
- The maximum number within the hut at any time (including guides) shall be: **8 people.**
- The annual maximum number of visitors shall be: **2,000 people.**
- The observed effects of monitored visitor levels suggest that significant adverse impacts could be caused by exceeding the maximums specified above.
- These limits have been set based on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). These limits shall be reconsidered at each management plan review, when the limit may be adjusted based on the monitored impacts at the site.
- All educational, outreach and recreational (including tourism) visits shall be supervised by a trained guide nominated by the operator (refer Section 7(x)). Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct in Section 7(iii).

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

- Visits for conservation or management purposes;
- Educational, outreach and/or recreational visits, including tourism; and
- Scientific activity that does not detract from or damage the values of the Area.

Visitors shall adhere to the following Mandatory Code of Conduct for site visits, except where conservation, research, monitoring or management activities specified in the permit require otherwise:

Mandatory Code of Conduct

- Smoking or the use of any naked flames in the Area, and particularly in or around Shackleton's *Nimrod* hut, is strictly prohibited, as fire is a major risk;
- Hazardous materials, such as asbestos, chemicals, mould, etc., are present on site. Avoid handling anything within the protected area and huts.
- Thoroughly clean grit, dirt, guano, ice and snow from boots using the brushes provided before entering Shackleton's *Nimrod* hut to reduce floor abrasion. Larger groups are recommended to lay the tarpaulin provided outside to keep footwear and personal items clean whilst waiting to enter the building;

- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;
- Do not touch, move or sit on any items or furniture in the huts – handling artefacts causes damage;
- As many areas are cramped and artefacts can be accidentally bumped, do not take bags or wear packs inside, do not use 'selfie' sticks for photos, and avoid tripods or monopods when the maximum number of visitors (8) are in the hut at one time;
- Only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the hut floor;
- When moving around the site, take great care not to tread on any artefacts, which may be difficult to see;
- Use the preferred walking routes; and
- Visits should be recorded in the visitor book provided. This allows data on times and numbers of visitors to be correlated with temperature and humidity data automatically logged inside the hut.

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

- Existing structures shall not be altered, and new structures shall not be erected in the Area, or scientific equipment installed, except when authorised by permit for conservation, educational or scientific purposes that do not detract from or damage the values of the Area as specified in Section 1.
- Historic items shall not be removed from the Area, unless specified in a permit issued in accordance with the provisions of Section 7(viii).

7(v) Location of field camps

- Shackleton's *Nimrod* hut shall not be used for living purposes.
- Camping is prohibited within the Area.
- Camping is permitted at the location of the New Zealand shelter hut at the northwestern boundary of the Area (Map 3).
- A seasonal field camp (US) used in support of science is located ~300 m north of the Area.
- Camping is also allowed at other sites in the vicinity in accordance with national procedures provided these are outside of 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, the following are restrictions on materials and organisms that may be brought into the area:

- Deliberate introduction of animals, plant material, micro-organisms or soils into the Area is prohibited;
- Visitors shall take precautions to prevent the accidental introduction of animals, plant material, micro-organisms and soils by ensuring that their equipment brought into the Area is 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;.
- Food shall not be consumed within the Area;
- Fuel, food, chemicals, and other materials shall not be introduced or stored within the Area, unless specifically authorised by permit for essential purposes connected with the conservation of the historic structures or the associated artefacts, 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;
- The introduction of materials for heritage purposes may be introduced and incorporated into the values of the Area, by parties with appropriate heritage conservation expertise that have determined the

introduced materials are in line with the aims and objectives of the management plan and the overall plan for conservation work at the site; 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 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 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 of anything not imported by the permit holder

1) Material may be collected and removed from the Area for conservation or scientific reasons consistent with the objectives of this Management Plan only in accordance with a permit issued by an appropriate national authority.
2) Materials that pose a threat to the historic values of the Area, environment or human health may be removed from the Area for disposal, in accordance with a permit, where they meet one or more of the following criteria:
    i. the artefact presents a threat to the historic values, environment, wildlife or human health and safety;
    ii. it is in such poor condition that it is not reasonably possible to conserve it;
    iii. it does not contribute in any significant way to our understanding of the hut, its occupants, other artefacts, or the history of Antarctica;
    iv. it does not contribute to, or it detracts from, the visual qualities of the site or the hut;
    v. it is not a unique or rare item;

and where such action is:

    vi. undertaken by parties with appropriate heritage conservation expertise; and
    vii. part of an overall plan for conservation work at the site.

3) National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.
4) Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a permit for storage in a controlled environment until such time as they can safely be returned to the Area, which should be the preferred outcome unless there is a high risk that return would be likely to damage or destroy the integrity of the artefact(s).
5) Samples of soil and other natural materials may be removed for scientific purposes only in accordance with permit issued by an appropriate national authority.

7(ix) Disposal of waste

All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

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

- Information on the requirements of this Management Plan shall be provided to all visitors.
- The Code of Conduct set out in Section 7(iii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational, outreach and recreational visits (including tourism) to the Area shall, prior to commencement of the summer season, nominate people with a working knowledge of both the

site and this Management Plan to act as guides during visits and provide training appropriate to ensure they are capable of fulfilling their roles.

- All educational, outreach and recreational visits, including tourism, shall be supervised by a nominated guide, who is responsible for briefing visitors on the Code of Conduct and the requirements of this Management Plan and for ensuring their full compliance. The guide(s) shall actively monitor visitor activity within the Area, and in particular within Shackleton's *Nimrod* hut, and take corrective actions against any potential or actual breaches of the Management Plan and Code of Conduct.

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 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.
- Any removal of materials in accordance with Section 7(viii) shall be detailed in the report, including the reason for removal and the current location of the items or the date of disposal. Any return of such items to the site shall also be reported to the appropriate national authority.
- 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 undertaken, and / or of any materials released and not removed, that were not included in the authorised permit.

8. Supporting documentation

Antarctic Heritage Trust 2003. *Conservation Report: Shackleton's Hut British Antarctic Expedition 1907-1909*. NZ Antarctic Heritage Trust, Christchurch.

Antarctic Heritage Trust 2018. *Antarctic historic huts of the Ross Sea region*. NZ Antarctic Heritage Trust, Christchurch.

Antarctic Treaty Parties. Guidelines for handling of pre-1958 historic remains whose existence or present location is not known. Resolution 5 (2001).

Antarctic Treaty Parties. Guidelines for the designation and protection of Historic Sites and Monuments. Resolution 3 (2009).

Antarctic Treaty Parties. Guidelines for the assessment and management of heritage in Antarctica. Resolution 2 (2018).

List of boundary coordinates

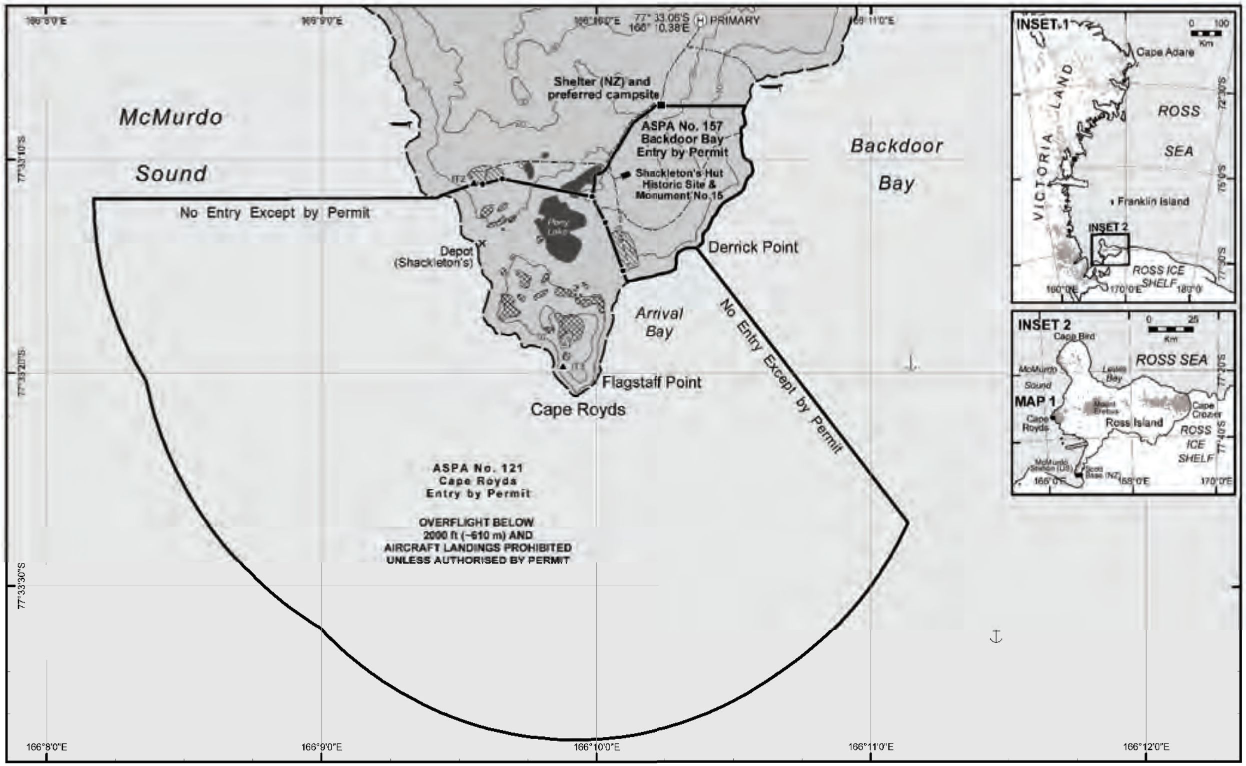
Southwestern corner (Arrival Bay): 77 º 33' 15.8"S, 166 º 10' 06.6"E;

Western corner (Pony Lake): 77 º 33' 11.8"S, 166 º 09' 59.0"E;

Northwestern corner (shelter (NZ)): 77° 33' 07.5" S, 166° 10' 12.9" E;

Northeastern corner (Backdoor Bay): 77 º 33' 07.5"S, 166 º 10' 32.6"E;

Southeastern corner (Derrick Point): 77º 33' 14.1" S, 166º 10' 22" E.



Map 1: ASPA No. 157 Backdoor Bay - overview

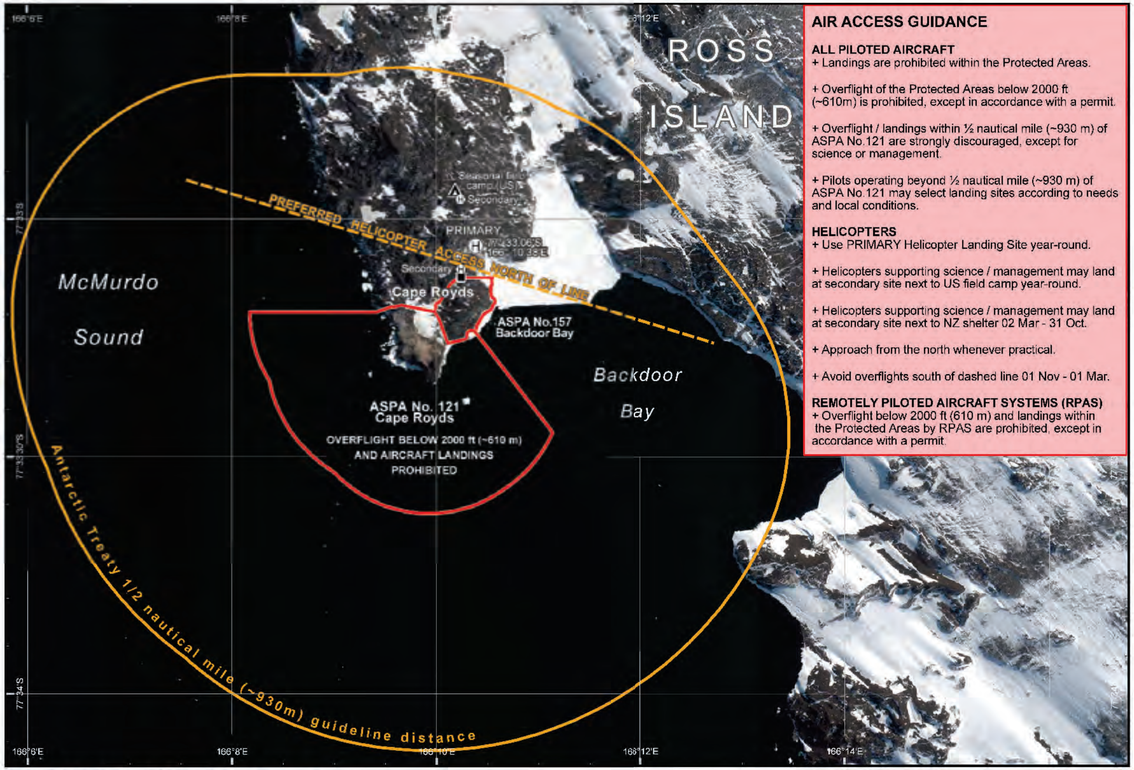
24 Mar 2020 (v3.0)
Antarctica New Zealand
Environmental Research & Assessment

Antarctica New Zealand

Ocean
Permanent ice
Ice free ground
ASPA boundary
Coastline (approx)
Contour (10 m)
Lake / pond
Path
Penguin nesting area 2019 (approx.)
Penguin viewing area
Building
Survey marker
Signpost / boundary point
Helicopter landing site
Preferred small boat landing site
Ship anchorage

0 50 100 150 200 250
Metres

Projection: Lambert Conic Conformal, Spheroid and horizontal datum: WGS84. Data sources: ASPA boundary: ERA (Jan 2014); Signposts: UNAVCO (Jan 2014); Topography & infrastructure data supplied by Antarctica NZ (2019); Penguins: aerial image (Landcare Research 2005) digitised by ERA, updated 2019 Ainley pers. comm.



Map 2: ASPA No. 157 Backdoor Bay - air access

14 Feb 2020 (v4.0)
Antarctica New Zealand / US Antarctic Program
Environmental Research & Assessment

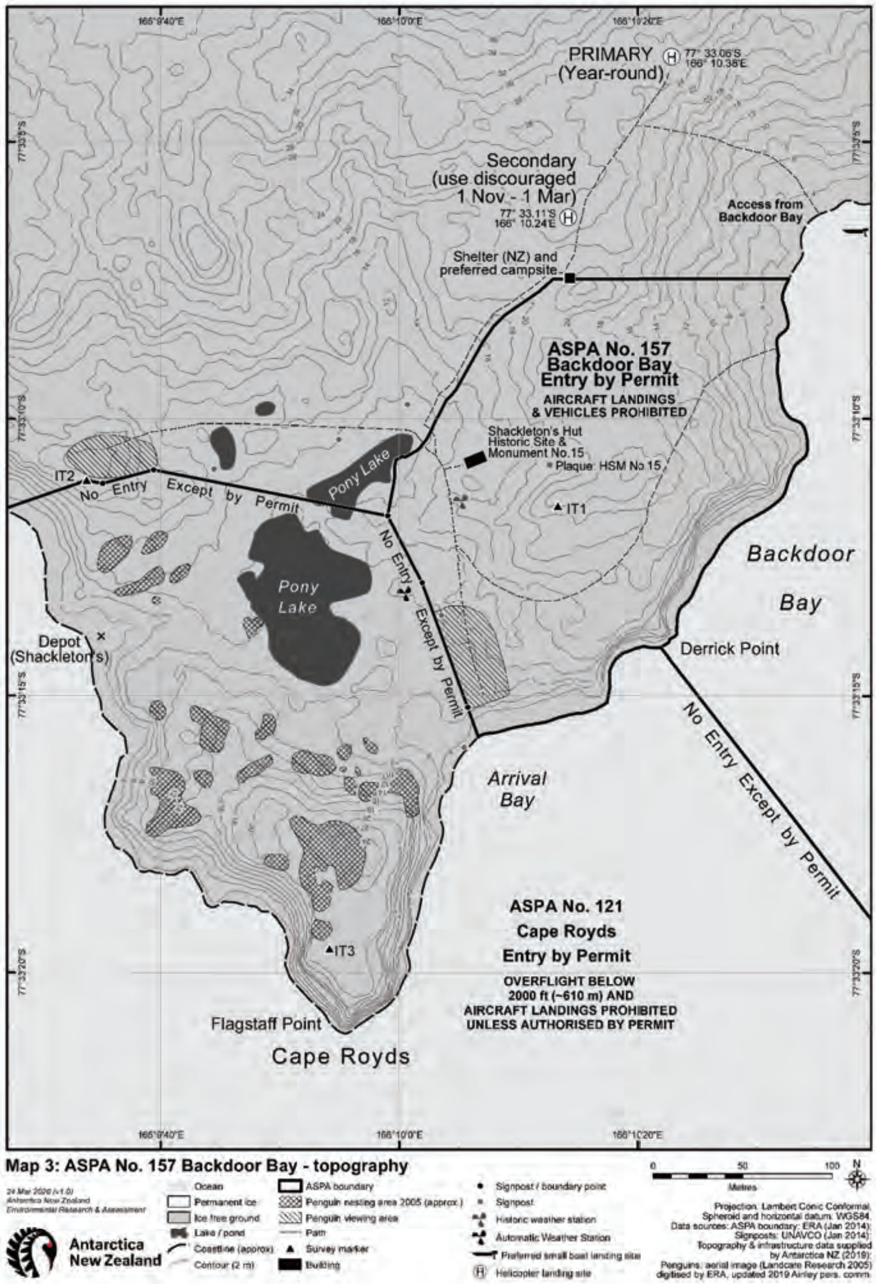
Antarctica New Zealand

- Antarctic Specially Protected Area (ASPA) boundary
- Recommended Aircraft Separation Distance
- Shelter (NZ)
- Primary HLS
- Secondary HLS
- Seasonal camp (US)

Nautical Miles 0 0.5 1
Kilometers 0 0.5 1

N

Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84.
Data sources: ASPA boundaries: ERA (2020);


PRIMARY
(Year-round)
77° 33.06'S
166° 10.38'E
Secondary
(use discouraged
1 Nov - 1 Mar)
77° 33.11'S
166° 10.24'E
Access from
Backdoor Bay
Shelter (NZ) and
preferred campsite
ASPA No. 157
Backdoor Bay
Entry by Permit
AIRCRAFT LANDINGS
& VEHICLES PROHIBITED
Shackleton's Hut
Historic Site &
Monument No.15
Plaque: HSM No 15
IT1
IT2
No Entry Except by Permit
Pony Lake
Pony
Lake
No Entry Except by Permit
Backdoor
Bay
Depot
(Shackleton's)
Derrick Point
No Entry Except by Permit
Arrival
Bay
ASPA No. 121
Cape Royds
Entry by Permit
OVERFLIGHT BELOW
2000 ft (~610 m) AND
AIRCRAFT LANDINGS PROHIBITED
UNLESS AUTHORISED BY PERMIT
IT3
Flagstaff Point
Cape Royds
166°9'40"E
166°10'0"E
166°10'20"E
77°33'5"S
77°33'10"S
77°33'15"S
77°33'20"S
Map 3: ASPA No. 157 Backdoor Bay - topography
Ocean
Permanent ice
Ice free ground
Lake / pond
Coastline (approx)
Contour (2 m)
ASPA boundary
Penguin nesting area 2005 (approx.)
Penguin viewing area
Path
Survey marker
Building
Signpost / boundary point
Signpost
Historic weather station
Automatic Weather Station
Preferred small boat landing site
Helicopter landing site
0
50
100
Metres
N
Antarctica
New Zealand
Projection: Lambert Conic Conformal
Spheroid and horizontal datum: WGS84
Data sources: ASPA boundary: ERA (Jan 2014)
Signposts: UNAVCO (Jan 2014)
Topography & infrastructure data supplied
by Antarctica NZ (2019)
Penguins: aerial image (Landcare Research 2005)
digitised by ERA, updated 2019 Ainley pers. comm.

Management Plan for

Antarctic Specially Protected Area No. 158

HUT POINT, ROSS ISLAND

(including Historic Site and Monument No. 18, the historic Discovery hut of Captain Robert Falcon Scott)

Introduction

The Area is situated approximately ~500 m west of McMurdo Station (US) at the southern extremity of Hut Point, Hut Point Peninsula, Ross Island. The Area was originally designated for the significant historic values of the hut built by the British National Antarctic (*Discovery)* Expedition of 1901-04 led by Captain Robert Falcon Scott, which was listed as Historic Site and Monument (HSM) No. 18 in Recommendation VII-9 (1972). The Area comprises the *Discovery* hut structure and associated artefacts located at 77° 50' 44.7"S, 166° 38' 30.3"E. The Area was designated as Specially Protected Area No. 28 through Measure 1 (1998) and renamed and renumbered as Antarctic Specially Protected Area (ASPA) No. 158 by Decision 1 (2002). Revisions to the Management Plan were adopted through Measure 2 (2005), Measure 10 (2010), and Measure 13 (2015).

1. Description of values to be protected

The hut was built in February 1902 by the British National Antarctic (*Discovery)* Expedition of 1901-04, led by Captain Robert Falcon Scott, and has come to be known as '*Discovery* hut' (Map 1). The British Antarctic (*Terra Nova)* Expedition 1910-13, also led by Captain Scott, later used it as a valuable advance staging point for journeys on the 'Barrier' (the Ross Ice Shelf). The hut was also used by Sir Ernest Shackleton during the 1907-09 British Antarctic (*Nimrod)* Expedition and later by his stranded Ross Sea party during the Imperial Trans-Antarctic Expedition of 1914-17. The building was prefabricated in Australia to an 'outback' design with verandas on three sides. Any artefacts on the verandas are included within the protected area.

The Hut Point site is one of the principal sites of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, and flora and fauna in Antarctica are associated with the *Discovery* Expedition based at this site. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica give this Area significant scientific, aesthetic and historic value.

Hut Point 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)).

2. Aims and objectives

The aim of the Management Plan is to provide protection for the Area and its features so that its values can be preserved. The objectives of the Management Plan are to:

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:

a) an annual ‘on-site’ maintenance programme;
b) a programme of monitoring the condition of artefacts and structures, and the factors that affect them;
c) a programme of site, building and artefact conservation which may occur on or off site;
d) mapping and otherwise recording the disposition of historic items in the hut environs; and
e) recording other relevant historic data.

- minimise human disturbance to the Area, its features and artefacts whilst allowing for managed access to *Discovery* hut; 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 on Ross Island;
- Copies of this management plan shall be made available to the principal permit holder of all groups visiting the Area;
- National Antarctic Programmes 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;
- National Antarctic Programmes operating in close proximity to the Area shall take steps to educate station and programme personnel about the site values and the need to observe the special protection that applies;
- Personnel (national program staff, field expeditions, tourist expedition leaders) accessing the Area shall be specifically instructed by their national programme, tour operator or appropriate national authority to observe the provisions and contents of the Management Plan, including on the location, boundaries and restrictions applying to access to the Area;
- Signs marking the location of the Area with clear statements of entry restrictions should, as appropriate, be installed near to the Area and at nearby facilities to raise awareness of the site’s protected status;
- Markers or signs erected near the Area or in nearby facilities should be secured and maintained in good condition, and removed when no longer required;
- A regular programme of conservation work shall be undertaken on *Discovery* hut and associated artefacts within the Area;
- Systematic monitoring shall be carried out to assess the impacts of visits and the results, and any related management recommendations on limits to the number of visitors allowed at any given time or in any given season, shall be included in reviews of this Management Plan;
- Interested National Antarctic Programmes and relevant groups and organisations should consult together and coordinate to ensure:
    a) skills and resources, particularly those related to conservation techniques, are developed and deployed to assist with protection of the historic values of the Area;
    b) the defined limits on visitor numbers are not exceeded; and
    c) the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: ASPA No.158, *Discovery* Hut, Hut Point, Ross Island..

Main map – location of Hut Point at the southern extremity of Hut Point Peninsula, McMurdo Station (US) and Scott Base (NZ), HSM No. 20 Scott’s Cross on Observation Hill, and nearby protected areas.

Projection: Lambert Conformal Conic; Standard parallels: 1st 77° 45' S, 2nd 77° 56' S: Central Meridian: 166° 45' E; Latitude of origin: 78° 00' S: Spheroid: WGS84; Horizontal datum: McMurdo Sound Geodetic Control Network.

Data sources: The base map and contours are derived from a digital orthophotograph using aerial imagery acquired by USGS/DoSLI Nov 1993 prepared at 1:2500 and 1:10,000 scales with a positional accuracy of ~ ±1 m (horizontal) and ~ ±2 m (vertical), and an on-ground pixel resolution of 0.25 m and 1.0 m respectively. Buildings: RPSC survey (Feb 2009). Other features derived from USAP (Feb 2009) and ERA (Nov 2009) field surveys. Approximate permanent ice extent digitised from Quickbird orthophoto image acquired 15 Oct 2005 (Imagery ©2005 Digital Globe). Contour interval: Main map – 20 m; Inset 3 – 2 m.

Inset 1: Ross Island in the Ross Sea.

Inset 2: McMurdo Station (US) and Scott Base (NZ) on Ross Island.

Inset 3: *Discovery* Hut (HSM No. 18) at the southern extremity of Hut Point and location of HSM No. 19 Vince’s Cross.

6. Description of the Area

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

Overview

Hut Point is a small ice-free area protruding south west from Hut Point Peninsula and situated ~500 m to the west of McMurdo Station (US). The designated Area consists solely of the structure of *Discovery* hut (and its associated on-site artefacts) (77° 50' 44.7" S, 166° 38' 30.3" E) which is situated near the southwestern extremity of Hut Point.

Boundaries

The boundary of the Area is the curtilage (i.e. footprint) of the building, including the verandas.

Human activities

A regular and multi-year programme of conservation has been carried out on *Discovery* hut by New Zealand since the 1950s. The New Zealand based non-governmental organisation Antarctic Heritage Trust has undertaken conservation of *Discovery* hut and associated artefacts for over 30 years in coordination with national Antarctic programmes operating in the region.

National programme personnel from nearby McMurdo Station (US) and Scott Base (NZ) and tourist groups regularly visit *Discovery* hut and the nearby vicinity. Numbers of visitors may fluctuate depending on a range of factors, including sea ice and weather conditions, available logistics, and the number of tour operators in any given year.

6(ii) Access to the Area

Access to Hut Point may be made on foot, by vehicle or by small boat. Access to the Area is usually made on the road from McMurdo Station (Map 1). The road terminates approximately 50 m northeast of *Discovery* hut, where large concrete blocks have been placed to prevent vehicle access beyond that point. *Discovery* hut may only be accessed on foot, or by suitable access provision for disabled persons as may be necessary. The specific conditions for access by pedestrians, vehicles, small boats, and aircraft are set out in Section 7(ii) below.

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

The designated Area consists solely of the structure of the historic *Discovery* hut and its associated on-site artefacts (HSM No. 18). HSM No. 19, a cross erected in February 1904 by the British National Antarctic Expedition of 1901-04, in memory of George T. Vince (a member of the expedition who died in the vicinity) is situated approximately 75 metres west of the hut. HSM No. 20, a cross erected in January 1913 by the British Antarctic Expedition of 1910-13, in memory of Captain Robert F. Scott's party which perished on the return journey from the South Pole in March 1912, is located on Observation Hill approximately 1.4 km southeast of the Area (Map 1).

Temporary support facilities are occasionally installed near *Discovery* hut to facilitate conservation work.

The nearest permanent scientific stations to the Area are McMurdo (US) and Scott Base (NZ), which are located ~500 m and ~3 km east of the Area respectively (Map 1).

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

- ASPA No. 122 Arrival Heights lies 1.4 km north of Hut Point on Hut Point Peninsula (Map 1).
- ASPA No. 121 Cape Royds and ASPA No. 157 Backdoor Bay, Cape Royds, are located ~34 km north of Hut Point (Map 1, Inset 2).
- ASPA No. 155 Cape Evans, is ~24 km to the north of Hut Point (Map 1, Inset 2).

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. A permit may be issued by a national authority to cover a number of visits in a season. Conditions for issuing a permit for entry to the Area are that:

- The activities are related to conservation, research and/or monitoring purposes, or for reasons essential to the management of the Area, or are activities related to educational, outreach or recreational activities, including tourism, provided they do not conflict with the objectives of this Management Plan;
- The activities 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 historic values of the Area;
- The permit shall be issued for a finite period; and
- The permit, or a copy, shall be carried by the principal permit holder, or their designated representative, when visiting the Area.

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

Access to Hut Point shall be on foot, by vehicle or by small boat. There are no particular routes designated for access to Hut Point, although access is usually along the road from McMurdo Station (US) (Map 1, Inset 3). Access to Hut Point during vessel resupply operations in Winter Quarters Bay shall be coordinated with McMurdo Station management.

Foot access and movement within the Area

1) *Discovery* hut shall only be accessed on foot, or by suitable access provision for disabled persons as may be necessary (Map 1, Inset 3).
2) Movement within *Discovery* hut shall be in accordance with the Code of Conduct in Section 7(iii).

Vehicle access

1) Vehicles approaching the Area by road from McMurdo Station (US) or Scott Base (NZ) shall not proceed beyond the large concrete blocks placed at the terminus of the road ~50 m northeast of *Discovery* hut, unless authorised by permit for essential maintenance, conservation or management purposes of the Area or HSM No. 19 (Map 1, Inset 3).

Small boat access

1) Access by small boat (when there is open water) may be made to McMurdo Station, Winter Quarters Bay, or to the coastline in McMurdo Sound ~100 m northwest of the Area at approximately 77° 50' 42"S, 166° 38' 23"E (Map 1, Inset 3).

Aircraft access and overflight

Aircraft shall operate within the Area according to strict observance of the following conditions:

1) Helicopter landings within 100 m of the Area are prohibited. Helicopter landings result in rotor wash, which can cause damage to *Discovery* hut;
2) Helicopter overflight of the Area should be avoided to the maximum extent practicable;
3) Overflight below 2,000 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 near or over the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

Limits to the number of people allowed within the Area

Control of the number of people and movement within the Area, both at any given time and cumulatively over time, is necessary to minimise damage and deterioration precipitated by:

a) physical foot traffic of visitors across the vulnerable features of the Area and from crowding inside *Discovery* hut in particular; and
b) measurable changes in ambient conditions (i.e. temperature and humidity) inside *Discovery* hut.

- The maximum number within the hut at any time (including guides) shall be: **8 people**.
- The annual maximum number of visitors shall be: **2,000 people**.
- The observed effects of monitored visitor levels suggest that significant adverse impacts could be caused by exceeding the maximums specified above.
- These limits have been set based on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). These limits shall be reconsidered at each management plan review, when the limit may be adjusted based on monitored impacts at the site.
- All educational, outreach and/or recreational visits, including tourism, must be supervised by a trained guide nominated by the operator (refer Section 7(x)). Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct in Section 7(iii).

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

- Visits for conservation or management purposes;
- Educational, outreach and/or recreational visits, including tourism;
- Scientific activity that does not detract from or damage the values of the Area.

Visitors shall adhere to the following Mandatory Code of Conduct for site visits, except where conservation, research, monitoring or management activities specified in the permit require otherwise:

Mandatory Code of Conduct

- Smoking or the use of any naked flames in the Area, and particularly in or around *Discovery* hut, is strictly prohibited, as fire is a major risk;
- Hazardous materials, such as asbestos, chemicals, mould, etc., are present on site. Avoid handling anything within the protected area and huts.
- Thoroughly clean grit, dirt, guano, ice and snow from boots using the brushes provided before entering *Discovery* hut to reduce floor abrasion. Larger groups are recommended to lay the tarpaulin provided outside to keep footwear and personal items clean whilst waiting to enter the building;
- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;
- Do not touch, move or sit on any items or furniture in the huts – handling artefacts causes damage;
- As many areas are cramped and artefacts can be accidentally bumped, do not take bags or wear packs inside, do not use ‘selfie’ sticks for photos, and avoid tripods or monopods when the maximum number of visitors (8) are in the hut at one time;
- Only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the hut floor;
- When moving around the site, take great care not to tread on any artefacts, which may be difficult to see; and
- Visits should be recorded in the visitor book provided. This allows data on times and numbers of visitors to be correlated with temperature and humidity data automatically logged inside the hut.

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

- The existing structure shall not be altered, or scientific equipment installed, except when authorised by permit for conservation, educational or scientific purposes that do not detract from or damage the values of the Area as specified in Section 1.
- Historic items shall not be removed from the Area, unless specified in a permit issued in accordance with the provisions of Section 7(viii).

7(v) Location of field camps

- *Discovery* hut shall not be used for living purposes.

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, the following are restrictions on materials and organisms that may be brought into the Area:

- Deliberate introduction of animals, plant material, micro-organisms or soils into the Area is prohibited;
- Visitors shall take precautions to prevent the accidental introduction of animals, plant material, micro-organisms and soils by ensuring that their equipment brought into the Area is clean. To the maximum extent practicable, footwear and other equipment used or brought into the area (including carry-bags for equipment) shall be thoroughly cleaned before entering the Area;
- Food shall not be consumed within the Area;
- Fuel, food, chemicals, and other materials shall not be introduced or stored within the Area, unless specifically authorised by permit for essential purposes connected with the conservation of the historic structures or the associated relics, 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;
- The introduction of materials for heritage purposes may be introduced and incorporated into the values of the Area, by parties with appropriate heritage conservation expertise that have determined the introduced materials are in line with the aims and objectives of the management plan and the overall plan for conservation work at the site; 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 or harmful interference with, native flora and fauna

There are no native flora or fauna within the designated Area.

7(viii) Collection of anything not imported by the permit holder

1) Material may be collected and removed from the Area for conservation or scientific reasons consistent with the objectives of this Management Plan only in accordance with a permit issued by an appropriate national authority.
2) Materials that pose a threat to the historic values of the Area, environment or human health may be removed from the Area for disposal in accordance with a Permit where they meet one or more of the following criteria:
   i. the artefact presents a threat to the historic values, environment, wildlife or human health and safety;
   ii. it is in such poor condition that it is not reasonably possible to conserve it;
   iii. it does not contribute in any significant way to our understanding of the hut, its occupants, other artefacts, or the history of Antarctica;
   iv. it does not contribute to, or it detracts from, the visual qualities of the site or the hut; and/or
   v. it is not a unique or rare item;

and where such action is:

   vi. undertaken by parties with appropriate heritage conservation expertise; and
   vii. part of an overall plan for conservation work at the site.

3) National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.
4) Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a Permit for storage in a controlled environment until such time as they can safely be returned to the Area, which should be the preferred outcome unless there is a high risk that return would be likely to damage or destroy the integrity of the artefact(s).

7(ix) Disposal of waste

All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

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

- Information on the requirements of this Management Plan shall be provided to all visitors.
- The Code of Conduct set out in Section 7(iii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational, outreach and recreational visits (including tourism) to the Area shall, prior to commencement of the summer season, nominate people with a working knowledge of both the site and this Management Plan to act as guides during visits and provide training appropriate to ensure they are capable of fulfilling their roles.

- All educational, outreach and recreational visits, including tourism, shall be supervised by a nominated guide, who is responsible for briefing visitors on the Code of Conduct and the requirements of this Management Plan and for ensuring their full compliance. The guide(s) shall actively monitor visitor activity within the Area, and in particular within *Discovery* hut, and take corrective actions against any potential or actual breaches of the Management Plan and Code of Conduct.

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 the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). The national authority should also forward a copy of the visit report and confirmation of site visitor numbers to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Any removal of materials in accordance with Section 7(viii) shall be detailed in the report, including the reason for removal and the current location of the items or the date of disposal. Any return of such items to the site shall also be reported to the appropriate national authority.
- 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 undertaken, and / or of any materials released and not removed, that were not included in the authorised permit.

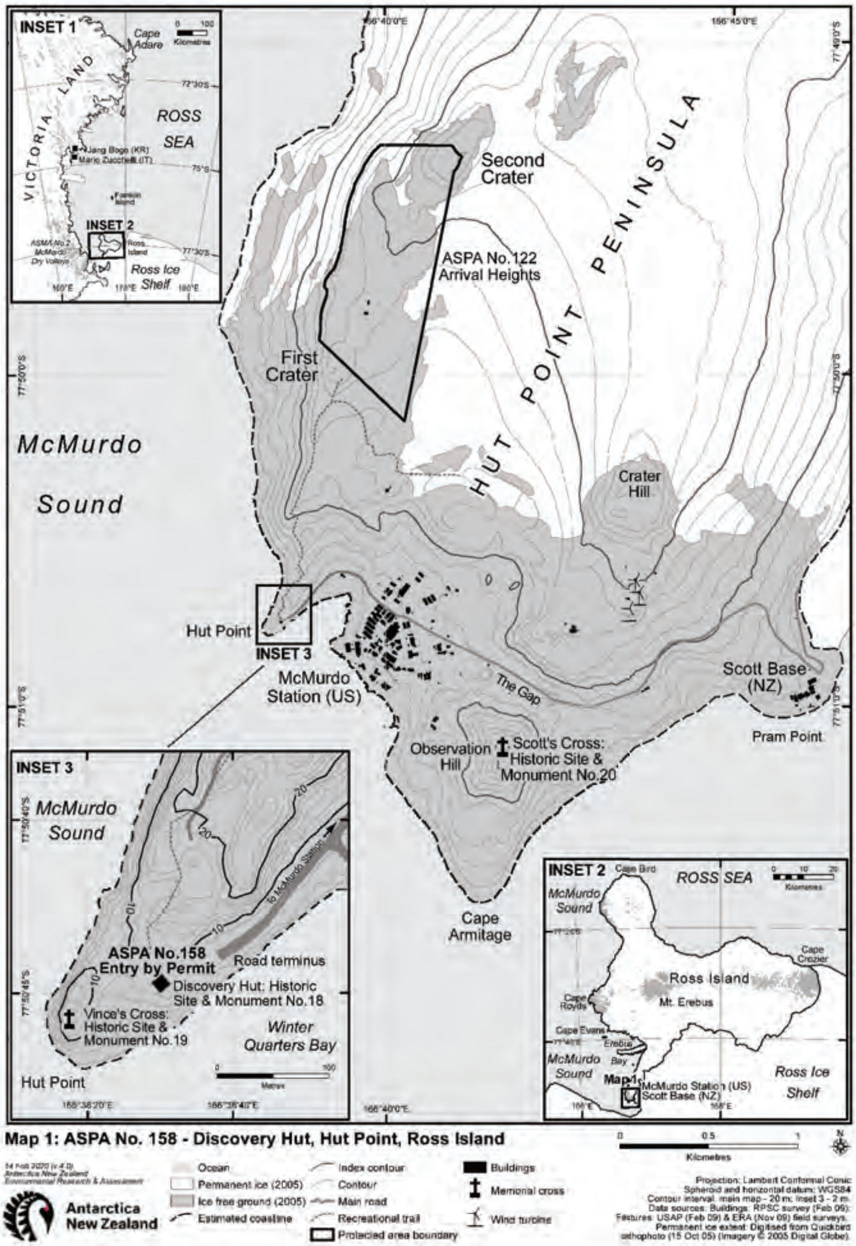
8. Supporting documentation

Antarctic Heritage Trust 2018. *Antarctic historic huts of the Ross Sea region*. NZ Antarctic Heritage Trust, Christchurch.

Antarctic Treaty Parties. Guidelines for handling of pre-1958 historic remains whose existence or present location is not known. Resolution 5 (2001).

Antarctic Treaty Parties. Guidelines for the designation and protection of Historic Sites and Monuments. Resolution 3 (2009).

Antarctic Treaty Parties. Guidelines for the assessment and management of heritage in Antarctica. Resolution 2 (2018).



Map 1: ASPA No. 158 - Discovery Hut, Hut Point, Ross Island

Management Plan for

Antarctic Specially Protected Area No. 159

CAPE ADARE, BORCHGREVINK COAST

(including Historic Site and Monument No. 22, the historic huts of Carsten Borchgrevink and Scott's Northern Party and their precincts)

Introduction

The Area, comprising an area of ~2.4 ha, is located at 71° 18' 26.2" S, 170° 11' 28.3" E on the northwestern coast of Cape Adare, at the northern extremity of the Adare Peninsula, Victoria Land, on the Borchgrevink Coast, Ross Sea. The Area was originally designated for the significant historic values of the huts built by the British Antarctic (*Southern Cross*) Expedition of 1898-1900 led by Carsten E. Borchgrevink, listed as Historic Site and Monument (HSM) No. 22, which was designated in Recommendation VII-9 (1972). The remains of a hut built by Scott's Northern Party on the British Antarctic (*Terra Nova*) Expedition of 1910-13 is close by. The Area was designated as Specially Protected Area No. 29 through Measure 1 (1998) and renamed and renumbered as Antarctic Specially Protected Area (ASPA) No. 159 by Decision 1 (2002). Revisions to the Management Plan were adopted through Measure 2 (2005), Measure 11 (2010), and Measure 14 (2015).

1. Description of values to be protected

There are three main structures in the Area (Map 1, Inset 3). Two huts were built in February 1899 during the British Antarctic (*Southern Cross)* Expedition led by Carsten E. Borchgrevink (1898-1900). One hut served as a living hut and the other as a store. They were used for the first winter spent on the Antarctic continent. The collapsing remains of a third hut built in February 1911 for the Northern party led by Victor L.A. Campbell of Robert Falcon Scott's British Antarctic (*Terra Nova)* Expedition (1910-13), is situated 20 meters to the north of Borchgrevink's living hut. The Northern party wintered in this hut in 1911.

In addition to these features there are numerous other historic relics located in the Area. These include stores depots, a latrine structure, two anchors from the ship *Southern Cross*, an ice anchor from the ship *Terra Nova*, and supplies of coal briquettes. Other historic items within the Area are buried in guano. Collectively, the three huts and associated historic relics are listed as HSM No. 22. The grave of a member of the British Antarctic (*Southern Cross)* Expedition is located ~1.5 km northeast of the Area and is listed as HSM No. 23.

Cape Adare is one of the principal sites of early human activity in Antarctica as it includes the first building erected on the continent. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, and flora and fauna in Antarctica are associated with the two earliest expeditions based at this site. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica give this Area significant historic, scientific, and aesthetic value.

Cape Adare is situated in Environment U – North Victoria Land geologic based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and in Region 8 – North Victoria Land based on the Antarctic Conservation Biogeographic Regions (Resolution 6 (2012)).

2. Aims and objectives

The aim of the Management Plan is to provide protection for the Area and its features so that its values can be preserved. The objectives of the Management Plan are to:

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:
    a. 'on-site' maintenance;
    b. monitoring the condition of artefacts and structures, and the factors that affect them;
    c. conservation of the site, buildings, and artefacts which may occur on or off site;
    d. mapping and otherwise recording the disposition of historic items in the hut environs; and
    e. recording other relevant historic data.
- minimise human disturbance to the Area, its features and artefacts whilst allowing for managed access to Borchgrevink's hut and other parts of 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:

- Copies of this management plan shall be made available to the principal permit holder of all groups visiting the Area and/or the leader of any groups operating in the adjacent vicinity at Cape Adare;
- National Antarctic Programmes 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;
- Personnel (national programme staff, field expeditions, tourist expedition leaders and pilots) operating in the adjacent vicinity of, accessing or flying over the Area shall be specifically instructed by their national programme, tour operator or appropriate national authority to observe the provisions and contents of the Management Plan, including on the location, boundaries and restrictions applying to access and landings within the Area;
- Markers or signs erected within or near the boundary of the Area or in nearby facilities shall be secured and maintained in good condition, and removed when no longer required;
- A programme of conservation work shall be undertaken on the historic huts and associated structures and artefacts within the Area;
- Systematic monitoring shall be carried out to assess the impacts of visits and the results and any related management recommendations, including on limits to the number of visitors allowed at any one time or in any given season, shall be included in reviews of this Management Plan.
- Interested National Antarctic Programmes and relevant groups and organisations should consult together and coordinate to ensure:
    a. skills and resources, particularly those related to conservation techniques, are developed and deployed to assist with protection of the historic values of the Area;
    b. the defined limits on visitor numbers are not exceeded; and
    c. the above management activities are implemented.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Map 1: ASPA No. 159 Cape Adare – regional overview. Inset: Ross Sea region.

Projection: Lambert Conformal Conic; Standard parallels: 1st 71°20' S, 2nd 71°30'S: Central Meridian: 170°20' E; Latitude of origin: 72°S: Spheroid and horizontal datum: WGS84. Contour interval 200 m. Data source: SCAR Antarctic Digital Database v7.1 (2019).

Map 2: ASPA No. 159 Cape Adare - topography and historic features.

Inset: HSM No. 22, showing the main historic features within the Area.

Projection: Lambert Conformal Conic; Standard parallels: 1st 71°17' S, 2nd 71°19'S: Central Meridian: 170°12' E; Latitude of origin: 72°S: Spheroid: WGS84. Main map contour interval 100 feet (15 foot contour shown on Ridley Beach) – contours spatially adjusted to approximate position in imagery.

Data sources: Coastline, ponds and streams digitised from WorldView-2 imagery (© Digital Globe 05 Dec 2019). Inset orthophotograph prepared by Korean Polar Research Institute (J. H. Kim pers. comm. Mar 2020). Historic features identified by L. Meek, Antarctic Heritage Trust (NZ) (pers. comm. Mar 2020).

6. Description of the Area

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

Overview

Cape Adare is a prominent, mostly ice-free, volcanic headland located at the northern extremity of the Adare Peninsula, Victoria Land, on the Borchgrevink Coast, Ross Sea (Map 1, Insets 1 and 2). The headland rises to an elevation of over 350 m (~1150 feet) (Map 1). Robertson Bay lies to the west of the Adare Peninsula. The Area is located ~1.7 km southwest of Cape Adare on the southern shore of Ridley Beach, which is a large, flat, depositional shingle feature of roughly triangular shape occupying an area of ~ 100 ha. From the western extremity of Ridley Beach, South Beach extends ~1.5 km southeast towards Boulder Rock, while North Beach extends around the same distance northeast towards Cape Adare.

The whole of Ridley Beach and the lower western slopes of the Cape Adare promontory are occupied by the largest Adélie penguin (*Pygoscelis adeliae*) colony in Antarctica. The breeding population numbered 504,332 pairs in 2018 (F. Shanhun pers. comm. 2020). The colony has been identified as Antarctic Important Bird Area No. 165 (Harris et al. 2015). The penguins occupy most of the Area and access to the historic huts is often constrained by the need to avoid disturbance to breeding birds.

Approximately 300 pairs of South polar skuas (*Stercorarius maccormicki*) nest on Ridley Beach and on the Adare Peninsula (Harris et al. 2015), and Weddell seals (*Leptonychotes weddellii*) also haul out along the shoreline of Ridley Beach. Southern giant (*Macronectes giganteus*), Snow (*Pagodroma nivea*), Wilson's storm (*Oceanites oceanicus*) and Antarctic (*Thalassoica antarctica*) petrels, Emperor (*Aptenodytes forsteri*) and King (*A. patagonicus*) penguins, and Leopard (*Hydrurga leptonyx*), Elephant (*Mirounga leonina*) and Antarctic fur (*Arctocephalus gazella*) seals may also occasionally be seen.

Boundaries

The boundaries of the Area, described in a clockwise direction from the northwest corner are:

- North: a line extending ~110 m along the line of latitude 71° 18' 23"S from the northwest corner of the Area at 71° 18' 23" S, 170° 11' 23" E to the northeast corner at 71° 18' 23" S, 170° 11' 34" E. The northern boundary lies ~115 metres north of Scott's Northern Party hut;
- East: a line extending ~250 m along the line of longitude 170° 11' 34" E from the northeast corner of the Area to the southeast corner at 71° 18' 31" S, 170° 11' 34" E. The eastern boundary lies ~50 metres east of Borchgrevink's stores hut;

- South: a line extending ~124 m from the southeast corner of the Area to the southwest corner at 71° 18' 29" S 170° 11' 23" E, following the mean high-water coastline along South Beach.
- West: a line extending ~190 m along the line of longitude 170° 11' 23" E from the southwest corner of the Area to the northwest corner. The western boundary lies ~55 metres west of Borchgrevink's living hut.

Human activities

Due to challenging access conditions at the site, to date limited conservation has been carried out on the historic features at Cape Adare by New Zealand. The New Zealand based non-governmental organisation Antarctic Heritage Trust has a planned programme of more substantive conservation of Borchgrevink's and Scott's huts and associated artefacts partly underway and planned for full implementation in coordination with National Antarctic Programmes operating in the region.

Tourist groups regularly visit the historic site and the nearby vicinity. Numbers of visitors may fluctuate depending on a range of factors, including sea ice and weather conditions, available logistics, and the number of tour operators in any given year.

6(ii) Access to the Area

The Area may be accessed by first travelling to locations adjacent to but outside of the boundaries by either aircraft, small boat, or on foot. Aircraft access to sea ice in Robertson Bay may be possible, although conditions vary and it may be difficult to get close to the Area without causing disturbance to penguins and skuas. Access into and within the Area is on foot. Particular routes for access to the Area have not been designated. The specific conditions for access by pedestrians, small boats, vehicles, overflight and aircraft landings are set out in Section 7(ii).

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

The major features of the Area include Borchgrevink's *Southern Cross* Expedition living hut and the unroofed stores hut. Scott's Northern Party hut, which is mostly collapsed, is situated ~20 m northwest of Borchgrevink's living hut. All structures within the Area are of historic origin, apart from a temporary conservation workshop erected in 2018 (see below) and a brass plaque installed ~7 m west of Borchgrevink's stores hut to commemorate HSM No. 22.

Numerous historic artefacts are present within the Area. These include stores depots, a latrine structure, two anchors from the ship *Southern Cross*, an ice anchor from the ship *Terra Nova*, and supplies of coal. Many of these items are either partly or completely covered in guano from Adélie penguins which breed within the Area.

The grave of a member of the British Antarctic (*Southern Cross)* Expedition, the Norwegian biologist Nicolai Hanson, is located ~1.5 km northeast of the Area at an elevation of ~1,000 feet (~300 m) on the Adare Peninsula and is listed as HSM No. 23 (Map 1). Hanson, who died at the age of 28, was the first person to be buried on the Antarctic continent. The grave is located at approximately 71° 18' 04"S, 170° 13' 51"E and is marked by a large boulder with an iron cross, a brass plaque and a white cross marked out in quartz pebbles. Originally, Hanson's name was outlined with the quartz pebbles, although recent photographs indicate this is now less distinct. An old ice axe rests on the surface of the grave. Louis Bernacchi wrote eloquently of the location: "There amidst profound silence and peace, there is nothing to disturb that eternal sleep except the flight of seabirds. In the long dark winter night, the brilliant and mysterious Aurora Polaris sweeps across the sky and forms a glorious arc of light over the Cape and the grave. In the summer the dazzling sunlight shines perpetually upon it" (Bernacchi 1901).

A provisions depot was established beneath a rock overhang at the base of cliffs behind Ridley Beach, following a fire at Borchgrevink's huts on 24 July 1899. The depot was seen by R. Priestly of Scott's Northern Party in 1911, and again by P. Wilson in 1982 and 1990. A search for the depot was made in 2015 but it could not be found, and its exact location is currently unknown (L. Meek, Antarctic Heritage Trust, pers. comm. Mar 2020).

A second depot originating from Scott's Northern Party in 1911 is situated on Adare Peninsula ~100 m northwest of HSM No. 23 Hanson's grave, and was recorded present in 1982 by Harrowfield (1982) and again in 1990 by Harrowfield (L. Meek, pers. comm. 2020).

Temporary facilities in support of conservation work were installed at Cape Adare in 2018 (Map 2 and Inset). These include living and storage facilities on South Beach ~100 m east of the Area, and a workshop installed to support repairs ~10 m west of Borchgrevink's huts. The conservation work is expected to be carried out over several seasons.

Two Automatic Weather Stations (AWS) are installed outside of the Area: one on South Beach and a second on the ridge of Adare Peninsula at an elevation of ~350 m (Map 2).

The nearest permanently operating scientific stations to the Area are Mario Zucchelli (Italy) and Jang Bogo (South Korea), which are located ~330 km south of the Area (Map 1, Inset 1).

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

The nearest protected area is ASPA No. 106 Cape Hallett, which is located at the northern extremity of Hallett Peninsula, ~115 km south of the Area.

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. A permit may be issued by a national authority to cover a number of visits in a season. Conditions for issuing a permit for entry to the Area are that:

- The activities are related to conservation, research and/or monitoring purposes, or for reasons essential to the management of the Area, or are activities related to educational, outreach or recreational activities, including tourism, provided they do not conflict with the objectives of this Management Plan;
- The activities 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 historic values of the Area;
- The permit shall be issued for a finite period; and
- The permit, or a copy, shall be carried by the principal permit holder, or their designated representative, when visiting the Area.

7(ii) Access to and movement within the Area

Access into the Area shall be on foot. Vehicles and aircraft landings are prohibited within the Area. All access to, and movement within, the Area and over Ridley Beach in general should avoid disturbance to birds and mammals.

Foot access and movement within the Area

1) Pedestrian access into the Area is generally made from South Beach (Map 2) although specific paths or routes of access have not been defined, as landing sites may vary according to conditions.
2) Movement within the Area shall be in accordance with the Code of Conduct in Section 7(iii).
3) Care should be exercised when walking within the Area, as delicate artefacts may be present on the ground, perhaps obscured by a thin snow covering, and may be difficult to see.

Small boat access

1) Access by small boat (when there is open water) should be made to the Ridley Beach coastline, and thence access shall be made on foot (Map 2). Landing locations will be influenced by local sea and ice conditions, and specific sites of access have not been defined.

Aircraft access and overflight

Taking into account the historic values as well as local concentrations of breeding birds, aircraft within and near the Area shall operate according to strict observance of the following conditions:

1) Helicopter landings within the Area are prohibited. Helicopter landings result in rotor wash, which can cause damage to the historic features;
2) 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.
3) Aircraft may land outside of the Area on sea ice in Robertson Bay when conditions allow and in the vicinity of Hanson's grave (HSM No. 23) (Map 1). Overflight / landings of all aircraft on or within ½ nautical mile (~930 m) of Ridley Beach are strongly discouraged, except for scientific or management purposes. Helicopter access to Hanson's grave should avoid approach, overflight and landings west and north of the grave and instead approach from the south where possible. Pilots operating near the Area should follow the Guidelines for the Operation of Aircraft near Concentrations of Birds (Resolution 2 (2004)) as a minimum requirement.
4) 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)).

Limits to the number of people allowed within the Area

Control of the number of people and movement within the Area, both at any given time and cumulatively over time, is necessary to minimise damage and deterioration precipitated by:

a) physical foot traffic of visitors across the vulnerable features of the Area and from crowding inside Borchgrevink's huts in particular; and
b) measurable changes in ambient conditions (i.e. temperature and humidity) inside Borchgrevink's hut.

- The maximum number within the Area at any time (including guides and those within the huts) shall be: **40 people.**
- The maximum number within either of Borchgrevink's huts at any time (including guides) shall be: **4 people.**
- The annual maximum number of visitors to the Area shall be limited to: **2,000 people.**
- The observed effects of monitored visitor levels at historic sites in the Ross Sea region suggest that significant adverse impacts could be caused by exceeding the maximums specified above.
- These limits have been set based on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). These limits shall be reconsidered at each management plan review, when the limit may be adjusted based on monitored impacts at the site.
- All educational, outreach and recreational (including tourism) visits shall be supervised by a trained guide nominated by the operator (refer Section 7(x)). Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct in Section 7(iii).

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

- Visits for conservation or management purposes;

- Educational, outreach and/or recreational visits, including tourism;
- Scientific activity that does not detract from or damage the values of the Area.

Visitors shall adhere to the following Mandatory Code of Conduct for site visits, except where conservation, research, monitoring or management activities specified in the permit require otherwise:

Mandatory Code of Conduct

- Smoking or the use of any naked flames in the Area, and particularly in or around Borchgrevink's hut, is strictly prohibited, as fire is a major risk;
- Hazardous materials, such as asbestos, chemicals, mould, etc., are present on site. Avoid handling anything within the protected area and huts.
- Thoroughly clean grit, dirt, guano, ice and snow from boots using the brushes provided before entering Borchgrevink's hut to reduce floor abrasion. Larger groups are recommended to lay the tarpaulin provided outside to keep footwear and personal items clean whilst waiting to enter the building;
- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;
- Do not touch, move or sit on any items or furniture in the huts – handling artefacts causes damage;
- As many areas are cramped and artefacts can be accidentally bumped, do not take bags or wear packs inside, do not use 'selfie' sticks for photos, and avoid tripods or monopods when the maximum number of visitors (4) are in the hut at one time;
- Only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the hut floor;
- When moving around the site, take great care not to tread on any artefacts, which may be difficult to see; and
- Visits should be recorded in the visitor book provided. This allows data on times and numbers of visitors to be correlated with temperature and humidity data automatically logged inside the hut.

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

- Existing structures shall not be altered, and new structures shall not be erected in the Area, or scientific equipment installed, except when authorised by permit for conservation, educational or scientific purposes that do not detract from or damage the values of the Area as specified in Section 1.
- Historic items shall not be removed from the Area, unless specified in a permit issued in accordance with the provisions of Section 7(viii).

7(v) Location of field camps

- Borchgrevink's huts, or other structures in the Area, shall not be used for living purposes.
- Camping is prohibited within the Area.
- A temporary camping area has been established on South Beach ~100 m east of the Area (Map 2), and this should be used when necessary for conservation or research purposes. To minimise the footprint of camps established on Ridley Beach, when necessary and to the extent practical this site should be re-used.

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, the following are restrictions on materials and organisms that may be brought into the area:

- Deliberate introduction of animals, plant material, micro-organisms or soils into the Area is prohibited;
- Visitors shall take precautions to prevent the accidental introduction of animals, plant material, micro-organisms and soils by ensuring that their equipment brought into the Area is 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;

- Food shall not be consumed within the Area;
- Fuel, food, chemicals, and other materials shall not be introduced or stored within the Area, unless specifically authorised by permit for essential purposes connected with the conservation of the historic structures or the associated artefacts, 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;
- The introduction of materials for heritage purposes may be introduced and incorporated into the values of the Area, by parties with appropriate heritage conservation expertise that have determined the introduced materials are in line with the aims and objectives of the management plan and the overall plan for conservation work at the site; 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 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 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 of anything not imported by the permit holder

1) Material may be collected and removed from the Area for conservation or scientific reasons consistent with the objectives of this Management Plan in accordance with a permit issued by an appropriate national authority.
2) Materials that pose a threat to the historic values of the Area, environment or human health may be removed from the Area for disposal, in accordance with a permit, where they meet one or more of the following criteria:
    i. the artefact presents a threat to the historic values, environment, wildlife or human health and safety;
    ii. it is in such poor condition that it is not reasonably possible to conserve it;
    iii. it does not contribute in any significant way to our understanding of the huts, their occupants, other artefacts, or the history of Antarctica;
    iv. it does not contribute to, or it detracts from, the visual qualities of the site or the hut; and/or
    v. it is not a unique or rare item;

and where such action is:

    vi. undertaken by parties with appropriate heritage conservation expertise; and
    vii. part of an overall plan for conservation work at the site.

3) National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.
4) Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a permit for storage in a controlled environment until such time as they can safely be returned to the Area, which should be the preferred outcome unless there is a high risk that return would be likely to damage or destroy the integrity of the artefact(s).
5) Samples of soil and other natural materials may be removed for scientific purposes only in accordance with a permit issued by an appropriate national authority.

7(ix) Disposal of waste

All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

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

- Information on the requirements of this Management Plan shall be provided to all visitors.
- The Code of Conduct set out in Section 7(iii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational, outreach and recreational visits (including tourism) to the Area shall, prior to commencement of the summer season, nominate people with a working knowledge of both the site and this Management Plan to act as guides during visits and provide training appropriate to ensure they are capable of fulfilling their roles.
- All educational, outreach and recreational visits, including tourism, shall be supervised by a nominated guide, who is responsible for briefing visitors on the Code of Conduct and for ensuring their full compliance. The guide(s) shall actively monitor visitor activity within the Area, and in particular within the historic huts, and take corrective actions against any potential or actual breaches of the Management Plan and Code of Conduct.

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 the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2 (2011)). The national authority should also forward a copy of the visit report and confirmation of site visitor numbers to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- Any removal of materials in accordance with Section 7(viii) shall be detailed in the report, including the reason for removal and the current location of the items or the date of disposal. Any return of such items to the site shall also be reported to the appropriate national authority.
- 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 undertaken, and / or of any materials released and not removed, that were not included in the authorised permit.

8. Supporting documentation

Antarctic Heritage Trust 2018. *Antarctic historic huts of the Ross Sea region*. NZ Antarctic Heritage Trust, Christchurch.

Antarctic Treaty Parties. Guidelines for handling of pre-1958 historic remains whose existence or present location is not known. Resolution 5 (2001).

Antarctic Treaty Parties. Guidelines for the designation and protection of Historic Sites and Monuments. Resolution 3 (2009).

Antarctic Treaty Parties. Guidelines for the assessment and management of heritage in Antarctica. Resolution 2 (2018).

Bernacchi, L. 1901. To the South Polar regions: Expedition of 1898-1900. Hurst and Blackett, London.

Harris, C.M., Lorenz, K., Fishpool, L.D.C., Lascelles, B., Cooper, J., Coria, N.R., Croxall, J.P., Emmerson, L.M., Fijn, R.C., Fraser, W.L., Jouventin, P., LaRue, M.A., Le Maho, Y., Lynch, H.J., Naveen, R., Patterson-Fraser, D.L., Peter, H.-U., Poncet, S., Phillips, R.A., Southwell, C.J., van Franeker, J.A., Weimerskirch, H., Wienecke, B. & Woehler, E.J. 2015. Important Bird Areas in Antarctica 2015. BirdLife International and Environmental Research & Assessment Ltd., Cambridge.

Harrowfield, D.L.1982.Report on Canterbury Museum Antarctic Expedition Event K22 Cape Adare. March 1982 report to the Antarctic Division, DSIR, Christchurch.

List of boundary coordinates

Northwestern corner: 71° 18' 30"S 170°11' 33"E.

Northeastern corner: 71° 18' 30"S 170°11' 44"E.

Southwestern corner: 71° 18' 35.5"S 170°11' 33"E.

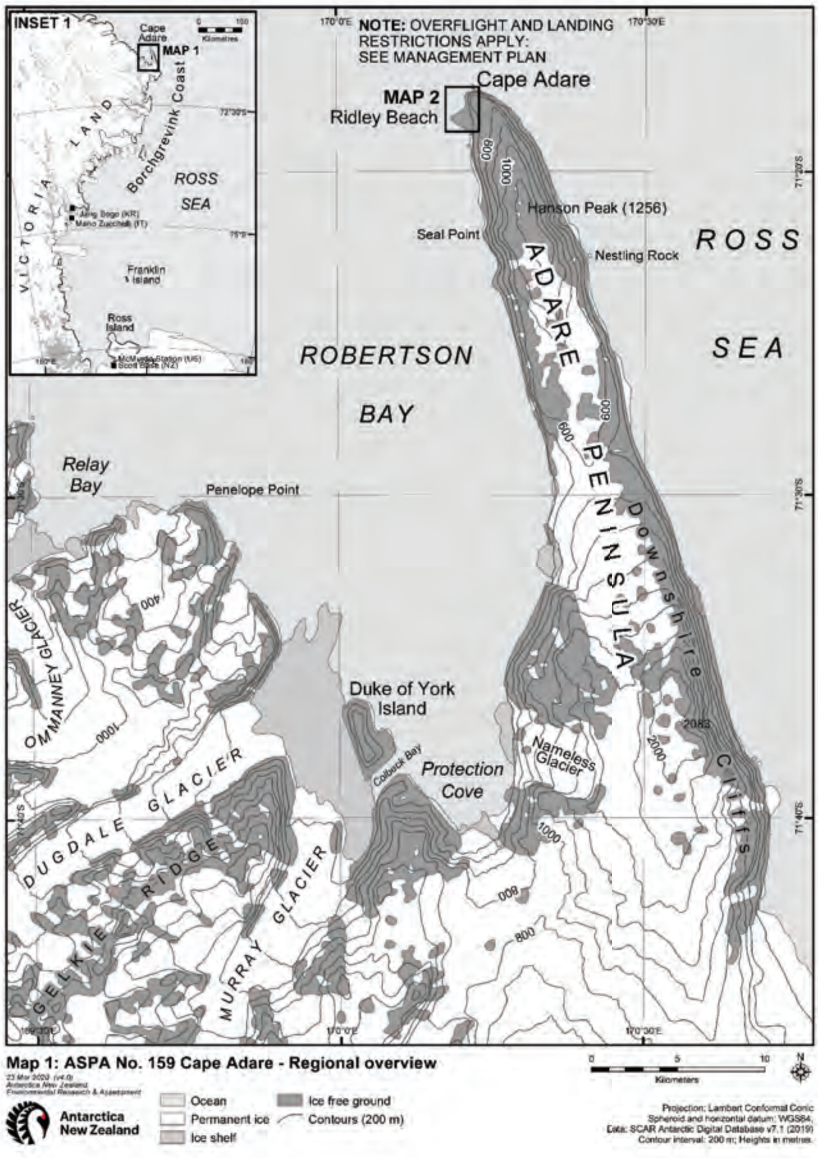
Southeastern corner: 71° 18' 38"S 170°11' 44"E.

Maximum northern extent: 71° 18' 30"S.

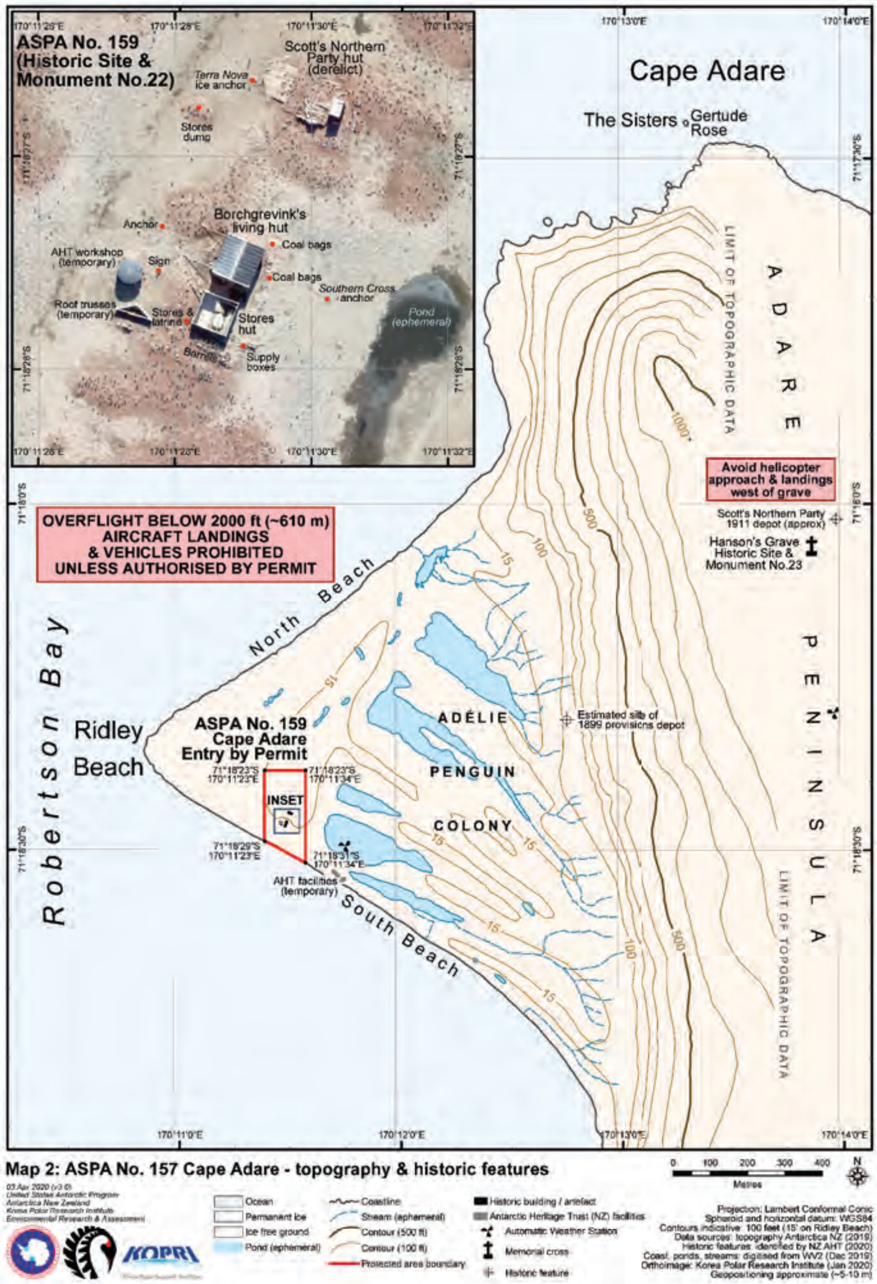
Maximum southern extent: 71° 18' 38"S

Maximum western extent: 170°11' 33"E

Maximum eastern extent: 170°11' 44"E.



Map 1: ASPA No. 159 Cape Adare - Regional overview


ASPA No. 159
(Historic Site & Monument No.22)
Scott's Northern Party hut (derelict)
Terra Nova ice anchor
Stores dump
Anchor
Borchgrevink's living hut
Coal bags
Coal bags
AHT workshop (temporary)
Sign
Southern Cross anchor
Roof trusses (temporary)
Stores & latrine
Stores hut
Pond (ephemeral)
Barrels
Supply boxes
Cape Adare
The Sisters
Gertude Rose
LIMIT OF TOPOGRAPHIC DATA
ADARE PENINSULA
Avoid helicopter approach & landings west of grave
Scott's Northern Party 1911 depot (approx)
Hanson's Grave Historic Site & Monument No.23
OVERFLIGHT BELOW 2000 ft (~610 m) AIRCRAFT LANDINGS & VEHICLES PROHIBITED UNLESS AUTHORISED BY PERMIT
Robertson Bay
North Beach
Ridley Beach
ASPA No. 159 Cape Adare Entry by Permit
ADÉLIE PENGUIN COLONY
Estimated site of 1899 provisions depot
INSET
AHT facilities (temporary)
South Beach
Map 2: ASPA No. 157 Cape Adare - topography & historic features
03 Apr 2020 (v3.0)
United States Antarctic Program
Antarctica New Zealand
Korea Polar Research Institute
Environmental Research & Assessment
Ocean
Permanent ice
Ice free ground
Pond (ephemeral)
Coastline
Stream (ephemeral)
Contour (500 ft)
Contour (100 ft)
Protected area boundary
Historic building / artefact
Antarctic Heritage Trust (NZ) facilities
Automatic Weather Station
Memorial cross
Historic feature
Metres
Projection: Lambert Conformal Conic
Spheroid and horizontal datum: WGS84
Contours indicative: 100 feet (15' on Ridley Beach)
Data sources: topography Antarctica NZ (2019)
Historic features: identified by NZ AHT (2020)
Coast, ponds, streams: digitised from WV2 (Dec 2019)
Orthoimage: Korea Polar Research Institute (Jan 2020)
Geopositioning approximate (~5-10 m)
KOPRI

Management Plan for Antarctic Specially Protected Area (ASPA) No 163: Dakshin Gangotri Glacier, Dronning MaudLand

Introduction

India introduced a Working Paper at XXV ATCM (WP47) on a draft management plan for a proposed site of Special Scientific Interest for Dakshin Gangotri Glacier Snout, Schirmacher Hills, Dronning Maud Land. The Committee noted that this should be termed an ASPA rather than SSSI. Accordingly, during XXVI ATCM India submitted a draft management plan for Antarctica Specially Protected Area (XXVI ATCM/WP-38) and thereafter submitted revised management plandurring XXVII-ATCM (WP 33). The management plan was adopted by Measure 2 (2005) and designated ASPA 163 during XXVIII ATCM (WP 25). This Management Plan was further reviewed after five years with minor changes, while submitted to XXXIII-ATCM (WP055 rev1.) and adopted under Measure 12 (2010). Thereafter Management Plan reviewed after five years and with minor changes submitted to XXXVIII-ATCM (WP 42) and then adopted under Measure 15 (2015).

Dakshin Gangotri glacier has significant value in terms of glacier retreat monitoring. A snout is being monitored since 1983 to understand the effect of climate change on glacier. This area is alsoimportant for study of algae, moss, cynobacteria and lichen which are wide spread in SchirmacherHills and especially within the ASPA site. Cynobacteria contribute significantly to the nitrogen fixation, and many species have been identified so far from this area. Many species of lichens are also indentified in this area according to study conducted since 2003.

1. **Description of values to be protected**

Historic Value

Dakshin Gangotri Glacier is a small tongue of polar continental ice sheet, overriding the Schirmacher Hills in central Dronning Maud Land (CDML). It was identified by the second Indian Antarctic Expedition in 1982-83 and since then its snout is being monitored regularly for fluctuation
w.r.t. retreat/advance.

Scientific Value

With the availability of the vast amount of data for the past two decades, it has become a valuable site for observing the changes in the movement of the Antarctic ice sheet under the impact of globalwarming. The area has primary scientific importance for glaciologists and environmental scientists.Due to The scientific values of the Area and the nature of the research, the area is protected as an Antarctic Specially Protected Area consistent with Articles 2, 3, 5 and 6 of Annex V of the Protocolon Environmental Protection to the Antarctic Treaty; to prevent interference with ongoing planned scientific investigations.

Global positioning system (GPS) campaigns were conducted during the 2003 and 2004 austral summer seasons to obtain insight into the velocity and strain-rate distribution on the margin of the continental ice sheet overriding southern part of Schirmacher Hills in CDML. GPS data were collected for two years at 21 sites and analyzed to estimate the site coordinates baselines and velocities. Horizontal velocities of the glacier sites lie between 1.89±0.01 and 10.88±0.01 m a-1 tothe north-northeast, with an average velocity of 6.21±0.01 m a-1. The principal strain rates providea quantitative measurement of extension rates, which range from (0.11±0.01) &times 10-3 to

(1.48±0.85) × 10-3 a-1, and shortening rates, which range from (0.04±0.02) × 10-3 to (0.96±0.16) × 10-3 a-1 (Sunil et al., 2007).

Environmental Value

At the designated area, exploration showed abundant faunal diversity of the moss-inhabiting terrestrial invertebrate fauna. Schirmacher Hills is also an important area for the algae and cyanobacterial diversity. Terrestrial mosses are quite widespread in the Schirmacher Hills colonizing on a wide range of habitats. The mosses, because of their poikilohydric nature and alternative strategy of adaptation, are one of the plant groups which grow in Antarctica. Mosses play role in habitat modification, nutrient cycling and providing shelter and security to associated invertebrate animals. Studies on mosses in Schirmacher Hills revealed that distribution of mosses issignificant at central part and at designated area as compare to eastern and western part.

Distribution of algae and cyanobacteria and flora of fresh water streams of the Hills at the designated area have been studied. The species reported are *G.magma, Chaemosiphon subglobosus,Oscillatoria limosa, O.limnetica,P. frigidum, P. autumnale, Nostoc commune, N.punctiforme, Calothrix gracilis, C.brevissima, Uronema sp.,and Cosmarium leave*. Among the cyanobacteria encountered in the stream of Schirmacher Hills, N_2 –fixing species might play a significant role in nitrogen economy of the ecosystem through N_2 –fixation. Studies on polar Skuas were also conducted at Schirmacher Hills and their nesting and breeding success have been reported around the designated place.

Further study on the Lichens carried out since 2003-04 within the protected area site, revealed occurance of species such as; *Acarospora geynnii* , C.W.Dodge & E.D.Rudolph, *Acarospora williamsii*, Filson, *Amandinea punctata*,(Hoffm.) Coppins & Scheid, *Buellia frigida*, Darb., *Buellia grimmiae*, Filson, *Candelaria murrayi*, Poelt, *Candelariella flava* , (C.W.Dodge & G.E. Baker), Castello & Nimis, *Carbonea vorticsa*, (Florke) Hertel, *Lecanora expectans* , Darb., *Lecanora fuscobrunnea* , C.W. Dodge & G.E. Baker, *Lecanora geophila* (Th. Fr.) Poelt, *Lecidea andersonii*, Filson, *Lecidea cancriformis* , C.W.Dodge & G.E. Baker, *Lecidella siplei* , (C.W. Dodge & G.E. baker) May., *Lepraria cacuminum* , (A. Massal.) Lohtander, *Physcia caesia* , (Hoffm.) Furnr., *Pseudephebe minuscule* , (Nyl. Ex Arnold) Brodo & D. Hawksw., and *Rhizoplaca melanophtalma*, (Ram.) Luckert & Poelt (Olech et al. 2010).

2. Aims and Objectives

Management of Dakshin Gangotri Glacier is aimed to:

- avoid degradation of values of the Area by preventing undue human interference
- allow glaciological and environmental scientific research, while ensuring protection ofobservational accuracy from any sort of man-made inputs
- ensure that peripheral points along the snout are not adversely affected by human activity in theArea
- maintain the Area as a reference marker for studying the movement patterns of this part of theAntarctic ice-sheet under the influence of global warming
- allow visits for management purposes in support of the aims of the Management Plan for theArea
- minimize the possibility of introduction of alien plants, animals and microbes into the Area

3. Management Activities

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

- A detailed map showing the location and boundaries of the Area and stating the special restrictions that apply would be displayed prominently at Maitri (India) and Novolazarevskaya(Russia) research stations; copies of this management plan will also be made available at both the stations.
- Two signs displaying the location and boundaries of the Area with clear statements of entry restrictions will be placed on prominent rocks near both the entrance points to the valley, theeastern end and the south-eastern end; to help avoid inadvertent entry.
- Copies of this management plan along with location and boundary maps of the Area will beprovided to all the visiting ships/aircraft.
- Markers, signs, cairns and other structures erected within the Area for scientific and management purposes will be secured and maintained in good condition, and will be removedwhen no longer necessary.
- Visits shall be made as necessary (at least once every year) to assess whether the Area continuesto serve the purposes for which it was designated and to ensure that maintenance and management are adequate.
- The management plan shall be reviewed no less than once every five years and updated asrequired.

4. Period of Designation

The ASPA is designated for an indefinite period.

5. Maps and Photographs

The following maps and photographs are enclosed for illustrating the Area and the proposed

plan:Map 1: Location of Schirmacher Hills in central Dronning Maud Land, East Antarctica.

Map2: Map of Schirmacher Hills, showing locations of Maitri Research Station, (India), Novolazarevskaya Research Station (Russia) and boundary of ASPA-163

Map 3: Classification and Numbering of Lakes of Schirmacher Hills. (after Ravindra et al,

2001)Map 4: Topographic map of the Area. (contour interval 10 m)

Map 5: Paths of Fossil Glaciers in Schirmacher Hills. (after Beg et al,

2000)Figure 1: Image showing the markers showing boundary location of

ASPA Figure 2: Aerial view of the Dakshin Gangotri Glacier Snout.

6. Description of the Area

i. Geographical coordinates, Boundary markers and Natural features

Schirmacher Hills is a rocky hill range, about 17 km long in E-W trend (bounded by Eastern longitudes 11° 22' 40" and 11° 54' 20") and about 0.7 km to 3.3 km wide (bounded by Southern latitudes 70° 43' 50" and 70° 46' 40"). Its elevation varies from 0 to 228 m above the msl. It is a partof central Dronning Maud Land in Eastern Antarctica. The proposed area is a fragment of the western part of Schirmacher Hills.

The Area proposed under ASPA is bounded by Eastern longitudes 11° 33' 30" and 11° 36' 30" andby the Southern latitudes 70° 44' 10" and 70° 45' 30". The Area is 4.53 sq. km in aerial extent. Thenortheastern and northwestern corners of the Area are on shelf-ice, while the southwestern extremity is on polar ice-sheet. The southeastern end lies on a rocky outcrop.

Topographically, the Area can be divided into four distinct units- the southern continental ice-sheet,rocky hill slopes, a vast central proglacial lake (Lake-B7, Sbrosovoye Lake) and northern undulatory shelf ice.

The southernmost ice-sheet is bare 'blue ice', descending from 180 m contour to 10 m contour at thesnout of the Glacier. It is crevassed and crisscrossed by NE-SW to NNE-SSW trending fractures.
Two small and ephemeral supraglacial streams flow over the snout in a NNE direction.

The rocky terrain is uneven and has the minimum width of the Schirmacher Hills at the snout point;less than 50 m only. The eastern and western sides of the hills slope towards the snout, making a wide valley. The contours descend from 150 m to msl at the northern margin of the rock outcrops.

The central part of the Area is occupied by Lake B7. It is a lake of glacial origin. The dimensionsof the lake are about 500 m x 300 m.

The northernmost part of the Area comprises shelf ice with pressure ridges, fractures and crevasses. The contact between shelf ice and eastern rocky slopes is marked by a prominent 3-km long, NNE- SSW trending lineament. The fractures in the ice are also aligned parallel to this lineament.

Schirmacher Hills exposes a granulite to amphibolite facies metamorphic terrain. The rock types arerepresented by charnockites, enderbites, garnet-sillimanite, gneisses, garnet-biotite gneisses, quartzofeldspathic augen gneisses with some foliated lamprophyres, amphibolites, dolerite, metagabbro and metabasalt. The rock suites dominantly fall under Grenvillean (1000 Ma) and Pan- African (550 Ma) events. Three phases of deformation are distinct.

The Area comprises mostly charnockite-Khondalite type of rocks (quartz-garnet-sillimanite-perthite±graphite gneisses) with some interlayering of garnet-sillimanite quartzites, calc silicate gneisses and mafic granulites. Two sets of faults (N30E and N50E) are quite prominent. One suchmajor fault runs from the north-eastern corner of the Area; cutting all the three geomorphological units- shelf ice, rocks and continental ice-sheet.

Meteorological data from the nearby Indian Research Station Maitri shows that the Area has a dry polar climate. The extreme temperatures for the warmest and the coldest months range between 7.4to -34.8°C. The mean annual temperature is -10.2°C. December is the warmest month of the year and August is the coldest. The blizzards touch a gale speed of 90 to 95 knots; the mean annual windspeed is 18 knots. The dominant wind direction is E-SE. Snowfall is quite frequent during the winter months, but gale force winds scrub the rocky surfaces clean and snow deposition is widespread on the leeward side of the hillocks.

Glaciological observations from 1983 to 1996 were carried out by surveys from two fixed points(‘G’ and ‘H’) using EDM or theodolite. The results showed that the Glacier is steadily receding every year at an average recession rate of 70 cm per annum.

In 1996, to enhance the accuracy of the observations, 19 peripheral points were marked encircling the snout of the Glacier. The average annual recession in the years 1997 to 2002 was 48.7 cm, 74.9 cm, 69.5 cm, 65.8 cm and 62.7 cm, respectively. This translates into an overall average recession of
65.3 cm per annum for the period 1996-2002; which is in conformity with the observations for

theprevious period (1983 – 1996) of a recession rate of 7 meters per decade.

Further monitoring were carried out and data revealed that average yearly recession for 2003, 2004,2005 and 2006, gradually increased to 68.0, 69.4, 71.3, 72.8 centimeter per annum. However duringthe year 2006-2007, the average retreat of the Dakshin Gangotri polar ice front was only 0.6 m, but the data collected from the western margin of Schirmacher Hills showed an average annual retreat of around 1.4 m during the year 2006-07. The average annual retreat of the Dakshin Gangotri Snoutwas recorded to be about 1m in 2008, whereas the average annual retreat for the western extension of polar ice front was recorded to be about 2m. The maximum recession was observed at

observation-point-14, which recorded a cumulative recession of 17.21 meters in ten years (1996-2006).

Observations carried out after 2008-09 every year till date. Results shows that the annual recession of the snout is computed to be 1.1m, 0.26m, 0.59m, 0.33m, 0.92m, 0.29m and 1.31m, respectively.The recessional values computed from 1996-97 till date shows that the lowest recession has occurred in the year 2009-10 i.e 0.26 meter, whereas highest recession occurred during 2014-15 i.e
1.31 meter.Restricted and Managed Zones within the Area

Along the periphery of the Dakshin Gangotri Glacier, 19 observation points have been marked inFebruary 1996. With reference to these points it was possible to record the movement of the Glacier with an accuracy of 1 cm. Precise monitoring on cm-scale is also available for the years 1996-2002. Access to this zone should be restricted. To protect the accuracy of scientific observations,it is proposed that a 100 m radius all along the periphery of the Glacier should havelimited admittance.

ii. *Structures within and near the Area*

There are no structures present in the Area, apart from two cairns (‘G’ and ‘H’) marking the sitesused for glaciological and topographical surveys.

In future, some signs and cairns will be erected notifying the protected status of the Area.

iii. *Location of other Protected Areas within close proximity of the Area*

In the entire Schirmacher Hills, there are no other protected areas.

7. Permit Conditions

i. *Access to and movement within or over the Area*

Entry into the Area would be prohibited except in accordance with a permit issued by an appropriate National Authority as designated under Annex V, Article 7 of the Protocol onEnvironmental Protection to the Antarctic Treaty.

A permit to enter the Area may only be issued for scientific research, or for essential management purposes consistent with the Management Plan’s objectives and provisions; with the condition that the actions permitted will not jeopardize the scientific and environmental values of the Area and will not interfere with ongoing scientific studies. Access to the area is permitted only by foot, accessto site using land vehicle or helicopter landing is prohibited within the area.

Overflight of bird colonies within the Area by RPAS shall not be permitted unless for scientific oroperational purposes, and in accordance with a permit issued by an appropriate national authority.

ii. *Activities that are or may be conducted within the Area, including restrictions on time* *orplace*

The following activities may be conducted within the Area:

- Scientific research programmes consistent with the management Plan for the Area, including thevalues for which the Area has been designated; which can not be carried out elsewhere and which will not jeopardize the ecosystem of the Area.
- Essential management activities, including monitoring.

iii. Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a permit. Any equipment should not be installed if it is not essential for scientific research or for management activities, andit must be authorized in a permit. All scientific equipment installed in the Area must be clearly identified by country with name of principal investigator, year of installation and expected date of completion of the study. Details are to be included in the visit report. All such equipment should

be made of materials that pose minimum risk of contamination and must be removed immediately after completion of the study. Removal of specific equipment for which the permit has expired shallbe a condition of the permit.

iv. Location of field camps

Camping is not allowed in the Area. The field parties can camp either east of "Lake Kalika" at "VK-Ground" or beyond the western limit of the Area.

v. Restriction on materials and organisms, which can be brought into the Area

- No living animals, plant material or microorganism shall be deliberately introduced into theArea and precautions shall be taken against accidental introductions.
- No pesticides, herbicides, chemicals, radio-isotopes shall be brought into the Area, other thanthose permitted for scientific or management purposes. These authorized agents shall be removed from the Area at the conclusion of the activity.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (CEP 2011), and in theEnvironmental Code of Conduct for terrestrial scientific field research in Antarctica (SCAR 2009).
- Fuel is not to be stored in the Area unless connected with authorized activity. Permanent depotsare not to be built in the Area.
- All material taken into the Area shall be for a stated period only and shall be removed at orbefore the conclusion of that stated period.

vi. Taking or harmful interference with native flora and fauna

Any interference with the native flora and fauna of the Area shall be in accordance with the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, 1991, annex II,Article 3. Where taking or harmful interference with animals is involved, SCAR Code of Conductfor Use of Animals for Scientific Purposes in Antarctica shall be used as a minimum standard.

vii. Collection or removal of anything not brought into the Area by the Permit holder

Material may only be collected or removed from the Area as specified in the permit and shall belimited to the minimum necessary to meet scientific or management requirements.

Material of human origin, not brought into the Area by the permit holder, but which is likely to compromise the values of the Area may be removed from the Area unless the impact of removal islikely to be greater than leaving the material in situ. If this is the case the appropriate authority should be notified.

viii. Disposal of Waste

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

ix. Measures that are necessary to ensure that the aims and objectives of the management plancan continue to be met

- Permits may be granted to enter the Area to carry out biological monitoring and area inspectionactivities.
- Specific sites of long-term monitoring shall be appropriately marked and GPS positions will be obtained for records with the Antarctic Data Directory System through the appropriate NationalAuthority.

x. Requirements for Reports

The principal permit holder would submit to the appropriate National Authority a visit report describing the activities undertaken by those issued permit. Reports are due and shall be submitted as soon as possible after the expiration of the permit, and include the types of information containedin SCAR visit report form or as required by national laws. The Authority will maintain a record of such activities and make this accessible to interested Parties.

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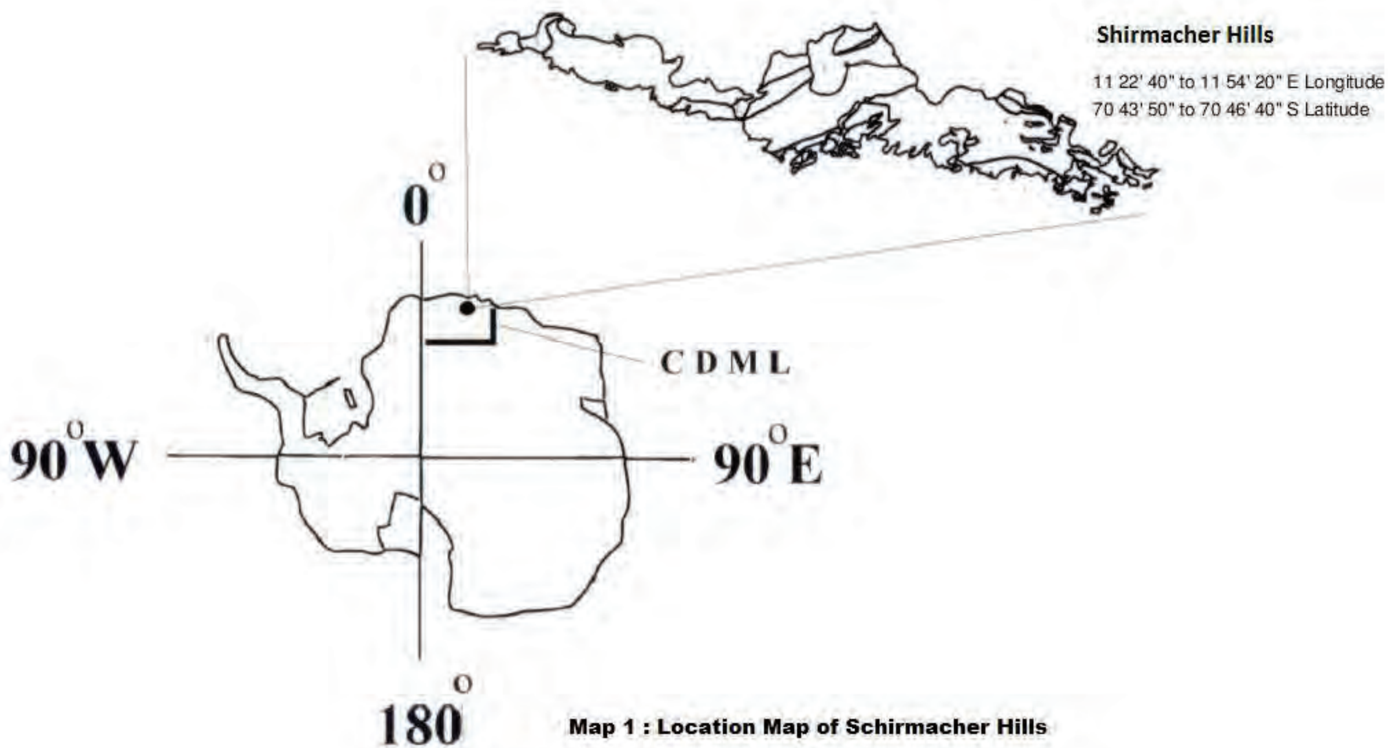
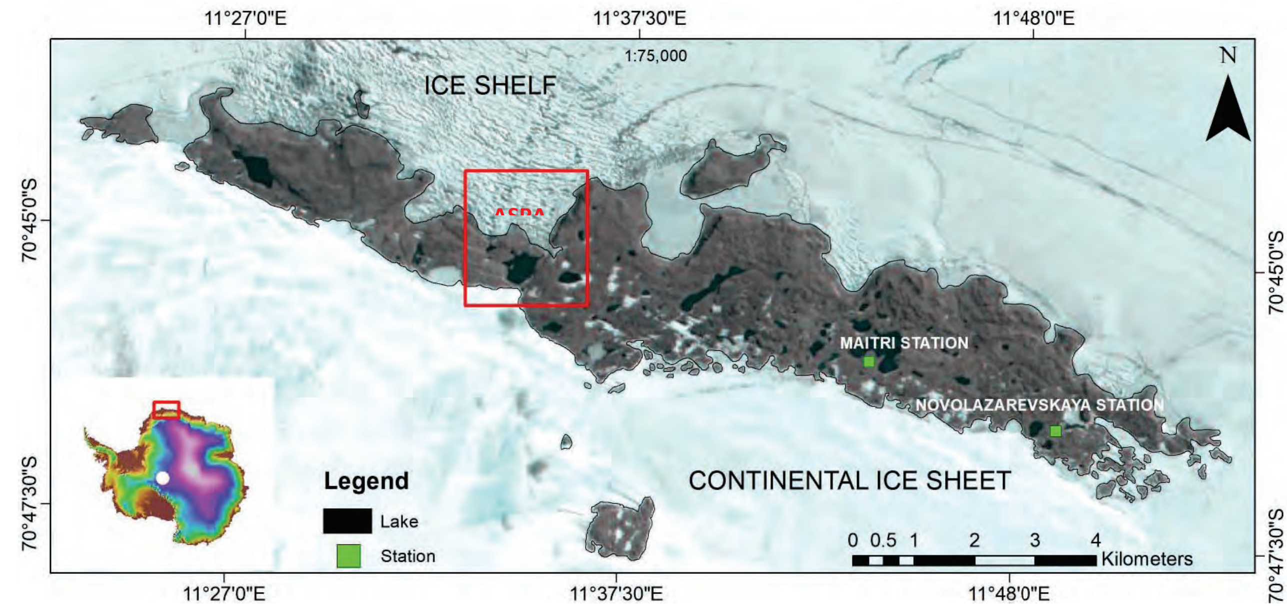
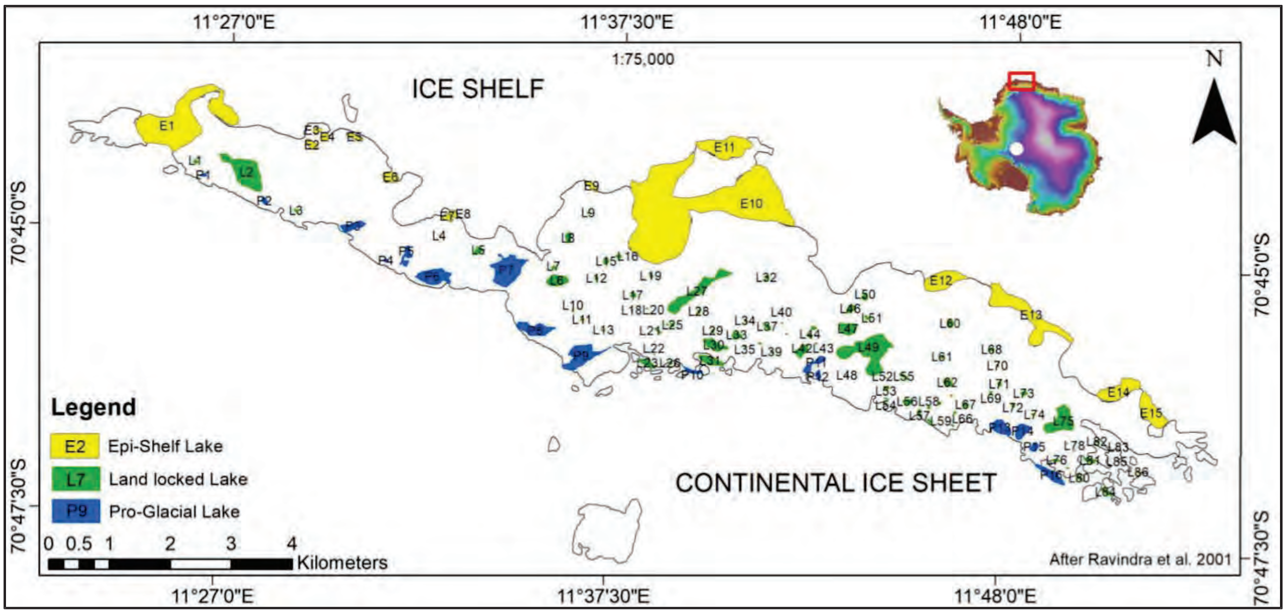


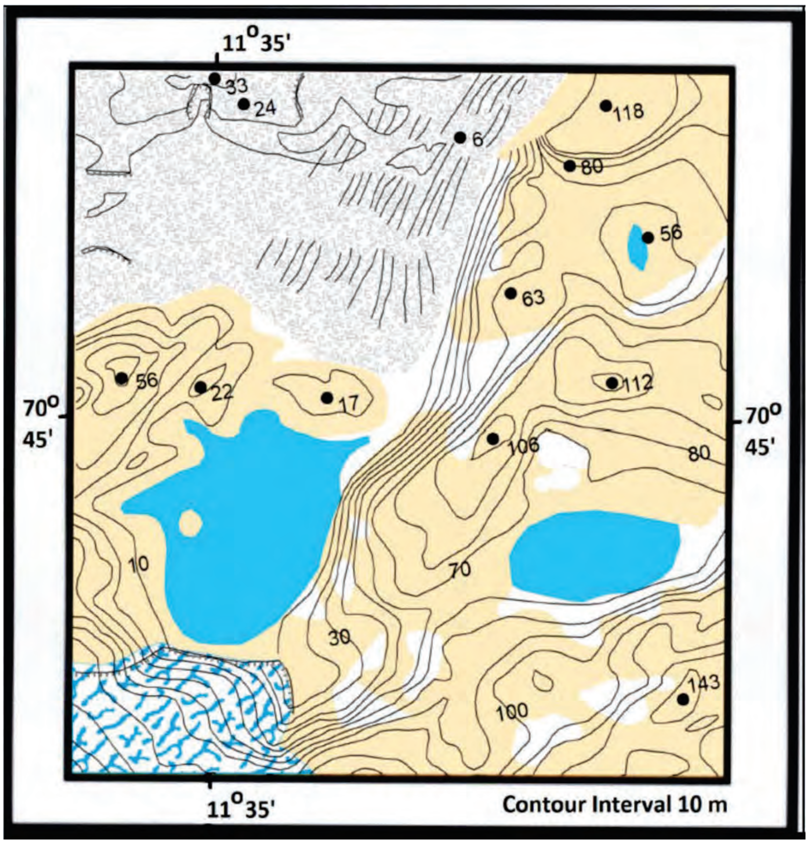
Map 1 : Location Map of Schirmacher Hills



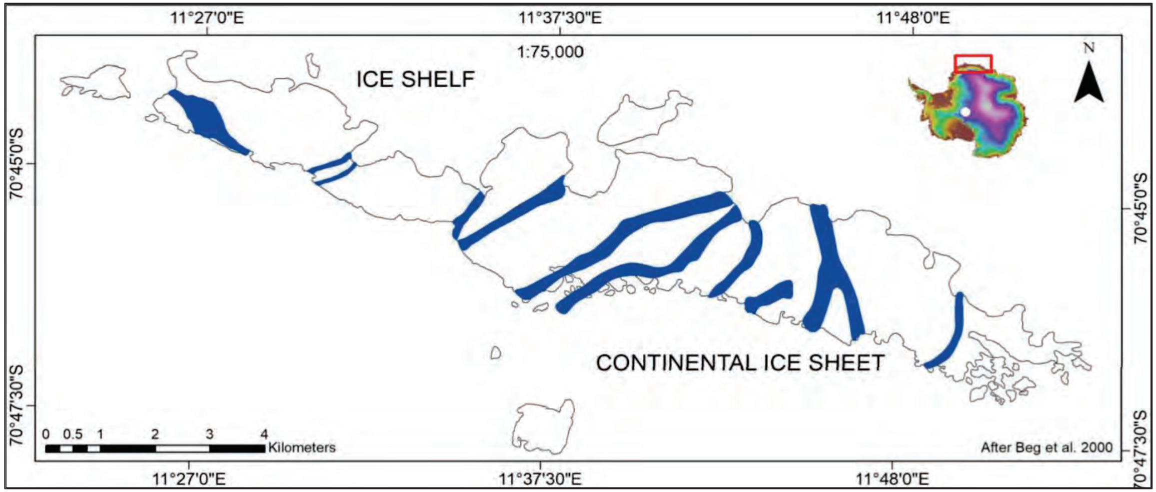
MAP 2: MAP SHOWING LOCATION OF MAITRI STATION, NOVOLAZAREVSKAYA STATION ANO ASPA-163 BOUNDARY



MAP 3: CLASSIFICATION AND NUMBERING OF LAKES, SHIRMACHER HILLS

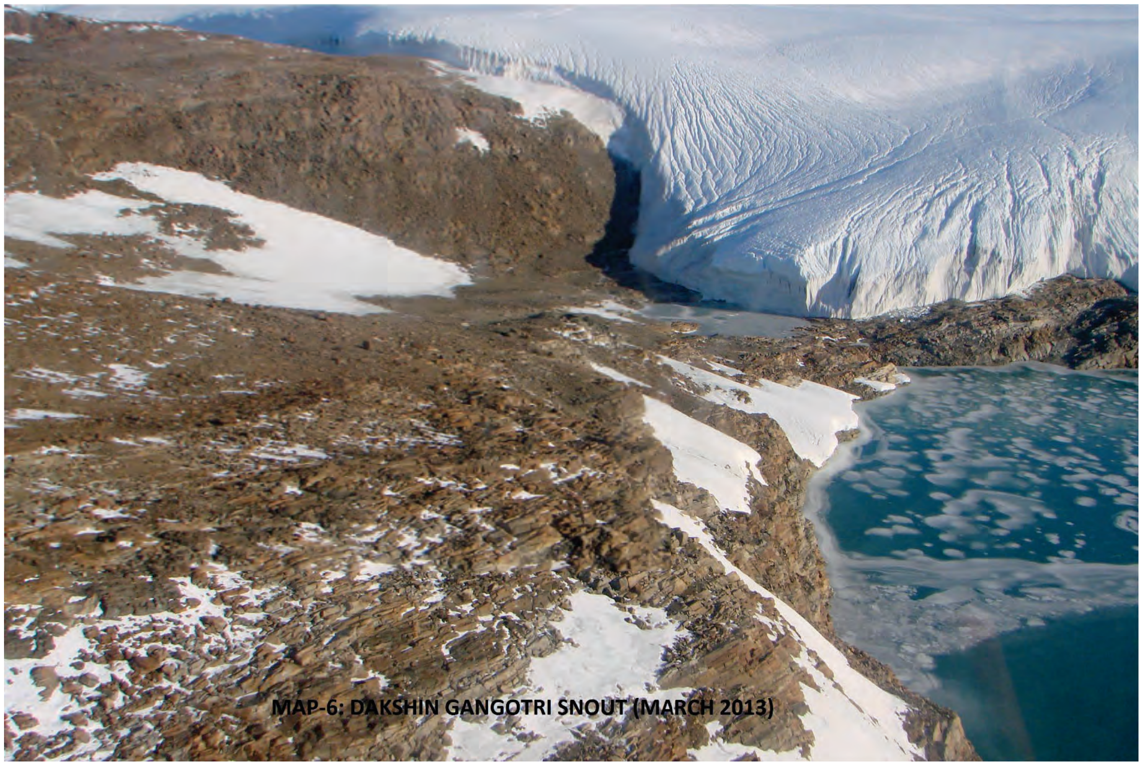


MAP 4: TOPOGRAPHIC MAP OF
THE AREA



MAP 5: PATHS OF FOSSIL GLACIERS IN SCHIRMACHER HILLS

Figure 1: Images of Secured Markers at two Locations at the Boundary of ASPA-163



MAP-6: DAKSHIN GANGOTRI SNOUT (MARCH 2013)

Management Plan for

Antarctic Specially Protected Area No. 167

Hawker Island, Princess Elizabeth Land

Introduction

Hawker Island (68°38’S, 77°51’E, Map A) is located 7 km south-west from Davis station off the Vestfold Hills on the Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica. The island was designated as Antarctic Specially Protected Area (ASPA) No. 167 under Measure 1 (2006), following a proposal by Australia, primarily to protect the southernmost breeding colony of southern giant petrels (*Macronectes giganteus*) (Map B). The Area is one of only four known breeding locations for southern giant petrels in East Antarctica, all of which are ASPAs: ASPA 102, Rookery Islands, Holme Bay, Mac.Robertson Land (67º36’S, 62º53’E) – near Mawson Station; ASPA 160, Frazier Islands, Wilkes Land (66°13’S, 110°11’E) – near Casey station; and ASPA 120, Pointe Géologie, Terre Adélie (66º40’S, 140º01’E) – near Dumont d’Urville. Hawker Island also supports breeding colonies of Adélie penguins (*Pygocelis adeliae*), south polar skuas (*Catharacta maccormicki*), and Cape petrels (*Daption capense*). Occasionally Southern elephant seal (*Mirounga leonina*) haul out on the southern beaches and Weddell seals (*Leptonychotes weddellii*) pup on the sea ice nearby.

1. Description of values to be protected

The total population of southern giant petrels in East Antarctica is currently unknown but is likely to represent less than 1% of the global breeding population. There are four known colonies in East Antarctica. At Hawker Island, there were 31 adults, 27 chicks and 3 yearlings (non-breeders, age 1 year) in January 2020. No more than 4 nests (one with a chick) were occupied at Giganteus Island (Rookery Islands ASPA 102) in January 2010. The last estimate of approximately 250 pairs at the Frazier Islands (ASPA 160) dates back to 2001 and comprised numbers only at one of the three islands. At Pointe Géologie (ASPA 120), 19 breeding pairs were recorded in 2016. Southern giant petrels also breed on other islands in the southern Indian and Atlantic oceans, and at the Antarctic Peninsula.

The southern giant petrel colony at Hawker Island was discovered in December 1963; 40–50 nests were estimated some with eggs, but it is unclear whether all the nests were occupied. From 1963 to 2007, adults, eggs or chicks were counted intermittently at various stages of the breeding cycle. Because of the variability in the timing of counts and the inconsistency of count units, it is not possible to establish a long-term trend for this population. Low numbers were previously reported for this colony, because counts included only the numbers of chicks banded in a given year, rather than total chick numbers.

Breeding southern giant petrels are sensitive to disturbance at the nest. Restrictions on activities permitted at breeding sites near Australian stations were introduced in the mid-1980s including a prohibition of banding.

Hawker Island also supports breeding colonies of Adélie penguins (*Pygocelis adeliae*), south polar skuas (*Catharacta maccormicki*), Cape petrels (*Daption capense*) and occasionally Weddell seals (*Leptonychotes weddellii*).

2. Aims and objectives

Management of the Hawker Island ASPA aims to:

- Protect the breeding colony of southern giant petrels and other wildlife.
- Avoid human disturbance or other adverse impacts on the values of the Area, while still allowing research or other activities consistent with this Plan.

- Protect the values of Hawker Island as a reference area for future comparative studies with other breeding populations of southern giant petrels.
- Minimise the possibility of the introduction of alien plants, animals and microbes to Hawker Island.
- Allow visits for management purposes in support of the aims of the management plan.

3. Management activities

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

- Research visits to assess population levels and trends of the southern giant petrel colony and/or other wildlife shall be permitted. Wherever feasible, preference shall be given to activities and methodologies which minimise disturbance to the breeding colony (for example, use of automated cameras).
- Where practicable, the Area shall be visited outside the breeding season of southern giant petrels (i.e. during the period mid-April to mid-September), as necessary, to assess whether it continues to serve the purposes for which it was designated and to ensure that management activities are adequate.
- Information on the location of Area (stating the restrictions that apply) shall be produced, and copies of this management plan shall be available at nearby stations. Informative material and the management plan should be provided to everyone visiting the vicinity.
- The management plan shall be reviewed at least every five years and updated/modified, as required.

4. Period of designation

Designation is for an indefinite period.

5. Maps

- Map A: Hawker Island Antarctic Specially Protected Area, Vestfold Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica.
- Map B: Hawker Island, Antarctic Specially Protected Area, Vestfold Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica, Biota, Topography and Physical Features.

Specifications for maps:

- Projection: UTM Zone 49
- Horizontal Datum: WGS84

6. Description of the Area

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

Hawker Island is located at 68°38’S, 77°51’E, approximately 300 m offshore from the Vestfold Hills. The Vestfold Hills are roughly triangular ice-free area of approximately 512 km2 of bedrock, glacial debris, lakes and ponds. The Vestfold Hills are bound by the ice plateau to the east, the Sørsdal Glacier to the south and Prydz Bay to the west, and contain low hills (maximum height 158 m at Boulder Hill) and valleys, and are penetrated deeply by fjords and lakes. Numerous islands fringe the coast of the Vestfold Hills, and Hawker Island lies in the south-west, between Mule Island and Mule Peninsula.

Hawker Island is an irregularly shaped island of low elevation (maximum elevation of nearly 40 m), with two parallel ranges of hills running in a north-south direction terminating in two small southern peninsulas. A third peninsula lies directly west and terminates with a 40 m hill with steep cliffs to the sea on the western and southerly aspects. A number of small freshwater lakes lie between the ranges of hills on the northern part of the island, with a number of small lakes lying on the flatter terrain on the eastern sector of the island. At its maximum extent the island is 2 km north to south and 1.7 km east to west.

The Area comprises the entire terrestrial area of Hawker Island, with the seaward boundary at the low water mark (Map B). Hawker Island is approximately 1.9 km². There are no boundary markers.

Environmental Domains, Antarctic Conservation Biogeographic Regions and Important Bird Areas

Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) Hawker Island is located within Environment D East Antarctica coastal geologic. Based on the Antarctic Conservation Biogeographic Regions (Resolution 3 (2017)) Hawker Island is located in Biogeographic Region 7 East Antarctica. Hawker Island is not identified as an Antarctic Important Bird Area under Resolution 5 (2015).

Human history

On 9 February 1931, Douglas Mawson on the BANZARE voyage of the Discovery made the first recorded sighting of the Vestfold Hills. Four years later, on 20 February 1935, Captain Klarius Mikkelsen of the tanker Thorshavn (Lars Christensen Company), sighted and landed in the area. He named many features in the area and in the Vestfold Hills after his home province in Norway. The Vestfold Hills were again visited by Mikkelsen in early 1937, while undertaking an aerial survey of the coast.

In January 1939, the American explorer, Lincoln Ellsworth, and his Australian adviser, Sir Hubert Wilkins, were the next recorded visitors to the area in the motor ship Wyatt Earp. Ellsworth flew some 400 km inland. In early 1947, the USS Currituck visited the Ingrid Christensen Coast as part of Operation Highjump. Photographic flights were conducted to survey the coastline.

The first Australian National Antarctic Research Expeditions (ANARE) visit to the area was led by Dr Phillip Law on Kista Dan and reached the Vestfold Hills on 1 March 1954. In January 1956, members of the First Soviet Antarctic Expedition landed on the Ingrid Christensen Coast in preparation for the International Geophysical Year and established Mirny station 595 km to the east. Australia established Davis station in the Vestfold Hills in 1957. Hawker Island was named for A.C. Hawker, radio supervisor at Davis station in 1957.

Climate

Meteorological data for the Area are confined almost entirely to observations at Davis station, 7 km northwest of Hawker Island. The Vestfold Hills area has a polar maritime climate that is cold, dry and windy. Summer days are typically sunny, with midday temperatures from –1°C to +2.9°C and a summer maximum of +5°C, but temperatures are below 0°C for most of the year falling to as low as −40.7°C in winter. The maximum temperature recorded at Davis station from 1957 to 2001 was +13°C. Long periods of relatively calm, fine conditions occur throughout the year. Winds are generally light; the yearly average is around 20 km/h. Violent winds and blizzards can commence with little warning, and gusts of over 200 km/h have been recorded. Snowfall averages 78 mm/y, with the greater proportion of annual accumulation resulting from windblown drift. Apart from several permanent ice banks, the Vestfold Hills are virtually snow free in summer and lightly covered in winter. The weather record illustrates the seasonal climate expected for high latitudes, but on average, Davis station is warmer than other Antarctic stations at similar latitudes. This has been attributed to the “rocky oasis”, which results from the lower albedo of rock surfaces compared to ice, hence, more solar energy is absorbed and re-radiated.

Geology

The Vestfold Hills consist of Archaean gneiss, upon which thin and often fossiliferous Pliocene and Quaternary sediments occupy depressions. The oldest known Cenozoic strata in the Vestfold Hills are the mid-Pliocene Sørsdal Formation, which contains a diverse marine fossil flora and fauna. Other younger Cenozoic strata attest to repeated glaciation, and several marine transgressions and regressions. The three major lithologies forming the Vestfold Hills are (in order of age) Chelnock Paragneiss, Mossel Gneiss and Crooked Lake Gneiss. This is repeated in units from east-north-east to west-south-west. Intruded into these, are groups of mafic dykes in a rough north-south orientation. The dykes are a major feature of the Vestfold Hills. Hawker Island comprises an extension of the Crooked Lake Gneiss of the northern portion of Mule Peninsula above Laternula Inlet. In common with the Archaean gneisses in the Vestfold Hills, the Hawker Island Crooked Lake Gneiss is cut by very distinctive, early to middle Proterozoic dolerite dykes.

Southern Giant Petrels

At Hawker Island, the southern giant petrel colony is situated at the northern end of the island on slightly sloping and uneven ground. The eastern side of the breeding area forms a small ridge about 20 m above sea level (Map B). The petrels have used the same area as a breeding site since it was first sighted in 1963–64. The small ridge provides a good area for take-off into the prevailing north-easterly winds.

The breeding season for southern giant petrels on Hawker Island commences from late September to early October, and eggs are laid during the second half of October. Following an incubation period of about 60 days, chicks hatch in the second half of December. Hatching continues over a period of three to four weeks until mid-January. About 14 to 16 weeks after hatching, the fledglings leave the colony from late March to early May. From the analysis of year round automated cameras and visits during recent winters, it is known that a small number of birds are present outside the breeding season; hence, the requirement to conduct visits to the Area in a manner that ensures minimal disturbance at any time of the year.

In the mid-1980s, a management strategy was implemented for all three southern giant petrels breeding localities near the Australian stations in East Antarctica, to minimise human disturbance. Previously, the Australian Antarctic Program restricted census visits to one in every three to five year period and implemented tight administrative controls over all other visits. At the time, this level of visitation was considered an appropriate balance between the risk of disturbing the birds and the need to obtain meaningful population data. With the development of new technologies (for example, automated cameras), detailed information can now be obtained with little or no human presence throughout the year.

In March 2011, 23 chicks and 64 adults were observed in the Area. Of the adult birds observed, four were banded birds, two of which were banded in the Casey region (dated 1985) and two were banded at Hawker Island (dated 1986). The two birds banded in the Casey region were not attending chicks but their presence within the colony suggests that immigration may occur from a hatchling colony. In January 2020, 31 adults, 3 yearlings (non-breeders, age 1 year) and 27 chicks were present.

Other birds

Adélie penguins breed along the Vestfold Hills coastline and on at least 25 offshore islands including Hawker Island. The total number of Adélie penguins in the Vestfold Hills was approximately 324,000 pairs in 2009/10. The Hawker Island colony is located in the vicinity of a small hill, midway on the western side of the island, and has been estimated at around 5000 pairs in 2009/10. The first Adélie penguins usually appear in the area in mid-October and eggs are laid about four weeks later. The interval between laying of the first and second egg is 2 to 4 days, and the incubation period lasts 32 to 35 days. The last moulted adults depart Hawker Island by the end of March.

A small colony of Cape petrels (12 pairs in 2017/18) exists on the southern tip of the south western peninsula. Cape petrels are absent from the Area in winter; they return to their nesting sites during October, lay eggs from late November to early December and chicks fledge from late February and early March.

South polar skuas are often seen near the Adélie penguin colony and may breed nearby.

Seals

Weddell seals are seen year-round in small numbers throughout the Vestfold Hills. They breed mainly in Long Fjord, Tryne Fjord and the Wyatt Earp Islands area, and occasionally on the south-east part of Hawker Island. Weddell seal numbers start to increase in late September and early October, and pupping occurs from mid-October to late November. Throughout summer, moulting Weddell seals continue to frequent the remnant fast ice and very occasionally haul out onto land. The numbers of seals seen in the Vestfold Hills fluctuates between winter and summer.

Non-breeding groups of southern elephant seals (*Mirounga leonina*) haul out during the summer months (December-April) near the south-western peninsula of Hawker Island and at several other sites along the southern coast of the Vestfold Hills (eg. at the station, Old Wallow). Like Old Wallow, the Hawker Island moulting areas contain layered deposits of hair and excrement that have accumulated over several thousand years and these areas could be considered as unique and sensitive locations.

Vegetation

The flora of the Vestfold Hills comprises at least 82 species of terrestrial algae, six moss species and at least 23 lichen species. With modern genetic analysis it is anticipated higher diversity would be found in sublithic communities.

The lichens and mosses are distributed chiefly in the eastern or inland sector and their distribution patterns reflect the availability of drift snow, time since exposure of the substrate from the ice plateau, time since the last glaciation, elevation and proximity to saline waters. Very few lichens or mosses occur along the salt-affected coastal margin including Hawker Island where the low terrain is densely covered with extensive sand and moraine deposits.

Terrestrial algae are widespread and are major primary producers in the Vestfold Hills. Sublithic (or hypolithic) algae have been reported from Hawker Island, developing on the undersurfaces of translucent quartz stones that are partially buried in soil. The dominant algae, Cyanobacteria, particularly *oscillatoriacean* species, *Chroococidiopsis* sp., and *Aphanothece* sp. occur with the greatest frequency together with the *Chlorophyta* species, cf. *Desmococcus* sp. A and *Prasiococcus calcarius*. The endaphic alga *Prasiola crispa* occurs as green crumpled sheet-like strands at melt flushes, usually associated with the diatom *Navicula muticopsis* and *oscillatoriacean* algae. The ornithocophilous lichen *Candelariella flava* grows at Hawker Island, and is associated with seabird nesting sites.

Invertebrates

An extensive survey of terrestrial tardigrades undertaken in the Vestfold Hills in 1981 found four genera and four species of tardigrade. Although no tardigrades were recovered from the Hawker Island sample site, it is possible that they may be found in other coastal areas of similar ecology, associated with *Prasiola crispa* as two species of tardigrade, *Hypsibius allisonii* and *Macrobiotus fuciger* were recovered from Walkabout Rocks. The mite *Tydeus erebus* is associated with the breeding colony of Adélie penguins on the island.

6(ii) Access to the Area

Depending on sea ice conditions, vehicles, small boats or aircraft can approach the Area but all must remain outside the Area. Vehicles and aircraft approaching the Area via the sea ice must adhere to minimum separation distances from all wildlife.

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

There are no permanent structures within or adjacent to the Area. At the time of writing, three automatic cameras are temporarily located near the southern giant petrel colony, for the purposes of ongoing population monitoring.

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

The following Protected Area is located near Hawker Island:

Marine Plain, Antarctic Specially Protected Area No. 143 (68°36’S, 78°07’E).

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 conditions

Visits to the Area are prohibited, except in accordance with a permit issued by an appropriate national authority. Permits to enter the Area may only be issued for compelling scientific research that cannot be undertaken elsewhere, or for the purpose of essential management of the Area consistent with the objectives and provisions of this management plan. Permits are only to be issued for research that will not jeopardise the ecological or scientific values of the Area, or interfere with existing scientific studies.

Permits shall include a condition that the permit or a copy shall be carried at all times when within the Area. Additional conditions, consistent with the objectives and provisions of the management plan, may be included by the issuing authority. The principal permit holder for each permit issued is required to submit to the permit issuing authority a visit report detailing all activities undertaken within the Area and all census data obtained during the visit.

Collaboration with other national programs is encouraged to reduce duplication of research and minimise disturbance of the southern giant petrels. National Antarctic programs planning research in this Area are encouraged to contact the Australian Antarctic Division, which maintains a regular population monitoring program on the island, to ascertain other projects that may be undertaken that season.

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

- Vehicles are prohibited within the Area.
- Depending on sea ice conditions, vehicles (including quad-bikes), small boats or aircraft can approach the Area but all must remain outside the Area. Vehicles and aircraft approaching the Area via the sea ice must adhere to minimum separation distances from all wildlife. Boats used to visit the island must be left at the shoreline.
    - Vehicles shall remain on the sea ice at least 150 m (quad-bike) or 250 m (other wheeled vehicles) from the edge of the southern giant petrel colony (see Table1).
- Movement within the Area is to be by foot only. Only personnel required to carry out scientific/management work in the Area may leave the landing/parking site.
- The minimum (closest) approach distances to wildlife are set out in Table 1. If disturbance of wildlife is observed, separation distance should be increased or the activity modified until there is no visible disturbance, unless a closer approach distance is authorised in a permit.
- Persons authorised by permit to approach southern giant petrels to obtain census data or biological data should maintain the greatest practical separation distance.
- 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 significant noise (thereby causing disturbance to nesting southern giant petrels and other nesting birds) is prohibited within the Area during the breeding period for southern giant petrels (from mid-September to mid-April).
- During the southern giant petrel breeding season, overflights of the island are prohibited, except where essential for scientific or management purposes of the Area and authorised in a permit. Such overflights are to be at an altitude of no less than:
    - 930 m (3,050 ft) for single-engine helicopters.
    - 930 m (3,050 ft) for twin-engine fixed-wing aircraft.
    - 1,500 m (5,000 ft) for twin-engine helicopters.
- Overflights of bird colonies in the Area by remotely piloted aircraft systems (RPAS) are prohibited, except where essential for compelling scientific or management purposes. Such overflights shall be undertaken in accordance with the *Environmental guidelines for operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica.*
- If required for an emergency, vehicles or aircraft may enter the Area.

Table 1: Minimum distances to maintain when approaching wildlife at Hawker Island

Species	**Distance (m)**			
	People on foot / ski (unless a closer approach distance is authorised in a permit)	Quad/ Skidoo	Hagglunds (and similar vehicles)	Small watercraft
Southern giant petrels	100 m	Not permitted inside the Area. Parking shall be on the sea ice and no closer than 150 m from wildlife colonies.	Not permitted inside the Area. Parking shall be on the sea ice and no closer than 250 m from wildlife colonies.	Watercraft should not be landed within 50 m of wildlife; in particular, the Adélie penguin colony on the eastern shore. Care shall be taken when in close proximity to the island.
Adélie penguins in colonies Moulting penguins Seals with pups Seal pups on their own South polar skuas on nests	30 m			
Penguins on sea ice Non breeding adult seals	5 m			

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

The following activities may be conducted within the Area from 15 April to 15 September (southern giant petrel non-breeding period) as authorised in a permit:

- scientific research consistent with the provisions of this management plan which cannot be undertaken elsewhere or in the Area outside that period, and which will not jeopardise the values for which the Area has been designated or the ecosystems of the Area
- essential management activities including monitoring
- sampling, which should be the minimum required for approved research programs.

Activities undertaken within the breeding period of the southern giant petrel shall only be permitted if the activity is non-invasive and cannot reasonably be undertaken during the non-breeding period.

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

- Permanent structures or installations are prohibited.
- Temporary structures or equipment, including cameras, shall only be erected within the Area in accordance with a permit.
- Small temporary refuges, hides, blinds or screens may be constructed for the purpose of facilitating scientific study.

- Installation (including site selection), removal, modification or maintenance of structures or equipment shall be undertaken in a manner that minimises disturbance to breeding birds and the environment. If possible, these activities should be carried out from 15 April to 15 September (non-breeding period of southern giant petrels).
- All scientific equipment or markers installed within the Area must be clearly identified by country, name of the principal investigator and year of installation.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed under permit when no longer required. All such items should be made of materials that pose minimal risk of harm to wildlife or of contamination of the Area.

7(v) Location of field camps

- Camping is prohibited within the Area except in an emergency. Any emergency camp should avoid areas of wildlife concentrations, if feasible.

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

- Fuel is not to be stored in the Area. Boat refuelling is permitted at landing sites. A small amount of fuel may be taken into the Area for an emergency stove.
- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No herbicides or pesticides are to be brought into the Area.
- 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 radio-nuclides or stable isotopes is prohibited.
- No animals, plant material or microorganisms shall be deliberately introduced into the Area, and precautions shall be taken against accidental introductions; all equipment and clothing (particularly footwear) should be thoroughly cleaned before entering the Area.
- All material introduced into the Area 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 as to minimise the risk of environmental impact.

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

- Taking of, or harmful interference with, native flora and fauna is prohibited unless specifically authorised by a permit issued in accordance with Article 3 of Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. The permit shall clearly state the limits and conditions for such activities which, except in an emergency, shall only occur following approval by an appropriate animal ethics committee.
- Research visits to assess population levels and trends of the southern giant petrel colony and/or other wildlife may be permitted. Wherever feasible, preference shall be given to activities and methodologies that minimise disturbance to the breeding colony (e.g. use of automated cameras).
- Research should be limited to activities that are non-invasive and non-disruptive to breeding southern giant petrel within the Area.
- Disturbance of southern giant petrels or other wildlife should be avoided or minimised.

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

- Material may only be collected or removed from the Area as authorised in 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, 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 place. If such material is found, the appropriate National Authority must be notified.

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

- GPS data shall be obtained for specific sites of long term monitoring for lodgement with the Antarctic Master Directory through the appropriate national authority.
- Permits may be granted to enter the Area to carry out biological monitoring and management activities, which may include collecting rubbish or samples for analysis or review; the erection or maintenance of temporary scientific equipment and structures, and signposts; or for other protective measures.
- To help maintain the ecological and scientific values of the Area, visitors shall take special precautions against introductions of non-indigenous organisms. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora and fauna at other Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area.

7(xi) Requirement for reports

Parties shall ensure that the principal permit holder for each permit submits a report on activities undertaken to the appropriate National Authority. 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 shall maintain a record of such activities and in the annual exchange of information shall provide summary descriptions of activities conducted by persons subject to their jurisdiction, which shall be in sufficient detail to allow evaluation of the effectiveness of this management plan.

Parties shall, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of use, to be used both in any review of the management plan and in organising the scientific use of the Area.

A copy of the report shall be forwarded to the National Authority responsible for development of the management plan to assist in management of the Area, and monitoring of bird and other wildlife populations. Additionally, visit reports shall provide detailed information such as 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.

7(xii) Emergency provisions

Exceptions to restrictions outlined in the management plan are in emergency as specified in Article 11 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty. A report of any such actions shall be provided to the relevant National Authority.

8. Supporting documentation

Some or all of the data used in this Management Plan were obtained from the Australian Antarctic Data Centre (IDN Node AMD/AU), a part of the Australian Antarctic Division (Commonwealth of Australia).

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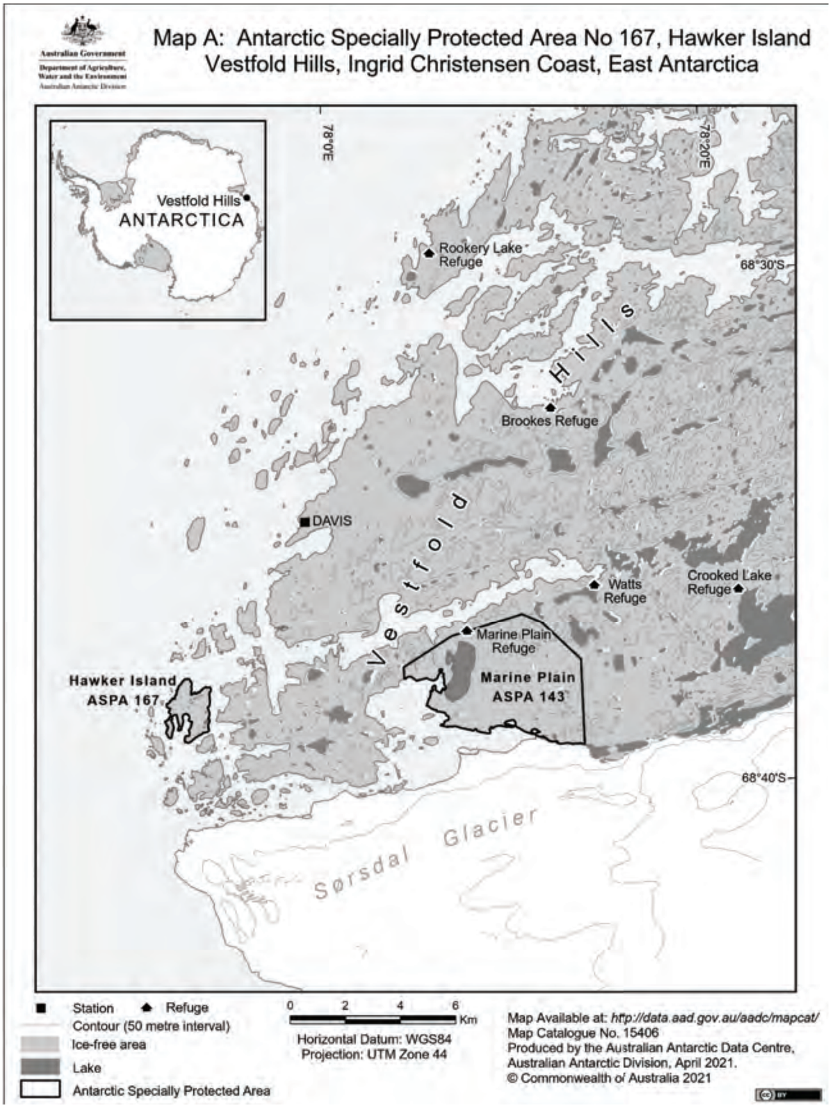
Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map A: Antarctic Specially Protected Area No 167, Hawker Island
Vestfold Hills, Ingrid Christensen Coast, East Antarctica
78°0'E
78°20'E
68°30'S
68°40'S
Vestfold Hills
ANTARCTICA
Rookery Lake Refuge
Brookes Refuge
Vestfold Hills
DAVIS
Watts Refuge
Crooked Lake Refuge
Marine Plain Refuge
Marine Plain ASPA 143
Hawker Island ASPA 167
Sørsdal Glacier
Station
Refuge
Contour (50 metre interval)
Ice-free area
Lake
Antarctic Specially Protected Area
0 2 4 6 Km
Horizontal Datum: WGS84
Projection: UTM Zone 44
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15406
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, April 2021.
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Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No 167, Hawker Island
Vestfold Hills, Ingrid Christensen Coast, East Antarctica
Topography and Fauna Distribution
77°50'0"E
77°52'0"E
68°38'0"S
68°38'30"S
Hawker Island
ASPA 167
Contour (5 metre interval)
Ice-free area
Lake
Antarctic Specially Protected Area
Adélie penguin colony
Southern giant petrel colony
Southern elephant seal haulout area (Jan-May)
0 100 200 300 400
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 44
Cape petrel colony
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 15405
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, April 2021.
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Management Plan for
Antarctic Specially Protected Area (ASPA) No. 176
ROSENTHAL ISLANDS, ANVERS ISLAND, PALMER ARCHIPELAGO

Introduction

The Rosenthal Islands are located on the western coast of Anvers Island, in the Palmer Archipelago, Antarctic Peninsula, at 64°36'S 64°15'W. The Antarctic Specially Protected Area (ASPA) includes adjacent islands and peninsulas and has an approximate area of 111 km^2. The primary reasons for designation of the Area are its large and diverse colonies of breeding birds which are of exceptional ecological and scientific interest, its apparently extensive vegetation communities, its rarely visited and almost pristine condition, and its potential role as a reference area for comparisons with localities that have been affected by human activities. In recognition of these values, the Area was first designated as a Restricted Zone within Antarctic Specially Managed Area (ASMA) No.7 Southwest Anvers Island and Palmer Basin in 2008. Designation as an ASPA supersedes the Restricted Zone, and while the boundaries of the Area extend beyond the original Restricted Zone, the Area remains fully within ASMA No.7.

The Area contains at least eight species of breeding birds. There are at least seven colonies of three species of Pygoscelid penguins (Adélie (*Pygoscelis adeliae*), Chinstrap (*P. antarctica*) and Gentoo (*P. papua*)), with a total population of approximately 9000 pairs. In addition, there are breeding colonies of Southern Giant petrel (*Macronectes giganteus*), Antarctic tern (*Sterna vittata*), Imperial shag (*Leucocarbo atriceps bransfieldensis*), South Polar skua (*Stercorarius maccormicki*), and Kelp gulls (*Larus dominicanus*). Wilson's Storm petrels (*Oceanites oceanicus*) are common and also likely breed in the Area, along with Snowy sheathbills (*Chionis alba*) which are present in association with the penguin and shag colonies. The Imperial shag colony is unusual because it appears to have maintained a resident breeding population at a similar level since first surveyed in 1975, in contrast to a regional trend of population decline for this species.

Little is known of the terrestrial ecology of the Rosenthal Islands, although high resolution satellite remote sensing indicates extensive vegetation cover on some of the islands not occupied by breeding penguins. The vegetation includes numerous species of mosses and lichens, many of which remain undescribed, and is likely to include the flowering plant Antarctic hair grass (*Deschampsia antarctica*) and with lower probability the Antarctic pearlwort (*Colobanthus quitensis*), which are found in the Anvers Island region.

The Area was proposed by the United States because of its outstanding diversity and number of breeding birds which are representative of the region, its exceptional importance for ornithological and ecological research, its value as a reference site for comparative studies and long-term monitoring, because it has been rarely visited and is in an almost pristine condition, and for its exceptional aesthetic and wilderness values.

Antarctic Important Bird Area No. 088 is identified within the Area. 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 (Resolution 3 (2008)). 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 Rosenthal Islands (64°36'S 64°15'W, 111 km^2), Anvers Island, Palmer Archipelago, Antarctic Peninsula, were designated on the basis that the Area contains large and diverse breeding seabird colonies, apparently extensive vegetation communities, and that it has been rarely visited and is in an almost pristine condition. The Area has exceptional ecological and scientific values and is valuable as reference site for comparative studies and long-term monitoring, in particular against more intensively studied sites close to Palmer Station, and in relation to the Palmer Long Term Ecological Research (PAL-LTER) site.

The Rosenthal Islands are particularly valuable for ornithological research, with at least eight species of birds breeding within the Area, making it also one of the most diverse and representative sites for breeding birds in the region. Research into seabird ecology and long-term monitoring studies are being conducted on Adélie (*Pygoscelis adeliae*), Chinstrap (*P. antarctica*) and Gentoo (*P. papua*) penguin colonies, as well as on Southern Giant petrels (*Macronectes giganteus*) (Fraser, pers. comm. 2018). The colonies at the Rosenthal Islands are of particular interest for comparisons to bird populations in the Arthur Harbor area where detailed and long-term studies are conducted on changes in ecosystem structure, functioning and dynamics, many of which have been and continue to be undertaken as part of the PAL-LTER program. The Rosenthal Islands area has been isolated from significant human visitation, and is therefore of particular value for comparisons with sites subjected to higher levels of human influence (Fraser, pers. comm. 2018). Antarctic Important Bird Area (IBA) No. 088, identified for its large colony of Gentoo penguins, lies within the Area (Map 3).

The Imperial shag colony is unusual in that the resident breeding population in 2016 appears to have remained at a similar level since first surveyed in 1975, which is in contrast to the general regional trend of population decline for this species since the 1970s.

Observations of prolific wildlife and of foraging behaviour, including of marine mammals, in the relatively deep embayment immediately south of the Rosenthal Islands suggest this could be an area of comparatively high productivity supporting the rich and diverse marine ecosystem. While more research on this aspect is needed, this embayment has been included within the Area as a precautionary measure given its potentially important role in supporting the local ecosystem.

The Area encompasses the Rosenthal Islands group, including the adjacent Anvers Island coastline and a number of nearby coastal islands and ice-free peninsulas, extending from the northern boundary at 64°33'S southwards for approximately 16 km (Map 3). The boundary includes the lower icefields on Anvers Island within 1 km of the coastline, the marine area up to 1 km seaward from the outer shores of the Rosenthal Islands, and the embayment immediately south of the Rosenthal Islands. The area encompasses all of the islands within the Rosenthal group where prolific wildlife is concentrated. The Area is ~9 km across at its widest point, ~14.6 km from north to south, and encompasses a total area of 111 km^2.

The Area also appears to have important values related to a rich terrestrial and marine ecology, although these have yet to be studied and described in detail; they are noted in this Management Plan in order that a precautionary approach is taken to protect these potential values.

In summary, the Area at the Rosenthal Islands has high value for its outstanding:

- ornithological communities that are diverse and representative of the region, with several large colonies of breeding seabird species, and which are the subject of long-term comparative studies and monitoring;
- utility as a reference area where human activity has historically been exceptionally low and the local environment remains virtually undisturbed by direct human activity and in an almost-pristine condition, and where the effects of natural processes on ecology and demography can be studied with the potential for local human interference kept to an absolute minimum;
- aesthetic and wilderness values, which are characterized by remote and rugged islands in almost pristine condition.

In order to protect the values of the Area, it is important that visitation continues to remain low and is carefully managed by permits and by this Management Plan.

2. Aims and objectives

Management at the Rosenthal Islands and vicinity 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 and physical environment in the Area provided it is for compelling reasons which cannot be served elsewhere and that will not compromise the values for which the Area is protected;
- Minimize the possibility of introduction of alien 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; 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 at Palmer Station (United States) on Anvers Island, at Yelcho Station (Chile) on Doumer Island and at 'Base A' at Port Lockroy on Goudier Island, where copies of this management plan and maps of the Area shall also be made available;
- Copies of this management plan shall be made available to all vessels and aircraft visiting 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;
- 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. These assessments shall be undertaken at least once every five years although, in view of the infrequent visits and difficulties of access, visits may be at longer intervals as appropriate.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA No. xxx Rosenthal Islands, Anvers Island – Location map.
Projection: Lambert Conformal Conic; Central Meridian: 64° 00' W; Standard parallels: 64° 40' S, 65° 00' S; Latitude of Origin: 66° 00' S; Spheroid and horizontal datum: WGS84; Contour interval: Land – 250 m, Marine – 200 m.
Data sources: coastline & topography SCAR Antarctic Digital Database v4.1 (2005); Bathymetry: IBCSO v.1 (2013); Protected areas: ERA (Aug 2018); Stations: COMNAP (Aug 2018).
<u>Inset:</u> the location of Anvers Island and the Palmer Archipelago on the Antarctic Peninsula.

Map 2: ASPA No. xxx Rosenthal Islands, Anvers Island – Regional map.
Projection: Lambert Conformal Conic: Central Meridian: 64° 25' W; Standard parallels: 64° 38' S; 64° 44' S; Latitude of Origin: 63° 45' S; Spheroid and horizontal datum: WGS84; Contour interval: 100 m. The coastline is derived from ERA (2014) near Palmer Station, and digitized from georeferenced satellite imagery (GeoEye 13 Mar 2013; WV3 25 Feb 2016; imagery © Digital Globe). Bird colonies and other features: from imagery, GPS survey (ERA 13 Dec 2016), and Fraser / Patterson-Fraser pers. comms. 2018.

Map 3: ASPA No. xxx Rosenthal Islands, Anvers Island – Topographic map.
Map specifications as for Map 2 except Central Meridian: 64° 15' W; Standard parallels: 64° 34' S; 64° 40' S; Latitude of Origin: 64° 00' S.

6. Description of the Area

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

Overview

The Rosenthal Islands (64°36' S 64°15' W) lie in the southerly part of the western coast of Anvers Island, in the Palmer Archipelago west of the Antarctic Peninsula (Map 1). They are located about 15 km north of Cape Monaco and about 22 km from Palmer Station (United States) (Map 2). The Rosenthal group comprises approximately 80 small islands, the largest of which is Gerlache Island, which rises to ~100 m in height and is approximately 2.5 km by 1.2 km in size (Map 3). The smaller islands are all less than 100 m in height, and generally less than 500 m across. Gerlache Island is almost completely covered by a permanent ice cap, while the smaller islands are generally ice-free. A number of promontories extend from the adjacent Anvers Island coastline, and many of these are also partly ice-free. Anvers Island itself is covered by the thick permanent ice cap known as the Marr Ice Piedmont that extends, in the vicinity of the Rosenthal Islands, to an elevation of about 500 m within ~7 km of the coast (Map 2). Many more small islands and peninsulas fringe the Anvers Island coast, both to the north and southwards to Cape Monaco (Map 2).

An embayment of relatively deep water separates the Rosenthal Islands from a smaller group of about 35 islands and peninsulas lying approximately six km to the south on the Anvers Island coast, all of which are included within the Area (Map 3). These more southerly islands and peninsulas provide habitat for a diversity of breeding birds. The precise physical characteristics of the embayment have not yet been described, although the deeper channel is likely to have been formed by a glacier draining the adjacent catchment on Anvers Island at a time when ice was more extensive. Observations of the relatively prolific wildlife breeding on adjacent islands and of foraging behaviour in this embayment in particular, including of marine mammals, suggest that this could be an area of deep water upwelling enabling relatively high levels of productivity near the surface, which in turn is supporting the nearby rich and diverse avian and marine mammal ecosystem (Fraser pers. comm. 2018).

The islands and peninsulas within the Area are generally rocky, rugged and exposed, with the more seaward islands tending to be steeper and with shorelines that are inaccessible to all but flying birds. The coastlines are irregular, with numerous offshore islets and rocks, most of which are uncharted. A number of islands and peninsulas close to Anvers Island are of more gentle topography and have more accessible coastlines, making them suitable for penguins to establish colonies, some with beaches where mammals, such as Elephant (*Mirounga leonina*), Weddell (*Leptonychotes weddellii*) and Antarctic Fur (*Arctocephalus gazella*) seals, may haul out.

The Rosenthal Islands were first charted by the German Antarctic Expedition of 1873/74 led by Dallmann and named after the then Director of the German Society for Polar Navigation. They were charted in more detail by Charcot's French Antarctic Expedition of 1903-05, which mapped and named Pointe de Gerlache as part of Anvers Island, as then it may have been; today this is Gerlache Island. The first people recorded to set foot in the Rosenthal Islands were members of a British geological party surveying the western coast of Anvers Island in May 1956.

An unofficial numbering system is in use to aid practical identification of the main islands and peninsulas within the Area (Fraser and Patterson-Fraser, pers. comms. 2018) (Map 3). The numbering system has been designed to meet survey needs for on-going ornithological and ecological research, and has been used to assist identification of particular sites as necessary in this Management Plan. This numbering system is not officially adopted, and may be subject to change as research needs evolve.

Boundaries and coordinates

The Area extends ~14 km north to south and ~9 km east to west, and encompasses a total area of 111 km^2. The boundary of the Area was designed to include all of the islands within the Rosenthal group, the embayment immediately to the south, the cluster of islands fringing the southern side of this embayment, and also the associated marine environment (Map 3). As a precautionary measure to protect features within the Area, the boundary is defined as a buffer extending outwards for around one km from the coastlines.

The northern boundary shares the 64°33' S parallel that also defines the northern extent of ASMA No. 7 SW Anvers Island and Palmer Basin. The eastern boundary also shares the ASMA boundary, which extends southward from 64°06' W, 64°33' S for three km, before extending south parallel to the Anvers Island coastline for ~13 km, buffered one km inland from the shore. The southern boundary extends approximately 3 km across a small bay, before extending NW for 7 km across the main embayment south of the Rosenthal Islands. The western boundary follows the 1 km buffer line parallel to the coastlines of the outer islands in the Rosenthal group.

Climate

No meteorological data are available for the Rosenthal Islands, although long-term data are available for nearby Palmer Station, where conditions are expected to be similar although perhaps less extreme.

Regional temperatures near Palmer Station are relatively mild because of local oceanographic conditions and because of the frequent and persistent cloud cover in the Arthur Harbor region (Lowry 1975). Annual average air temperatures recorded at Palmer Station during the period 1974 to 2012 show a distinct warming trend, although also demonstrate significant inter-annual variability. Between 2010-17 the mean annual temperature at Palmer Station was –1.8° C, with an average monthly air temperature in August of –5.94° C, and in January 1.72° C. The maximum temperature recorded April 1989 through October 2018 was +11.6° C on 08 March 2010, while the minimum was -26.0° C on 24 August 1995. Storms and precipitation at Palmer Station are frequent, with winds being persistent but generally light to moderate in strength, prevailing from the north-east, although local wind conditions may be at variance from Palmer Station. Cloud cover is frequent and extensive, often with a ceiling of less than 300 m. Between 1989 and 2018 the average annual precipitation was 636 mm of water equivalent, with an average annual snowfall depth of 344 cm.

The Rosenthal Islands will have minor climatic differences as a result of local geography, in particular because of their more exposed position to westerly winds and ocean swells. There is some anecdotal evidence that snowcover may be more persistent in the Rosenthal Islands than at Arthur Harbor (Gantz *et al*. 2018).

Geology, geomorphology and soils

Three main rock groups have been described in the Rosenthal Islands area (Hooper 1962). Rock outcrops on Anvers Island opposite Gerlache Island are composed of the Cape Monaco Granite, while the islands in the Rosenthal group comprise Upper Jurassic Volcanics. The Cape Monaco Granite occupies a narrow, possibly intermittent, belt ~8 km wide and ~60 km long extending along the western margin of Anvers Island from the Joubin Islands, which Hooper (1962: 50) suggested may have developed along a fault running parallel to the NW Anvers Island coastline. Within the Area south of the Rosenthal Islands embayment, outcrops on peninsulas and nearby islands are composed of unaltered tonalite of the Andean Intrusive Suite. The geomorphology and soil characteristics of the Rosenthal Islands have yet to be described.

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 ponds are evident in satellite imagery (10 Mar 2013) on Islands 201 and 202, which are likely to be enriched by nutrients from local breeding penguins. Inspection of high resolution satellite imagery (25 Feb 2016) revealed only a small number of freshwater bodies or streams on ice-free ground elsewhere within the Area.

The vegetation of the Rosenthal Islands has yet to be described in detail, although several species have been identified from Islands 202 and 205 (Appendix One, Table 1). These observations are from islands that are intensively colonised by breeding penguins, where habitat suitable for vegetation is relatively scarce. Moreover, the observations made were opportunistic at several sites, rather than made as part of a systematic survey, and therefore these records represent the absolute minimum of species likely to be present.

Preliminary observations using high resolution satellite remote sensing indicates more widespread vegetation cover on some of the other islands and peninsulas, particularly those not colonised by breeding penguins. Island 206 appears to host more extensive vegetation cover than some other islands, particularly on its northeastern slopes. The flowering plants *Deschampsia antarctica* and *Colobanthus quitensis* are relatively common on ice-free ground along the southern Anvers Island coast (Greene & Holtom 1971), with the former observed approximately five km to the south of the Area on Cape Monaco and Dream Island (Komárková *et al*. 1985).While it has not yet been possible to visit and verify species or abundance within the Area, it is anticipated that many of the species present are likely to be similar to those at sites where vegetation is present at nearby sites on southern Anvers Island and offshore islands.

A preliminary survey of terrestrial arthropods in the Area was conducted on 13 Dec 2016 (Gantz *et al*., 2018). The survey was limited to Islands 201, 202, and 205, all of which are intensively occupied by breeding penguins. Sampling was conducted along the edge of seabird colonies (where special attention was paid to ornithogenic soil under rocks), and at sites with moss and *P. crispa* that were unused by, or inaccessible to, nesting seabirds. Other ice-free islands and peninsulas within the Area, many of which support vegetation cover and which are likely to provide habitat suitable for invertebrate populations, have yet to be surveyed.

This study identified two species of Collembola (*Cryptopygus antarcticus* and *Friesea grisea*), four species of mites (*Alaskozetes antarcticus*, *Hydrogamasellus racovitzai*, *Tectopenthalodes villosus* and *Rhagidia* sp.), and the chironomid midge *Belgica antarctica*. The mite *A. antarcticus* and the collembolan springtail *C. antarcticus* were common in large aggregations at collection sites, and were occasionally observed on the surface of penguin guano without vegetative cover. Although the collembolan *C. antarcticus* and the mite *A. antarcticus* were abundant, their distribution was patchy. *Belgica antarctica* was less common and found only in vegetated areas in one location on each of Islands 201 and 202. The preliminary results from Gantz *et al.* (2018) show that the arthropod diversity of the Rosenthal Islands is similar to that of Palmer Station. No further information is available on the invertebrate assemblages in the Area. There is no information available on local bacterial or fungal communities.

Breeding birds and mammals

At least eight species of birds breed in the Rosenthal Islands: Adélie penguin (*Pygoscelis adeliae*), Chinstrap penguin (*Pygoscelis antarctica*), Gentoo penguin (*Pygoscelis papua*), Southern Giant petrel (*Macronectes giganteus*), Antarctic tern (*Sterna vittata*), Imperial shag (*Leucocarbo atriceps bransfieldensis*), Kelp gull (*Larus dominicanus*) and South Polar skua (*Stercorarius maccormicki*) (Appendix One, Table 2). Wilson's Storm petrels (*Oceanites oceanicus*) are common and probable breeders. Snowy sheathbills (*Chionis alba*) are present in small numbers at penguin and shag colonies, and although nesting has not been observed may also breed in the Area. Snow petrels (*Pagodroma nivea*) are commonly seen although are not known to breed in the area. Some breeding birds have been observed within the Area that were originally banded near Palmer Station (Fraser pers. comm. 2018). Available data on seabird population numbers are summarised in Appendix One, Table 2.

Breeding seabirds are present on almost all of the larger ice-free islands and peninsulas in the Area, although tend to be concentrated on the more sheltered localities close to Anvers Island, with the more seaward islands tending to be occupied in low densities by only South Polar skuas, Kelp gulls and Antarctic terns (Fraser *et al*. 2016). Islands and peninsulas with the most substantial numbers of seabirds are 201, 202, 203, 204, 205, 303, 306, and 307. There is some evidence in high resolution satellite imagery that colonies may exist on other islands within the Area, for example on several islands at the northeastern extremity, although the presence of breeding seabirds here has yet to be verified and there is no record of these islands ever having been visited by humans.

The Imperial shag colony is highly unusual in that the resident breeding population of 65 pairs at Island 205 in 2016 appears to have changed little from the 70 observed when first surveyed in 1975 (Appendix One, Table 2). This is in sharp contrast to a general trend of population decline for this species elsewhere on the western Antarctic Peninsula since the 1970s (Fraser *et al*. 2016). There is evidence that at least some of the birds winter in the Area (Vicknair *et al*. 2015) (Appendix One, Table 2). Similarly, the numbers of Adélie penguins breeding on Island 202 have declined relatively less than elsewhere in the region, with a 40% drop from 153 pairs in 1975 to 92 pairs in 2016 being about half of the percentage decline seen in this species near Palmer Station (Fraser *et al*. 2016). The reasons underlying the comparative breeding continuity in the Rosenthal Islands are not yet understood, although may be related to factors such as local sea ice conditions and prey availability, and this is a subject of on-going research.

Chinstrap and Gentoo penguins, on the other hand, appear to have experienced significant expansion in breeding numbers in the Rosenthal Islands since 1975, which may in part be attributable to the emergence of suitable habitat as a result of glacial retreat (Fraser *et al*. 2016). Chinstrap penguins now total ~4000 to 5000 breeding pairs throughout the Area, which is similar to the numbers reported in 1979, 1985 and 1987, although considerably more than the 1140 pairs recorded in 1975 (Fraser *et al*. 2016 and pers. comm. 2018). Gentoo penguins appear to have increased more substantially, with ~7324 pairs recorded in 2012/13, compared with only 811 pairs in 1975 (Fraser *et al*. 2016 and pers. comm. 2018) (Appendix One, Table 2). The trend of decline in Adélie penguin numbers breeding at the Rosenthal Islands and the increasing Gentoo penguin breeding population is consistent with observations of colonies at nearby Palmer Station (Ducklow *et al*. 2013) and elsewhere in the Antarctic Peninsula region (Hinke *et al*. 2007). Long-term research on seabird ecology has been carried out close to Palmer Station as part of the PAL-LTER grid, and observations at the Rosenthal Islands form an important comparison and reference area for those studies.

Southern Giant petrel numbers have also grown substantially, with the Feb 2016 survey estimating ~320 – 350 individuals spread throughout the Area, with Island 303 now a significant breeding location for this species; only ~35 individuals were present throughout the Area in 1975 (Fraser *et al*. 2016).

Antarctic terns also breed within the Area, and opportunistic observations on 13 Dec 2016 identified ~24 individuals perched on a steep rocky ridge of a small island ~50 m east of Island 205, some of which appeared to be nesting, with a further ~25 individuals perched on nearby rocks near the waterline.

A solitary transient Emperor penguin (*Aptenodytes forsteri*) was observed on 11 Feb 2016 (Fraser pers. comm. 2018; misidentified as a King penguin in Pickett 2016). Further information on transients is not available.

Antarctic Important Bird Area (IBA) No. 088 was identified for a large colony of Gentoo penguins that is located in the south of the Area (Harris *et al*. 2015) (Map 3). Updated and improved mapping data show that this site lies not on Island 303 but on Peninsula 306. Within the management unit defined by the protected area boundary the number of breeding pairs of Gentoo penguins present in 2012/13 (7324; Appendix One, Table 2) qualifies the Area as an IBA (IBA Criteria A4: The site is known or thought to hold congregations of ≥1% of the global population of one or more species on a regular or predictable basis). Data gathered in February 2016 for individual islands (Appendix One, Table 2) show a substantial number of Gentoo penguins continue to breed, although the total for the Area cannot be given because the count in that year was incomplete. For this reason the IBA status of the Area is affirmed based on the 2012/13 data. Revisions to the boundary of the original IBA have been made to be consistent with the boundary of the Area, and these have been submitted to Birdlife International for incorporation into the global IBA database.

Small numbers of Southern Elephant seals (*Mirounga leonina*), Weddell seals (*Leptonychotes weddellii*), and non-breeding Antarctic Fur seals (*Arctocephalus gazella*) have been observed on beaches within the Area in summer, with numbers tending to be greater nearer to Anvers Island (Fraser *et al*. 2016). Further information on numbers and breeding status, or on other seal species, is not available. Whales of two species (Minke (*Balaenoptera bonaerensis*) and Humpback (*Megaptera novaeangliae*)) have been observed in the vicinity of the Area. No information is available on the local marine environment.

Human activities and impact

Human activity within the Area has been minimal. Members of a British geological party surveying the western coast of Anvers Island were first to set foot in the Rosenthal Islands in May 1956 (Hooper 1956, 1962). This party travelled overland by dog sledge from Base 'N' at Arthur Harbor to visit 'Gerlache Point' (now Gerlache Island) and a peninsula 'four miles from Cape Monaco' (i.e. Peninsula 306) where they carried out geological observations, surveyed the coastline, and observed a 'considerable number of Gentoo penguins and Giant petrels' (Hooper 1956).

The next reported visits to the Rosenthal Islands were made in summer 1974/75 (Fraser pers. comm 2018), and then on 03 Feb 1979, on 08 Dec 1984 (by helicopter, no landings) and on 02 Jan 1985 (Parmelee *et al*. 1987), supported by R/V *Hero* and the U.S. Coastguard survey boat *Glacier* and helicopter. A yacht visit was made on 08 Feb 1987 (Poncet & Poncet 1987). In the 32-year period 1956–88 it is estimated that fewer than ~20 people visited the Rosenthal Islands.

Over the thirty-year period since 1988 there is one record of a tourist vessel visiting the Rosenthal Islands in the 2010/11 season by 6 people on the yacht *Golden Fleece* (IAATO Tourism Statistics, 2010/11), and several other yacht visits have been made since the 1980s for filming, around February (J. Poncet pers. comm. 2018). Brief ornithological surveys by research teams from Palmer Station have been conducted in the summer of 2012/13, on 11 Feb 2016 and on 13 Dec 2016. On this latter visit a large fishing float (~1 m diameter) was found embedded in ice on the eastern shore of Island 201, which was removed from the Area. It is estimated that fewer than an additional 40 people have visited the Area in this more recent period.

Given the extremely low number and brief duration of human visits, with fewer than ~60 people estimated to have ever visited, it is assumed that human impacts in the Area derived from local sources are very low. The Area is therefore considered almost pristine, and this low level of human impact is an important value of the Area to be maintained.

6(ii) Access to the Area

Access to the Area may be made by small boat, by piloted or remotely piloted aircraft, or on foot. Piloted aircraft landings are prohibited and overflight restrictions apply to aircraft operating within the Area. The specific conditions for access are set out in Section 7(ii) below.

Access to the Rosenthal Islands prior to 2016 was usually by deployment of rubber inflatable small boats (up to ~6 m (~20 ft) in length) from a nearby ship, with rare visits made by inflatables from Palmer Station. Rigid Hulled Inflatable Boats (RHIBs), which are ~10 m (33.5 ft) in length, have operated out of Palmer Station since 2016, and with a range of up to ~32 km (~20 miles) these small boats have made the Rosenthal Islands more accessible to Palmer Station than was previously the case.

Seasonal sea ice in the SW Anvers Island area is variable, formation usually beginning between March and May and, for the period 1979 to 2004, persisting between five and 12 months (Stammerjohn *et al*., 2008). Dense brash ice is frequently found close to shore, which may impede small boat access.

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

No structures, instruments, caches or markers are known to be present within or adjacent to the Area.

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

The nearest protected areas to the Rosenthal Islands are: Litchfield Island (ASPA No. 113) which is ~12 km southeast in Arthur Harbor; Biscoe Point (ASPA No.139) which is ~26 km to the southeast at southern Anvers Island; and South Bay (ASPA No. 146) which is approximately 37 km to the southeast at Doumer Island (Map 1).

6(v) Special zones within the Area

There are no special Zones within the Area. The nearest Restricted Zones within ASMA No. 7 Southwest Anvers Island and Palmer Basin are the Joubin Islands (~10 km south) and Dream Island (~5 km south) (Map 2).

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 research that cannot be served elsewhere, and in particular for research on the marine or 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 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 within the Area.

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

Access to the Area shall be by small boat, by aircraft, or on foot. Access by vehicles is prohibited.

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.

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

- Southern Giant petrels (*Macronectes giganteus*) – 50 m
- Antarctic Fur seals – 15 m
- other birds and seals – 5 m.

Visitors should move carefully so as 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

Particular routes have not been designated for small boat access to the Area, and in view of the very low levels of visitation and variable conditions, there are no restrictions on small boat access routes or landing sites. However, the best small boat travel is usually found parallel to and ~800 m to 1 km from the Anvers Island coastline, dependent on ice and wind conditions (Map 3). A number of relatively sheltered small embayments offering some protection for small boats may be found near Islands 201-203 and 303-309, as well as outside of the Area in the Gossler Islands and near Cape Monaco (Map 2).

A large number of uncharted islands and submerged, or partially submerged, rocks and shoals exist within the Area, which may represent a hazard to boating operations. Available bathymetric information for the Area and the surrounding region is poor and unreliable. Ice conditions, frequent and often considerable ocean swell, and exposure to westerly and / or katabatic winds descending from Anvers Island may also affect boat operations within the Area.

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:

1) Piloted aircraft landings, including by helicopters, are prohibited within the Area.
2) 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)).
3) 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 (such as documentary reporting (e.g. visual, audio or written) or the production of educational resources or services) that are for compelling reasons that cannot be served elsewhere. Activities for educational and / or outreach purposes do not include tourism;
- Essential management activities, including monitoring and inspection.

7(iv) Installation, modification or removal of structures

- No structures are to be erected within the Area except as specified in a permit and, with the exception of survey markers, 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 flora and fauna, 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

Temporary camping is allowed within the Area. Specific camp sites have yet to be identified or designated, although any camp sites should by preference be located on beach gravels, snow surfaces or rocky ground. Camping on surfaces with significant vegetation cover is prohibited.

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 / or markers are clean. To the maximum extent practicable, clothing, footwear and other equipment (including e.g. backpacks, carry-bags, tents, walking poles, tripods etc) shall be thoroughly cleaned prior to entry. 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));
- 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 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 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 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 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:

1) carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
2) install or maintain signposts, markers, structures or scientific equipment;
3) carry out protective measures;
4) 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 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.
- 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 exceptionally been undertaken, and / or of any materials released and not removed, that were not included in the authorized permit.

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List of boundary coordinates

Northwestern corner: 64°33'S 64°15'W.

Northeastern corner: 64°33'S 64°06'W.

Maximum northern extent: 64° 33'S.

Maximum southern extent: 64° 40' 54"S.

Maximum eastern extent: 64° 06'W.

Maximum western extent: 64° 21' 24"W.

Northern boundary: coincident with the boundary of ASMA No. 7 SW Anvers Island and Palmer Basin.

Eastern boundary: 1 km buffer inland from the western coast of Anvers Island, coincident with the boundary of ASMA No. 7 SW Anvers Island and Palmer Basin.

Western and southern boundaries: 1 km buffer from the western coastlines of islands within and to the south of the Rosenthal Islands group.

Appendix One

Species Records

Table 1. Vegetation species identified in the Rosenthal Islands [1].

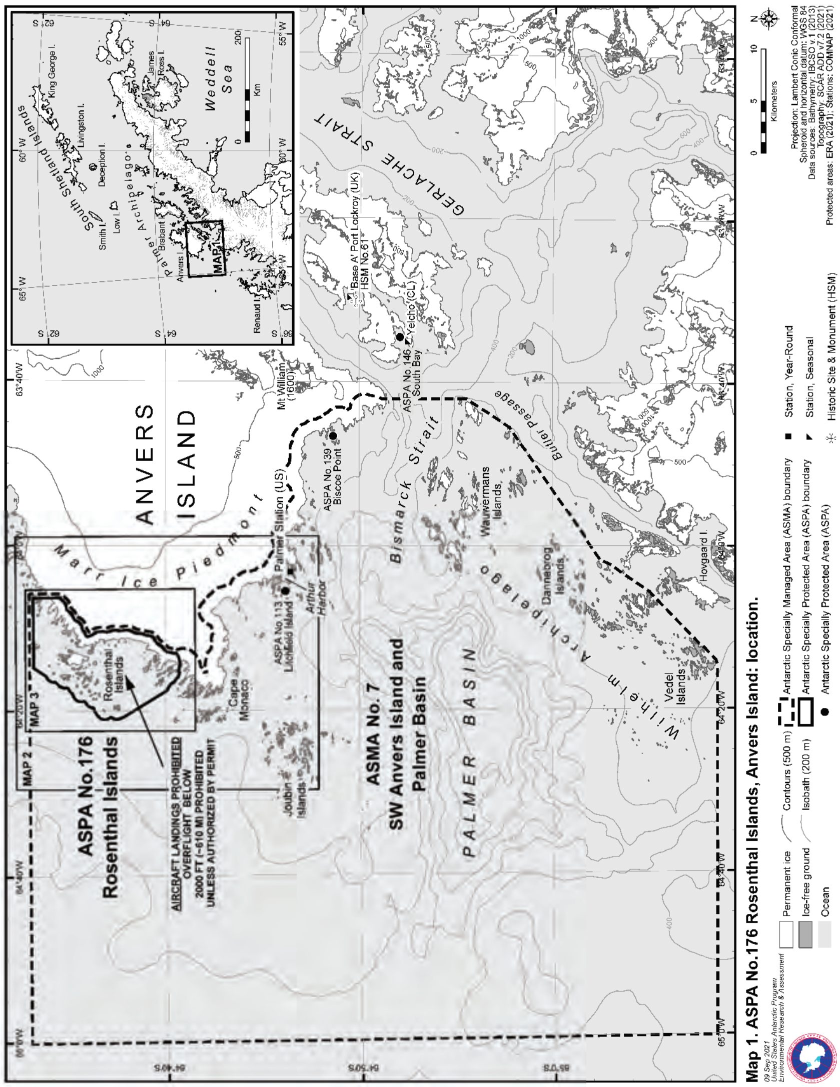
Location	Species	Description
Island 202	*Sanionia uncinata*	Moss. On rocky ledge on steep slope, at south of island adjacent to breeding penguins.
	Prasiola crispa	Algae. As above.
	Staurothele gelida (?)	Lichen. As above, on rock adjacent to moss / algae. ID uncertain.
	Caloplaca cirrochrooides	Lichen. As above, less extensive.
	Turgidosculum complictulum	Lichen. As above, in patches.
	Xanthoria elegans	Lichen. Extensive cover of bright orange on cliffs at south of island.
Island 205	*Turgidosculum complictulum*	Lichen. On rock in northern part of penguin colony.
	Xanthoria candelaria	Lichen. As above, on rock crevice associated with *T. complictulum*
	Acarospora macrocyclos	Lichen. As above.
	Staurothele gelida (?)	Lichen. As above. ID uncertain.

1. Identifications R.I. Lewis Smith, pers. comm. 2018, from photographs by C. Harris (13 Dec 2016).

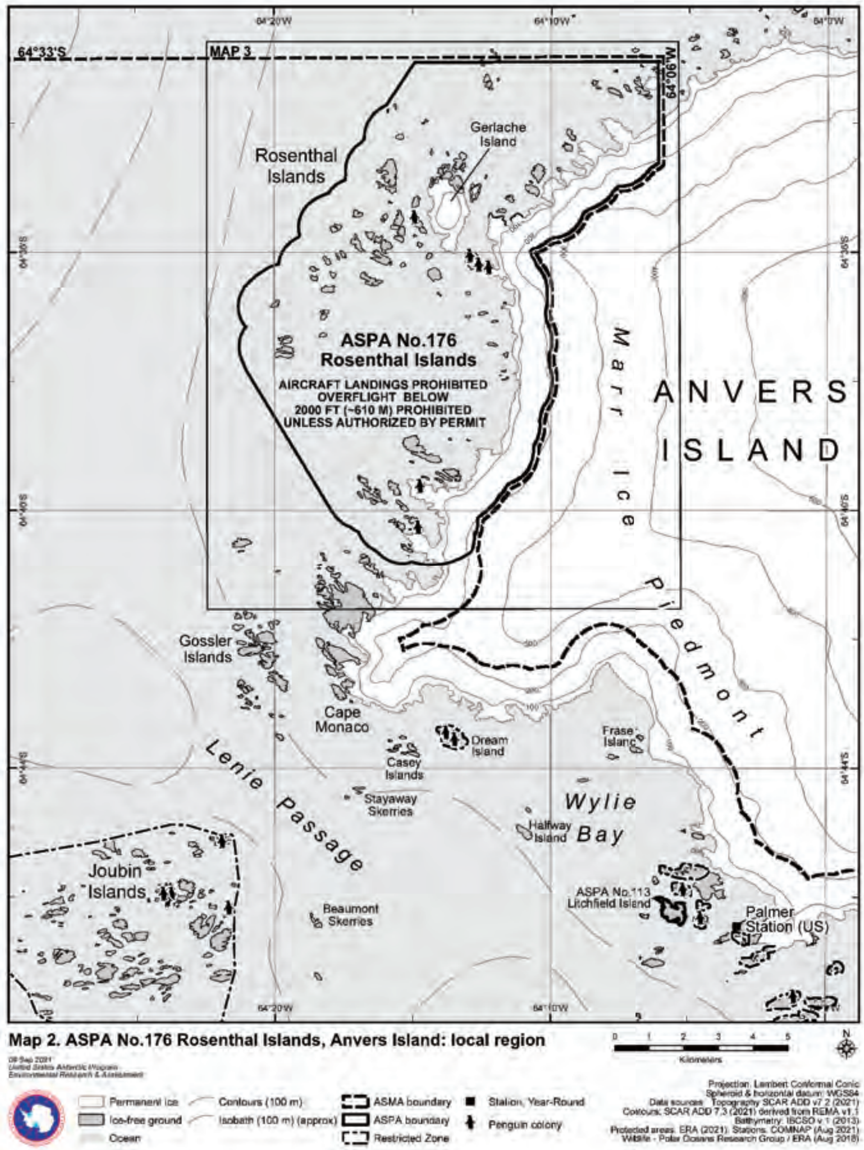
Table 2. Numbers of breeding penguins, Imperial shags and Southern Giant petrels in the Rosenthal Islands & vicinity 1975-2017.

Location		*Adélie penguin Pygoscelis adeliae*			*Chinstrap penguin Pygoscelis antarctica*			*Gentoo penguin Pygoscelis papua*			*Imperial shag Leucocarbo atriceps bransfieldensis*			*Southern Giant petrel Macronectes giganteus*		
Date	**Site**	**Pairs**	**Type[1]**	**Source[2]**	**Pairs**	**Type[1]**	**Source[2]**	**Pairs**	**Type[1]**	**Source[2]**	**Pairs**	**Type[1]**	**Source[2]**	**Pairs**	**Type[1]**	**Source[2]**
1974-75	202	153	N1	4												
	205										70	N1	4			
	Total[3]				1140	N1	4	811	N1	4				35	A	4
03-Feb-79	201/ 202				4000	A5	1	2000	A5	1						
	306							950	C1	1						
02-Jan-85	201	1	N1	1	1500	N5	1	873	N1	1						
	202	170	N1	1	1000	N5	1	150	N1	1						
…	203				500	N5	1									
08-Feb-87	205				4000		3									
	306				2		3	3000	C3	3						
2012-13	Total	124	C1	4	5163	C1	4	7324	C1	4						
05-Jun-15											10 [4]	A1	5			
11-Feb-16	201				1005	C1	4	1123	C1	4						
	202	92	C1	4	2005	C1	4	471	C1	4						
	203				62	C1	4									
	205				1410	C1	4				65		4			
	306							2442	C1	4						
	307							483	C1	4						
	Total													350	A	4
13-Dec-16	201			6	437	N1		1329	N1							
	202	76	N1		1848	N1		677	N1							
	203				17	N1										
	205				1388	N1										
	306															

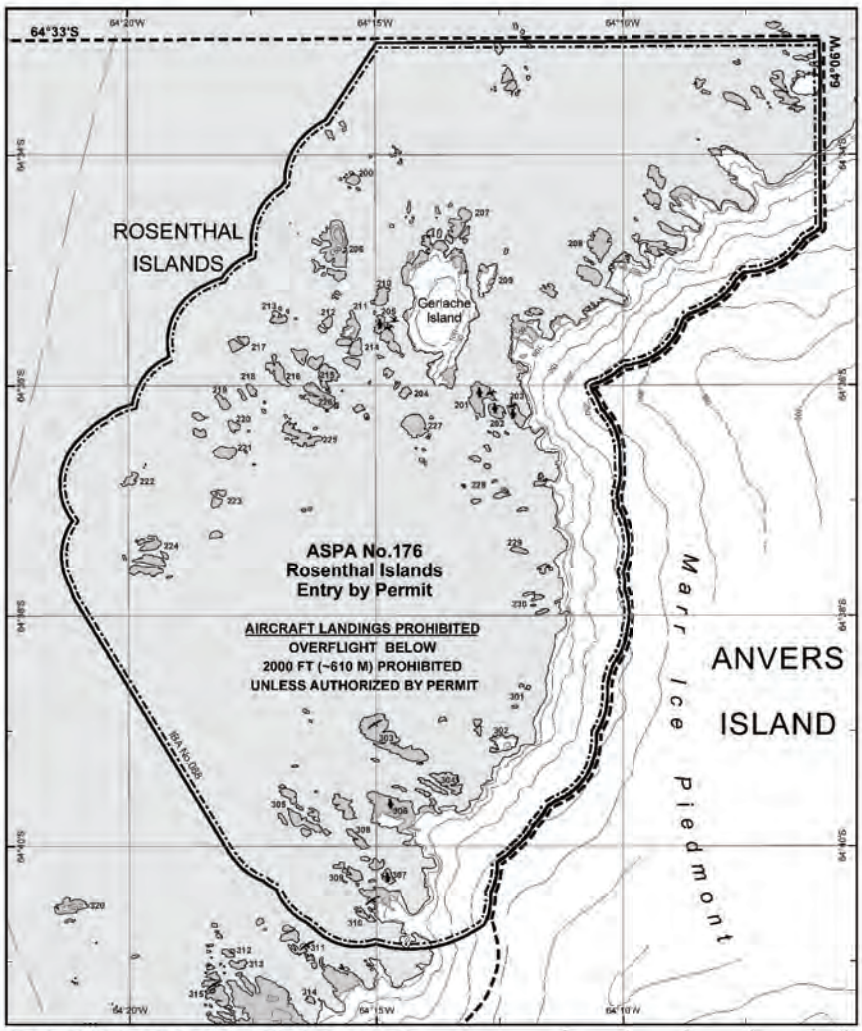
1. N = Nest, C = Chick, A = Adults; 1 = < ± 5%, 2 = ± 5-10%, 3 = ± 10-15%, 4 = ± 25-50% (classification after Woehler, 1993)
2. Source: 1. Parmelee and Parmelee 1987; 2. Parmelee, Fraser & Neilson 1987; 3. Poncet and Poncet 1987; 4. Fraser *et al* 2016; 5. Vicknair *et al* 2015. 6. Fraser pers. comm. 2018.
3. 'Total' given where location of birds counted within the Area was indeterminate from the data source.
4. 10 Imperial shags (breeding adults) in flight as a group at SW edge of Rosenthal Islands.



Map 1. ASPA No.176 Rosenthal Islands, Anvers Island: location.



Map 2. ASPA No.176 Rosenthal Islands, Anvers Island: local region



Map 3. ASPA No.176 Rosenthal Islands: topography.

09 Dec 2021
United States Antarctic Program
Environmental Research & Assessment

Coastline
Contour (50 m)
Isobath (100 m)
Ocean
Permanent ice
Ice free ground
Palmer ASMA boundary
Protected area boundary
Important Bird Area (IBA)
Penguin colony
Imperial shag colony
Southern Giant petrel colony
Antarctic tern colony

0 1 2 3 4
Kilometers
N

Projection: Lambert Conformal Conic
Spheroid & horizontal datum: WGS84
Data sources: Coastline & ice free ground: digitised from orthorectified aerial imagery acquired 02 Feb 2009 and satellite imagery by ERA & PGC.
Contours: derived from DEM created by PGC (2017).
Bathymetry: IBCSO v 1 (2013).
Wildlife - Polar Oceans Research Group/ ERA (2018).

Management Plan for Antarctic Specially Protected Area No. 177

LÉONIE ISLANDS AND SOUTH-EAST ADELAIDE ISLAND, ANTARCTIC PENINSULA

Introduction

The primary reason for the designation of the six sites located on the Léonie Islands, Ryder Bay, and south-east Adelaide Island, Antarctic Peninsula (Lat. -67.60°; Long. -68.23°), as an Antarctic Specially Protected Area (ASPA) is to protect a combination of outstanding scientific, environmental, wilderness and aesthetic values and, in particular, relating to the avifauna and terrestrial biological communities within the Area.

The Area consists of sites located on the Léonie Islands, within Ryder Bay, and the south-east of Adelaide Island, Antarctic Peninsula (see Table 1). The six sites identified as components of the ASPA include: Anchorage Island (Lat. -67.593º; Long. -68.189º), Donnelly Island (Lat. -67.606º; Long. -68.189º), East Lagoon Island (Lat. -67.590º; Long. -68.239º), Walton Terraces, Léonie Island (Lat. -67.596º; Long. -68.350º), Mucklescarf Island (Lat. -67.594º; Long. -68.261º) and the Horton, Hurley and Turner Glaciers (Lat. -67.58º; Long -68.49º). The total area of all six sites is 102.1 km^2, with ice-free ground accounting for 2.7 km^2. The area is considered to be of sufficient size as it encompasses many of the bird nesting sites and important concentrations of terrestrial vegetation in the locality, as well as areas of outstanding scientific, wilderness and aesthetic value.

Table 1. List of the six sites that comprise ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula.

Site name	**General coordinates**	**Primary value**	**Area (ha)**
Anchorage Island	Lat. -67.593°; Long. -68.189°	Scientific and Environmental	60
Donnelly Island	Lat. -67.606°; Long. -68.189°	Scientific	12
East Lagoon Island	Lat. -67.590°; Long. -68.239°	Environmental	20
Walton Terraces, Léonie Island	Lat. -67.596°; Long. -68.350°	Environmental, Wilderness and Aesthetic	15
Mucklescarf Island	Lat. -67.594°; Long. -68.261°	Environmental	0.2
Horton, Hurley and Turner Glaciers	Lat. -67.584°; Long -68.490°	Wilderness and Aesthetic	10100

East Lagoon Island, Walton Terraces on Léonie Island and Mucklescarf Island are included within ASPA No. 177 to ensure conservation of the environmental values contained therein and therefore should be subject to as little human visitation and impact as possible (although essential science should be permitted). The designation of Anchorage Island is to protect scientific values and, as far as possible, if the scientific activity cannot be undertaken outside the ASPA, then it should be undertaken here in preference to the other sites in ASPA No. 177 Donnelly Island has been designated as a control site for monitoring the impact of Rothera Research Station on the surrounding fellfield ecosystem; it is important, therefore, that visits are undertaken only for associated environmental monitoring purposes. Horton, Hurley and Turner Glaciers and Walton Terraces on Léonie Island have been designated to protected outstanding wilderness and aesthetic values.

The sites comprising the Area are located between 3.5 and 11 km from Rothera Research Station. Historically, the island sites were subject to visitation by tourists (including those from cruise ships and smaller yachts) and National Antarctic Programme personnel and were, therefore, susceptible to disturbance from field research and logistical and recreational activities. ASPA designation assists in ensuring that these locations are protected in light of the scientific, logistical and recreational activities in the local vicinity, and that permitted activities are suitably managed to minimise impacts upon the values within the Area.

Using the Environmental Domains classification, the Léonie Islands and south-east Adelaide Island are predominantly Environmental Domain B (Antarctic Peninsula mid-northern latitudes geologic). Other protected areas containing Environment Domain B include ASPA Nos. 108, 115, 134, 140 and 153 and ASMA 4. The Area is within Antarctic Conservation Biogeographic Region (ACBR) 3 North-west Antarctic Peninsula. The ASPA islands are contained within Antarctic Important Bird Area (IBA) No. 47236 (AQ205), which was designated in 2018.

Four other ASPAs are present within the Marguerite Bay area (ASPA No. 107 Emperor Island, Dion Islands, ASPA No. 115 Lagotellerie Island, ASPA No. 117 Avian Island and ASPA No. 129 Rothera Point). ASPA No. 107 Emperor Island and ASPA No. 117 Avian Island were designated predominantly to protect the avifauna of the area, ASPA No. 115 Lagotellerie Island to protect terrestrial communities and avifauna, while ASPA No. 129 Rothera Point was designated to monitor the impact of the nearby station on an Antarctic fellfield ecosystem. Therefore, ASPA No. 177, Léonie Islands and south-east Adelaide Island, complements the local network of ASPAs primarily by protecting exceptionally rich terrestrial biological communities and high densities of breeding avifauna. In particular, although Rothera Point and Léonie Island both have a high plant biodiversity, the number of shared plant species is not high, indicating the need to protect different vegetated sites within the Ryder Bay area (Cannone et al., 2018). ASPA No. 177 Léonie Islands and south-east Adelaide Island includes over 8.1% of the known world population of south polar skuas and would therefore constitute one of the largest protected populations globally for this species. Furthermore, the ASPA protects 2.2% of the known global population of Antarctic shags, with the protected colony within ASPA No. 177 of roughly equivalent size to colonies within ASPA No. 117 Avian Island and ASPA No. 115 Lagotellerie Island. A larger population is found in ASPA 107 Emperor Island. The ASPA also protects an area of aesthetically outstanding and largely unvisited wilderness juxtaposed against areas of on-going and often intense human activity associated with the nearby research stations.

1. Description of values to be protected

The primary reason for the designation as an ASPA is to protect a combination of outstanding scientific, wilderness and environmental values and, in particular, the avifauna and terrestrial biological communities within the Area (see Table 2). Specific values in the Area as a whole include:

- Scientific values relating to terrestrial ecosystems found in an area used for on-going international scientific research.

- Scientific values associated with a control area against which to compare human impacts at Rothera Research Station. Since ASPA No. 129 Rothera Point, Adelaide Island was designated in 1985 as a control area against which to monitor the impact of Rothera Research Station, the footprint of the station has expanded, including through the construction of a rock airstrip within 300 m of the ASPA. ASPA No. 129 may therefore be subject to greater levels of local impact than envisioned when the area was first designated. Therefore, part of the Area (Donnelly Island, c. 5 km from the station and rarely visited), has been designated as a further control site for environmental monitoring purposes.
- Environmental values associated with avian fauna:
    - South polar skuas (*Stercorarius maccormicki)* - over 8.1% of the global population, based on the revised global population estimate (Phillips et al. 2019).
    - Antarctic shags (*Phalacrocorax [atriceps] bransfieldensis*) – 2.2% of the revised global population estimate (Schrimpf et al. 2018, Phillips et al. 2019).

  The ASPA island sites are contained within Antarctic Important Bird Area (IBA) No. 47236 (AQ205) that was designated in 2018; this is the first IBA to be identified in Antarctica since the wider review of candidate sites by Harris et al. (2015) (see Resolution 5 (2015)). The IBA qualifies on the basis of the large breeding populations of south polar skua and Antarctic shag. The IBA includes Rothera Point and the islands in Ryder Bay, which in January 2018 held 978 occupied territories of south polar skuas, 259 south polar skuas at club sites and 405 pairs of Antarctic shags (Phillips et al. 2019). Based on these counts, the islands in the wider Ryder Bay area contain an estimated c. 3.5% of all breeding Antarctic shags, and c. 10.3% of all breeding south polar skuas (see Phillips et al., 2019, for updated global population estimates for both of these species). ASPA No. 177, includes c. 80% of the skuas and 62% of the shags breeding in the IBA.
- Environmental values associated with unusually rich areas of terrestrial vegetation. Rich lichen-dominated communities are found on Anchorage Island and East Lagoon Island. Walton Terraces, Léonie Island, support large and diverse vegetation stands (including the flowering plants, *Deschampsia antarctica* and *Colobanthus pratensis*), as well as boulder areas which support a typical lichen fellfield community.
- Wilderness values that are outstanding for the geographical region due to the very limited visitation of some of the ASPA sites, when compared to areas where local scientific infrastructure and Rothera Research Station are located. In accordance with a common understanding of the concept of wilderness (Dudley 2008; Bastmeijer 2016), the relevant parts of the ASPA are characterised by a very high degree of naturalness (unmodified native ecosystems) and undevelopedness (absence of and distance from any permanent or semi-permanent infrastructure, artefacts, transport routes or any other evidence of present or past visible human presence).
- Aesthetic values due to the spectacular scenery when looking at the sites from the Ryder Bay area. The aesthetic values are strengthened by an outstanding combination of mountains, cascading glaciers, streams, vegetation and wildlife present within the Area.

The specific values found in each of the Area's sites are detailed in Table 2, and described below:

<u>Anchorage Island</u>: The island contains a combination of outstanding scientific and environmental values. It is a site of on-going international scientific research on terrestrial ecology, undertaken by researchers from several nations including the United Kingdom, the Netherlands, Germany, Italy and Malaysia (see section *8. Supporting documentation*).

Research on Anchorage Island has focused on the potential impact of climate warming on the functioning of Antarctic terrestrial ecosystems, including how vegetation, soil communities and ecosystem processes respond to warmer temperatures. One warming study using open topped chambers is ongoing and has now run for 17 years. Other studies focus on the role of marine vertebrates and invasive species on ecosystem functioning. Both factors are likely to respond to climate change and may have a larger impact on Antarctic terrestrial ecosystems than warming alone. Anchorage Island is also of ecological importance as the breeding site of c. 460 pairs of south polar skuas, and through the presence of localised areas of moss-dominated vegetation and more widespread lichen-dominated vegetation.

Donnelly Island: This site protects scientific values, primarily that the area serves as a control area, against which the effects of human impact associated with the nearby Rothera Research Station (UK; 5 km away) can be monitored. The island is also the breeding site of c. 25 pairs of south polar skuas.

East Lagoon Island: The island contains environmental values including c. 150 pairs of breeding south polar skuas and an unusually rich area of lichen-dominated fellfield habitat.

Walton Terraces, Léonie Island: Walton Terraces, located on the western side of Léonie Island, contain environmental values including c. 160 pairs of south polar skuas and an unusually large area of rich and biodiverse terrestrial vegetation. Walton Terraces are located c. 10 km from Rothera Research Station, have received little visitation relative to many of the other locations in Ryder Bay and there is no direct line of sight to the research station on Rothera Point. The site is one of the most verdant in the area, with rich vegetation, streams and high numbers of birds. It also has considerable wilderness and aesthetic value due to the absence of evidence of human presence or activities.

Mucklescarf Island: This small island, only 55 m across, contains outstanding environmental values due to the presence of a colony of 251 pairs of Antarctic shags.

Horton, Hurley and Turner Glaciers: This area of south-east Adelaide Island provides outstanding wilderness values, as it has remained almost entirely unvisited, compared with the other locations in the vicinity that have been subject to sometimes intense levels of human activity during the past 112 years. Regarding aesthetic values, the site also presents stunning scenery when viewed from Ryder Bay, and has been the subject of paintings by artists including Philip Hughes (b. 1936: works include 'Hurley and Horton Glaciers from Lagoon Island' and 'Notebook Antarctic Volume 4. Léonie Island'), Keith Grant (b. 1930) and Sandra Chapman (NESTA Dreamtime Fellowship). Sir Peter Maxwell Davies, composer of the Antarctic Symphony (Symphony No. 8), described the snow-covered mountains as 'heart-rendingly beautiful', and wrote 'the view across the sea to distant mountains is stupendous'.

2. Aims and Objectives

The aims and objectives of this Management Plan are to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary or inadvertent human disturbance through uncontrolled access and inappropriate collections of biological material;
- avoid major changes to the structure and composition of the terrestrial ecosystems, in particular to the fellfield ecosystem and breeding birds, by (i) preventing physical development within the site, (ii) limiting human access to the Area and (iii) prohibit inappropriate collection of biological material;
- prevent installation or development of any permanent or semi-permanent infrastructure, artefacts, transport routes or any other evidence of present or past

visible human presence in or near the sites designated to protect wilderness values (see Table 2).

- prevent the introduction of non-native species to the Area;
- minimise the possibility of the introduction of pathogens which may cause disease in fauna populations within the Area;
- allow 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 the natural ecosystem of the Area as a reference area for future studies, including comparative studies within ecosystems in the vicinity of Rothera Research Station.
- 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:

- Visiting field parties shall be briefed fully by the National Antarctic Programmes operating in the area on the values that are to be protected within the Area and the precautions and mitigation measures detailed in this Management Plan.
- Personnel in the vicinity of, accessing or flying over the Area shall be specifically instructed, by their national programme or appropriate national authority, as to the provisions and contents of the Management Plan.
- Visits to the Horton, Hurley and Turner Glaciers site and Walton Terraces, Léonie Island, shall be kept to an absolute minimum.
- A map showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently at Rothera Research Station (UK; Lat. -67.56944°; Long -68.12222°), Teniente Luis Carvajal Station (Chile; Lat. -67.76056°; Long. -68.91472°) and General San Martin Station (Argentina; Lat. -68.12972°; Long. -67.10278°), where copies of this management plan shall be made available.
- Copies of this Management Plan shall be made available to vessels and aircraft planning to visit the vicinity of the Area.
- 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.
- Abandoned equipment or materials shall be removed to the maximum extent possible provided that doing so does not adversely impact on the values of the Area
- The Area shall be visited, as necessary, to assess whether it continues to serve the purposes for which it was designated and to ensure that management and maintenance activities 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 studies and monitoring should be conducted, to the maximum extent possible, by non-invasive methods and, if appropriate, through the use of remote sensing techniques.

- 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. Location of ASPA No. 177 Léonie Islands and south-east Adelaide Island, within the wider Marguerite Bay area. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. (Inset map: WGS84 Antarctic Polar Stereographic. Central Meridian 55°W, Standard Parallel: 71°S)

Map 2. Overview map of the multi-site ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula. The Horton, Hurley and Turner Glaciers site is detailed in the map below. The Walton Terraces site on Léonie Island is detailed in Map 3. The Anchorage Island, East Lagoon Island, Donnelly Island and Mucklescarf Island sites are detailed in Map 4. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. Boundary coordinate details can be found in Table 3.

Map 3. Map of the Walton Terraces site, which is part of the multi-site ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. Boundary coordinate details can be found in Table 3.

Map 4. Map of the Anchorage Island, East Lagoon Island, Donnelly Island and Mucklescarf Island sites, which are part of the multi-site ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. Boundary coordinate details can be found in Table 3.

6. Description of the Area

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

General description

Ryder Bay, located in northern Marguerite Bay, is 11 km wide at its mouth and indents 7 km into the south-east side of Adelaide Island, south-west Antarctic Peninsula (see Map 1). The peaks to the east of Ryder Bay rise up to 2315 m above sea level, and three glaciers (Horton, Hurley and Turner Glaciers) drop over 1 km in altitude from the base of the peaks to flow into the bay. All of the Léonie Islands are situated in Ryder Bay. A minimum deglaciation date for Marguerite Bay has been estimated at c. 9000 years ago. Most of the islands in the bay have patches of persistent snow, and Léonie Island, the largest and highest of the Léonie Islands, has a large permanent ice cap. The islands are rocky, with irregular coastlines including beaches, steep cliffs, scattered rocks and boulders, providing extensive ice-free ground and crevices for nesting birds and the development of terrestrial communities. Several ephemeral freshwater ponds, meltwater channels and small streams are present, particularly on Léonie Island. Small ponds and melt pools are present on East Lagoon and Anchorage

Islands. Vegetation is sparse and dominated by lichens and mosses, but with Antarctica's two native flowering plants, *Deschampsia antarctica* and *Colobanthus quitensis,* also present.

Boundaries

Boundary coordinates for the Area are provided in Table 3, but for more detail, please see Maps, 2, 3 and 4. There are no boundary markers delimiting the Area as, in general, the coast itself is a clearly defined and visually obvious boundary, or the presence of markers would detract from the wilderness values of the Area.

Boundary descriptions for each of the six sites that comprise the Area are as follows:

<u>Anchorage Island</u>: The site encompasses all of the ice-free ground, permanent ice and semi-permanent ice found within Anchorage Island. However, it excludes the marine environment extending greater than 10 m offshore from the low tide water line, all unnamed adjacent islands and islets and an area on the north-west of the island where a hut is located to support field parties working on the island.

<u>Donnelly Island</u>: The site encompasses all of Donnelly Island but excludes all unnamed adjacent islands and islets. The site encompasses all of the ice-free ground, permanent ice and semi-permanent ice found within Donnelly Island, but excludes the marine environment extending greater than 10 m offshore from the low tide water line.

<u>East Lagoon Island</u>: The site encompasses most of East Lagoon Island, but excludes all unnamed adjacent islets, the marine environment extending greater than 10 m offshore from the low tide water line and the area of the island west of longitude -68.23888° (Boundary Coordinates 1 to 2 on Map 4). A sign detailing the extent of the site boundary will be installed on the island on ice-free ground outside the Area.

<u>Walton Terraces, Léonie Island</u>: The site encompasses predominantly ice-free ground to the west of Léonie Island to a maximum altitude of 100 m, but excludes the marine environment extending greater than 10 m offshore from the low tide water line. From the northernmost point of the site, located on the north-west coast of Léonie Island (Boundary Coordinate (BC) 1), the boundary follows the coast south-west (BC 2) and then south, until a large snow slope, c. 225 m wide, is crossed (BC3). The boundary follows the snow slope inland for c. 250 m to an altitude of 100 m above sea level. (BC 4). The boundary follows the 100 m contour line in a north-north-westerly direction until a large show slope is crossed (BC 6). The boundary then traverses downward across the slope in a northerly direction to join the coast at the northernmost point of the site (BC 1). A sign detailing the extent of the site boundary will be installed on coastal ice-free ground at the northern-most point of the island outside the Area boundary.

<u>Mucklescarf Island</u>: The site encompasses all of the ice-free ground and semi-permanent ice found within Mucklescarf Island, but excludes the marine environment extending greater than 10 m offshore from the low tide water line.

<u>Horton, Hurley and Turner Glaciers</u>: The site encompasses all ice-free ground and permanent and semi-permanent ice found predominantly within the catchment areas of the Horton, Hurley and Turner Glaciers. Much of the boundary follows the rock ridges that limit the catchment area and are described in an anti-clockwise direction starting with the northernmost point, which is located at the summit of Mount Barré (Boundary Coordinate (BC) 1; Map 2). The boundary extends along the south-west ridge of Mount Barré to the col between Mount Barré and Mount Gaudry (BC 2). It then continues along the north-east ridge of Mount Gaudry to the summit (BC 4). From here, the boundary passes south and then south-east along the southern ridge of Mount Gaudry to Hurley Glacier (BCs 5 and 6). The boundary then follows a line west (towards BC 7), then north-west (BC 9) to join the north-western ridge of Mount Liotard. The boundary follows this ridge south, then east-south-east to the

summit of Mount Liotard (BC 11) and then onward down Mount Liotard's south-easterly ridge to the coast of Ryder Bay (BC 13). Following the coastline north, the boundary then crosses the ocean at the snouts of the Turner Glacier (BCs 14 to 15) and then the Hurley and Horton Glaciers (BC 15 to 16) to then re-join the coastline (BC 16). The boundary follows the coastline north-east for c. 1 km, after which it passes inland (BC 17) along the bottom of the north-eastern face of the south-east ridge of Mount Barré. At a point a little under half way along the south-east ridge of Mount Barré (BC 19) the boundary ascends to join the ridgeline and continues east-north-east to the summit of Mount Barré (BC 1). At the glacier fronts (which have fluctuated in position by up to 100 m over the past 60 years) the boundary is marked using permanent ice-free rock outcrops (marked by BCs 14, 15 and 16); however, this means a small marine area (c. 3.3 km^2) is included within the Area (see Map 2). Where the boundary follows the coastline, it excludes the marine environment extending greater than 10 m offshore from the low tide water line.

Access to the Area site boundaries shall be by overland vehicle, by small boat or by snowmobile over sea ice. Access points for small boats to the Léonie Island sites are described in section *6(ii) Access to the Area*. Use of overland vehicles within the Area is not permitted. Winged aircraft and helicopters are not permitted to land within the Area. Movement within the Area shall be by foot only. Pedestrian traffic shall be kept to the minimum necessary to be consistent with the objectives of any permitted activities.

Climatic conditions

Summer temperatures in the Ryder Bay area are typically between 0 and +5 °C, and in winter generally range from –5 to –20 °C; however, because of the Area's coastal location and the Southern Ocean low-pressure weather systems, temperatures can vary widely at any time of year. Sea ice can form in Ryder Bay from late May to late November, although it takes prolonged periods of calm conditions for ice to form and become fast. Prevailing winds are northerly, reaching gale force on around 70 days per year. While it can snow at any time of year, in recent years the main snowfall has come at the end of winter. Rain occasionally falls during the summer months and overall, annual precipitation is around 700 mm. Because the Area is just south of the Antarctic Circle, it is light for 24 h per day during summer, and for a few weeks in winter the sun does not rise above the horizon.

Geology

No areas of outstanding geological value are located within the Area; however, a description of the general geology of each ASPA site is provided below:

<u>Anchorage and Donnelly islands</u>: The geology of Anchorage and Donnelly islands is part of the Adelaide Island intrusive suite, which is dominated by granodiorites, tonalities and gabbroic rocks. On Anchorage Island, granodiorite is predominant, with minor amounts of quartz diorite and diorite. The geology of Anchorage and Donnelly islands is interpreted to be consistent with the rest of the Adelaide Island intrusive suite and is therefore thought to be approximately 48 Ma (Eocene age). Dioritic/andesitic, feldspar-phyric xenoliths are common, and can account for 30–40% of the rock. The mineralogy of the Anchorage Island granodiorite consists of plagioclase, quartz, amphibole, biotite and variable amounts of chlorite and epidote, which has formed along cracks and joints in the rock, as a result of hydrothermal alteration. Malachite (copper) mineralisation is also a characteristic of the granodiorites of Anchorage and Donnelly Islands. At the northern extremity of Anchorage Island, a 20 m^2 megacrystic granitic block is hosted within the granodiorite.

<u>East Lagoon Island and Mucklescarf Island</u>: Basaltic and andesitic lavas and breccias crop out on the eastern and western parts of Lagoon Island; these generally weather grey/green although some exposures display intense red/yellow hematite mineralised weathering. The

basalt rocks identified on Lagoon Island are associated with the lava successions observed at other more northerly locations on Adelaide Island, including Bond Nunatak and Mount Vélain. Basaltic rocks from East Lagoon Island are generally massive, fine grained lavas, which are typically feldspar porphyritic. Breccias and autoclastic breccias are associated with the lavas, along with thinner vulcanoclastic units. The geology of Mucklescarf Island has not been investigated, but is assumed to be similar to the geology of the Lagoon Islands.

Walton Terraces, Léonie Island: Western Léonie Island is distinct to the main massif of the island, which is gabbroic in composition. The western coastal area is part of the Buchia Buttress formation, also observed in the Turner Glacier region on Adelaide Island. This section is characterised by vulcanoclastic sandstone beds with associated cobble/boulder conglomerates, typical of deposition in a shallow water setting. The rocks are Late Jurassic in age.

Horton, Hurley and Turner Glaciers: This region is dominated by three distinct rocks types. The Mount Liotard Formation is exposed on Mount Liotard and the area to the north and west. At least 1800 m of basaltic andesite and andesite multiple lava flows are exposed across the region. Individual, complete lava units are difficult to distinguish, but where possible, individual lavas of 30–40 m thickness have been identified within the succession. The units are typically feldspar porphyritic, are cut by rare basaltic sills and are interpreted to be approximately 70 million years old. Mount Gaudry and the region to the east of Mount Liotard is dominated by Eocene age granodiorite and hybrid gabbro-granodiorite plutons. Many of the plutons are heterogeneous and are characterized by concentrations of well-rounded xenoliths, which are typically more mafic than the host rock. The coastal margin of this area is characterised by volcanic breccias, crystal tuffs, volcaniclastic rocks and coarse-grained vulcanoclastic sandstone units with interbedded cobble/boulder conglomerates of the Late Jurassic age Buchia Buttress Formation.

Soils

On rock terraces, particularly on Léonie Island, closed stands of moss and grass have developed a relatively rich loamy soil up to 25 cm in depth, which is also present on Anchorage Island, but only in isolated patches. Within the Area the sparse soils occasionally contain egg shell and bone fragments indicative of the earlier existence of penguin colonies, as also recorded on nearby Rothera Point.

Terrestrial habitats and vegetation

A list of plant and lichen species found on the sites that comprise the Area and within other ASPAs in the Marguerite Bay area is given in Table 4. Distinct arrays of plant and lichen species exist within different locations. In particular, despite Léonie Island and ASPA No. 129 Rothera Point both having a high plant biodiversity, the number of shared plant species between locations is not high, demonstrating the need to protect different vegetated sites within the Ryder Bay area. Significant input of nutrients from vertebrate sources occurs on all islands in Ryder Bay and may play a part in determining the relative biological richness of the Area.

Anchorage Island: This irregularly shaped island is around 3 km in length, includes several rocky ridges and reaches a maximum height of 57 m above sea level. On the slopes of these ridges, there are patches of the moss *Sanionia uncinata* and the grass *Deschampsia antarctica*. However, the dominant vegetation consists of lichens. Lichen-dominated areas typically have high coverage of the lichens *Buellia latemarginata*, *Usnea antarctica*, *Rhizoplaca aspidophora*, *Acarospora macrocyclos* and *Buellia* spp., with bryophytes scarce or absent altogether. In contrast, the much scarcer moss-dominated habitats typically have high coverage of the mosses *Sanionia uncinata*, *Brachythecium austro-salebrosum, Pohlia* *nutans* and the algae *Prasiola crispa*, with smaller quantities of the liverwort *Cephaloziella varians* and the lichens, *Buellia spp.*, *Usnea antarctica* and *Acarospora macrocyclos*.

Donnelly Island: Comprehensive surveys of the vegetation of Donnelly Island have not been undertaken, but much of the rocky areas are dominated by *Usnea antarctica. Deschampsia antarctica* and *Colobanthus quitensis* are present on the island and small areas of lush moss are found in some gullies. Plants and lichens on Donnelly Island are likely to be a subset of those present on the immediately adjacent Anchorage Island.

East Lagoon Island: Much of the island, down to rocks just above high water, is covered by a dense, well-developed lichen fellfield of similar species composition to that found on Anchorage Island. However, raised beach terraces on the island's eastern slopes are locally dominated by the grass *Deschampsia antarctica* and the moss *Polytrichastrum alpinum,* whilst west-facing damp gullies and slopes are covered by a moss carpet dominated by *Sanionia uncinatus, Brachythecium austro-salebrosum* and *Andreaea* spp. Moist rock faces are festooned with large thalli of macro-lichens (notably *Umbilicaria* spp. and *Usnea* spp.).

Walton Terraces, Léonie Island: Walton Terraces, on the western part of Léonie Island, are sheltered and receive much reflected radiation from the nearby Hurley and Turner glaciers on Adelaide Island. Additionally, water is continuously available during the summer from late and permanent snow beds, including a number of small, defined streams. Stable terraces, crags and gullies from sea level to *c.* 100 m support large and diverse vegetation stands, while more consolidated boulder screes at the same altitude harbour a typical lichen fellfield community. Several coastal terraces support stands of vegetation of 400-500 m^2, including many closed stands of higher plants *(Deschampsia antarctica, Colobanthus quitensis)* of up to 10 m^2. Dominant bryophytes include *Andreaea* spp., *Barbilophozia hatcheri, Cephaloziella* spp.*, Brachythecium austro-salebrosum, Bryum* spp.*, Sanionia uncinatus, Pohlia nutans* and *Polytrichastrum alpinum* and there is also a very diverse lichen flora (see Table 4).

Mucklescarf Island: Little is known about the terrestrial biology of the island; however, due to the small size of the island, high density of birds and large quantities of surface guano, terrestrial vegetation is minimal.

Horton, Hurley and Turner Glaciers: Little is known about the biology of the ice-free ground within the site. However, the predominance of permanent ice and glaciers, combined with the high altitude and generally steep angle of the ice-free ground means that terrestrial biological communities are likely not to be extensive and may be largely limited to small patches of lichen-dominated communities on available lower altitude rock surfaces.

Invertebrates

The islands of Ryder Bay have unusually diverse invertebrate communities. Nevertheless, differences in invertebrate species richness between sites have been recorded, this being greatest on Léonie Island, intermediate on Anchorage Island, and most limited on the Lagoon Islands (Table 5). On Léonie Island, the most widely distributed species are *Globoppia loxolineata, Gamasellus racovitzai, Eupodes minutus, Nanorchestes berryi, Stereotydeus villosus, Cryptopygus antarcticus, Cryptopygus badasa* and *Friesia grisea*. On Anchorage Island and East Lagoon Island, *Gamasellus. racovitzai, Cryptopygus antarcticus* and *Friesia grisea* are widely distributed, with *Halozetes belgicae* being widespread on East Lagoon Island and *Alaskozetes antarcticus* on Anchorage Island. The presence of the latter two species indicates the coastal marine influence on these low-lying islands. The two predatory mites, *Gamasellus racovitzai* and *Rhagidia gerlachei*, are found in most substrates sampled, and the herbivore/detritivore *Stereotydeus villosus* (Prostigmata) is also often found in great numbers on the surface of stone substrates. The springtails *C. antarcticus* and *C. badasa* show little overlap in distribution at Ryder Bay sites, the latter being more abundant in material taken from small growths of moss found on ledges and crevices at higher altitude (on Léonie Island in particular) and the former dominating more extensive coastal (and possibly more consistently damp) habitats. *F. grisea* is generally encountered infrequently in coastal substrates, with the exception of drier *Polytrichastrum alpinum* turfs where it is dominant. Invertebrate records are not available for Mucklescarf Island, Donnelly Island, or the Horton, Hurley and Turner Glaciers, although they are likely to be a subset of those listed in Table 5.

The non-native Collembolon, *Hypogastrura viatica*, was recorded from Léonie Island and presumably introduced before 1993. In 2015 an attempt was made to assess the continued presence and distribution of this species in the local area, including the islands of Ryder Bay and Rothera Point. *Hypogastrura viatica* was not identified amongst the Collembola specimens extracted from samples taken from the islands and Rothera Point. With no evidence of the continued presence of this non-native Collembolon in the local area, either *H. viatica* has become extinct or has such a restricted spatial distribution that the monitoring programme failed to detect it. In light of these results, biosecurity measures are described as a precautionary measure to reduce the risk of further anthropogenic dispersal of this potentially invasive species (see *7(i) General permit conditions*).

Vertebrate fauna

Numbers of skua territories counted in January 2018 within the ASPA sites on each of the islands, were as follows: Léonie Island (west) (159, and 58 skuas at a club site), East Lagoon Island (144), Anchorage Island (439 and 136 skuas at two club sites) and Donnelly Island (25). Skua territories were widely distributed across snow-free ground except on the scree above 100 m on Léonie Island.

Antarctic shags breed on Mucklescarf Island (251 pairs), with the colony unusually large for this species; only 11 other colonies (<10% of those recorded) hold ≥200 pairs (Schrimpf et al. 2018). No skua territories were found on the island.

Other breeding species are kelp gulls (*Larus dominicanus*), which are found on East Lagoon Island (15-25 pairs), Anchorage Island (10-20 pairs), Léonie Island (20-30 pairs) and Donnelly Island (10-20 pairs) (all counts in 2018; British Antarctic Survey unpublished data). Antarctic terns (*Sterna vittata*) do not breed within the Area, but around 10 pairs breed elsewhere on Léonie Island. However, Antarctic terns were recorded breeding in small numbers on Lagoon and Anchorage Islands in the 1990s (Milius 2000). Wilson's storm-petrels (*Oceanites oceanicus*) breed at Anchorage Island, confirmed in 2018 by records of adults calling from crevices in daylight or a bird seen incubating - and are highly likely to breed on East Lagoon Island given the large extent of suitable habitat. Moulting Adélie penguins (*Pygoscelis adeliae*) are present in considerable numbers (10s to 100s of birds) on Anchorage Island, and in smaller numbers elsewhere in the Area in the late summer. However, no penguin or giant petrel colonies are present within the Area.

Weddell seals (*Leptonychotes weddellii*) haul out on the shore of raised beaches at all sites. Large numbers (>100) of moulting southern elephant seals (*Mirounga leonina)* haul out on Anchorage Island, and East Lagoon Island in the summer, and 100s of non-breeding Antarctic fur seals (*Arctocephalus gazella*) may be present on the islands in the late summer. The numbers of fur seals are currently small and may be rising, which may ultimately cause a similar threat to the terrestrial environment as experienced at sites in the South Orkney Islands.

Human activities and impact

The Léonie Islands have been subject to human activity for over 112 years. The islands were charted originally in January 1909 by Jean-Baptiste-Etienne-Auguste Charcot during the French Antarctic Expedition (1908-10) and further charted by the British Graham Land Expedition in February 1936, when the name of the largest island was also applied to the whole group. The islands were further surveyed by British expeditions from "Stonington

Island" (1948-50) and charted by an RN Hydrographic Survey Unit from HMS Endurance (1976-77). The islands were visited occasionally following the establishment of Adelaide Station (1961-77) and more regularly following the establishment of Rothera Research Station (Lat. -67.56944°; Long -68.12222°) in 1975, which is located only 3.5 km from the nearest island within the Area. The Léonie Islands became a focus for substantial terrestrial biology research following the construction of the Bonner Laboratory at Rothera Research Station in 1997. Overall, activities have been confined to scientific research visits and recreation visits by station personnel and occasional visits by tourists aboard yachts and, more rarely, cruise vessels.

Anchorage Island: Anchorage Island has been subject to intensive research since the mid-1990s. The Anchorage field hut (located just outside the Area) has supported field researchers for several years. A wooden mast was erected for survey purposes in the 1960s on the highest point of the island (Lat. -67.59778°; Long. -68.20417°), but this has subsequently collapsed and the mast, anchor cables and stakes were removed in Jan 2018.

Donnelly Island: Donnelley Island was visited by two people for one hour on 31 Jan 2018 for environmental management purposes. To our knowledge it had not been visited previously for at least 20 years. However, a brief visit to the island was made in the mid-1990s to install a small memorial plaque for John P. Donnelly, ship Chief Engineer with the British Antarctic Survey, after whom the island is named.

East Lagoon Island: East Lagoon Island has been subject to research, particularly on its lichen communities, since the 1990s. The close proximity of East Lagoon Island to the field hut on West Lagoon Island means that the site has been subject to some recreational visits. The two islands are separated by a shallow channel, 50 m wide, which can be crossed using waders at low tide.

Walton Terraces, Léonie Island: Located on the side of Léonie Island that is furthest from Rothera Research Station, the area has received occasional visits by researchers and infrequent recreational visits by research station staff.

Mucklescarf Island: Due to its small size and high density of breeding birds, the island has been of interest to bird biologists but has only been visited irregularly (every few years) to undertake bird population counts.

Horton, Hurley and Turner Glaciers: In contrast to the high levels of visitation to some of the other sites within the Area over the past century or more, visitation of the Horton, Hurley and Turner Glaciers has been almost non-existent. Ascents of the peaks located at the northern and western boundary of the Area site have been made by geological parties, but they did not enter the Area. One landing was made by a small geological party during the 2006/7 for c. 1 hour at the eastern boundary of the site at the rock bluff south of the Turner Glacier front (Lat. -67.57778°; Long. -68.38750°). No other access to the site is known. No permanent or semi-permanent infrastructure, artefacts, transport routes or any other evidence of visible human presence are known.

Other nearby research stations

Two year-round scientific research stations operate in the vicinity: General San Martín (Argentina; Lat. -68.12972°; Long. -67.10278°) which is 75 km south-east, and Rothera Research Station (UK; Lat. -67.56944°; Long -68.12222°) which is c. 3.5 km to the north-east. A summer-only station, Teniente Luis Carvajal (Chile; Lat. -67.76056°; Long. -68.91472°), located 35 km to the south-west at the southern end of Adelaide Island, has been operated by Chile since 1985. The temporary Turkish Antarctic Research Station (TARS; Lat. -67.829676°; Long -67.237757°) is located on Horseshoe Island, c. 45 km east-south-east from the Area.

6 (ii) Access to the Area

Due to the presence of submerged rocks, access to each of the Area sites is best made by small shallow-bottomed boats. Alternatively, if reliable sea ice has formed, it may be possible to access the Area by snowmobile. Access points for small boats are shown in Maps 3 and 4 and are described below.

Anchorage Island: Access to the island is best made at rocks located near the research hut on the north-west shore of the island at coordinates Lat. -67.60278°; Long -68.21319°. An alternative access point is to the east of the island at Lat. -67.60167°; Long. -68.20056°, but landings at other locations around the island may be possible.

Donnelly Island: The recommended landing site is located at Lat. -67.61000°; Long. -68.20222°, but landings at other locations around the island may be possible.

East Lagoon Island: Landing may be possible at many locations on the beach to the east of the 'lagoon' that separates West Lagoon Island and East Lagoon Island, for example, at Lat. -67.59344°; Long. -68.24003°.

Walton Terraces, Léonie Island: Given that the site is included in the Area to protect its wilderness values, entry is only allowed for compelling scientific reason, which cannot be served elsewhere in the ASPA, or for reasons essential to the management of the Area. Léonie Island is best accessed on the northern tip of the island outside the Area (Lat. -67.59250°; Long. -68.34139°). Other landing sites may be possible, but submerged rocks present a significant risk to vessels.

Mucklescarf Island: Access to the island is best made at a small inlet to the south of the island at coordinates Lat. -67.59411°; Long. -68.26119°. Landing at other locations may be difficult due to the rocks and the large density of birds on the island.

Horton, Hurley and Turner Glaciers: Given that the site is included in the Area to protect its wilderness values, entry is only allowed for compelling scientific reasons, which cannot be served elsewhere in the ASPA, or for reasons essential to the management of the Area. If access is required for such reasons, then this may be achieved by small boat from Ryder Bay, or overland via various snow covered mountain passes to the north and west of the site.

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

There are no permanent structures present within the Area. The nearest scientific research station is Rothera Research Station, located 3.5 km north-east of Anchorage Island (see Map 2). A refuge, which is currently being replaced, is located on Anchorage Island just outside the Area, c. 200 m from the western-most recommended boat landing site. Scientific equipment has been installed at several locations on Anchorage Island including cloches (Lat. -67.60611°; Long -68.21806°), an Automatic Weather Station (Lat. -67.60253°; Long. -68.20292°) and artificial plant experiments (Lat. -67.60556°; Long. -68.20556° and Lat. -67.64583°; Long. -68.20417°). On Donnelly Island a memorial plaque has been installed with the words 'This island named in memory of John P. Donnelly (1948-1993) Chief Engineer RRS James Clarke Ross' (Lat. -67.60806°; Long. -68.19667°). No structures are located within East Lagoon Island, Walton Terraces on Léonie Island, Mucklescarf Island or the Horton, Hurley and Turner Glaciers.

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

ASPA No. 129 Rothera Point, Marguerite Bay lies 4 km north-east of Anchorage Island. ASPA No. 107, Emperor Island, Dion Islands, Marguerite Bay, lies about 15 km south of Adelaide Island. ASPA No. 115, Lagotellerie Island, Marguerite Bay, lies about 11 km south of Pourquoi Pas Island. ASPA No. 117, Avian Island, Marguerite Bay, lies about 0.25 km south of the south-west tip of Adelaide Island. HSM No. 63 'Base Y' is located on Horseshoe Island, c. 45 km east-south-east from the Area. The locations of these protected areas are shown on 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 under Article 3, paragraph 4, and 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 reason, which cannot be served elsewhere, or for reasons essential to the management of the Area;
- for sites that are included in the Area to protect wilderness values, i.e., Horton, Hurley and Turner Glaciers and Walton Terraces on Léonie Island (see Table 2), activities shall only be undertaken for compelling scientific reasons, which cannot be served elsewhere in the ASPA, or for reasons essential to the management of the Area.
- the activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the environmental, scientific, wilderness and aesthetic values of the Area;
- the activities permitted are in accordance with this Management Plan;
- the Permit, or an authorised copy, shall be carried when in the Area;
- the Permit shall be issued for a finite period;
- a report is supplied to the authority or authorities named in the Permit; and
- the appropriate authority should be notified of any activities/measures that might have exceptionally been undertaken, and/or of any materials released and not removed, that were not included in the authorized permit.

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

To protect the values of the Area, the following restrictions apply within the Area:

- To protect the wilderness values of the Area, in accordance with the aims and objective of this management plan, visits to the Horton, Hurley and Turner Glaciers site and Walton Terraces on Léonie Island shall be kept to the absolute minimum.
- Access to the Area site boundaries shall be by small boat (e.g., Rigid Inflatable Boat (RIB)) or by snowmobile or other overland vehicle. Access points for small boats to the Léonie Island sites are described in section *6(ii) Access to the Area* and below:

- Anchorage Island: Lat. -67.60278°; Long. -68.21306° or Lat. -67.60167°; Long. -68.20056°

- Donnelly Island: Lat. -67.61000°; Long. -68.20222°

- East Lagoon Island: Lat. -67.59344°; Long. -68.24003°

- Walton Terraces, Léonie Island: Lat. -67.59250°; Long. -68.34139°

- Mucklescarf Island: Lat. -67.59411°; Long. -68.26119°

- Horton, Hurley and Turner Glaciers: Access by boat not recommended

- Use of overland vehicles within the Area is not permitted.
- Movement across land and ice within the Area shall be by foot only. Pedestrian traffic shall be kept to the minimum necessary to be consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects. No trails exist within the Area. Visitors should avoid areas of visible vegetation. Care should be exercised when walking in areas of moist ground, particularly stream course beds, where foot traffic can easily damage sensitive soils, plant and algal communities, and degrade water quality.
- Winged aircraft and helicopters are not permitted to land within the Area.
- The Rothera Research Station runway commenced operation in 1991 and is located within 3.5 km of some sites within the Area. Given the proximity of the runway, on occasions overflight of the Area may be necessary for operational or scientific reasons. To the maximum extent possible, the operation of aircraft over the Area should be carried out, in compliance with the *Guidelines for the Operation of Aircraft near Concentrations of Birds* contained in Resolution 2 (2004) (available at: http://www.ats.aq/documents/recatt/Att224_e.pdf).
- Overflight of bird colonies within the Area by Remotely Piloted Aircraft Systems (RPAS) shall not be permitted unless for compelling scientific or operational purposes, and in accordance with a permit issued by an appropriate national authority. Furthermore, 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://www.ats.aq/devAS/ats_meetings_meeting_measure.aspx?lang=e).
- Strict personal quarantine precautions shall be undertaken to avoid the introduction of non-native species. Precautions shall also be applied when moving between the different sites that comprise the Area. Specifically, footwear shall be scrubbed to remove any adhered soil or mud and outer clothing, bags and experimental equipment must be free of soil, mud, guano and plant propagules.

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.
- Scientific research that will not jeopardise the environmental, scientific or wilderness values of the Area.
- Essential management activities, including monitoring.

For sites that are included in the Area to protect wilderness values, i.e. Horton, Hurley and Turner Glaciers and Walton Terraces on Léonie Island (see Table 2), activities shall only undertaken for compelling scientific reasons, which cannot be served elsewhere in the ASPA, or for reasons essential to the management of the Area.

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 and for a pre-established period, as specified in a permit.
- For sites that are included in the Area to protect wilderness values, i.e., Horton, Hurley and Turner Glaciers and Walton Terraces, Léonie Island (see Table 2), the installation of structures shall only be undertaken for compelling scientific reason, which cannot be served elsewhere in the ASPA, or for reasons essential to the management of the Area.
- Permanent structures or installations are prohibited.
- 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, spores) 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 the responsibility of the authority which granted the original permit and shall be a condition of the Permit.
- Existing structures within the Area must not be removed, except in accordance with a permit (see section *6 (iii) Location of structures within and adjacent to the Area*).

7(v) Location of field camps

- Camping within the Area is prohibited.
- Accommodation may be available at Rothera Research Station.
- Alternatively, field huts/facilities operated by the British Antarctic Survey are located on West Lagoon Island (Lat. -67.59393°; Long. -68.24311°) and on Anchorage Island just outside the Area (Lat. -67.60222°; Long. -68.20893°) (see Map 4).
- Camping outside the Area on Léonie Island may be possible on the beach at location Lat. 67.59361°; Long. -68.34389° (see Map 3).

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, restrictions on materials and organisms that may be brought into the area are as follows:

- The deliberate introduction of animals, plant material, microorganisms and non-sterile soil into the Area shall not be permitted.
- Precautions shall be taken to prevent the unintentional introduction of animals, plant material, microorganisms and non-sterile soil from other biologically distinct regions (within or beyond the Antarctic Treaty area). Furthermore, substantial differences in biodiversity have been recorded between the different sites that comprise the ASPA,

therefore, precautions shall be taken to prevent the transfer of species between sites within the ASPA. Visitors should also consult and follow, as appropriate, recommendations contained in the *CEP non-native species manual*, and in the *Environmental code of conduct for terrestrial scientific field research in Antarctica*. Additional specific biosecurity measures are listed in section *7(x)*.

- 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 radio-nuclides or stable isotopes, which may be introduced for a compelling scientific purpose 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, food and other materials are not to be deposited in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. They shall be stored and handled in a way that minimises the risk of their accidental introduction into the environment. Permanent depots are not permitted.
- Materials introduced into the Area shall be for a stated period only and shall be removed by the end of that stated period.

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 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*.
- Any water, sediment, soil or vegetation sampling is to be kept to the minimum required for scientific or management purposes, and carried out using techniques that minimise disturbance to surrounding soil, ice structures and biota.

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 (see sections *7(iii) Activities which may be conducted in the Area*, *7(x) Measures that may be necessary to continue to meet the aims of the management plan* and *7(vii) Taking of, or harmful interference with, native flora and fauna*). With regard to geological sampling, permits shall not be granted if there is a reasonable concern that any proposed sampling would take, remove or damage such quantities of rocks (including fossiliferous rocks) that their abundance within the Area would be significantly affected. Other 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 national authority must be notified and approval obtained.

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 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;
- maintenance of scientific equipment; and
- 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 programmes working within the Area, such as those of the United Kingdom or the Netherlands, before initiating the work.

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 Area, visitors shall take special precautions against biological introductions both into <u>and</u> between each of the six sites that comprise the ASPA. 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 shall ensure that footwear, clothing and equipment – particularly any sampling equipment – is thoroughly cleaned before entering the Area or moved between the six sites that comprise the Area.

The Area has not been designated specifically to protect geological values; however, in view of the fact that geological sampling is both permanent and results in cumulative impact the following measures shall be taken to safeguard the values of the Area:

- Visitors removing geological samples from the Area shall complete a record describing the geological type, quantity and location of samples taken, which should, at a minimum, be deposited with their National Antarctic Data Centre or with the Antarctic Master Directory.
- Visitors planning to sample within the Area shall demonstrate that they have familiarised themselves with earlier collections to minimise duplication.

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)).
- In this report, particular note should be made of the specific ice-free locations visited within the Area (including, if possible, GPS coordinates), the length of time spent at each location and the activities undertaken.
- 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 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.

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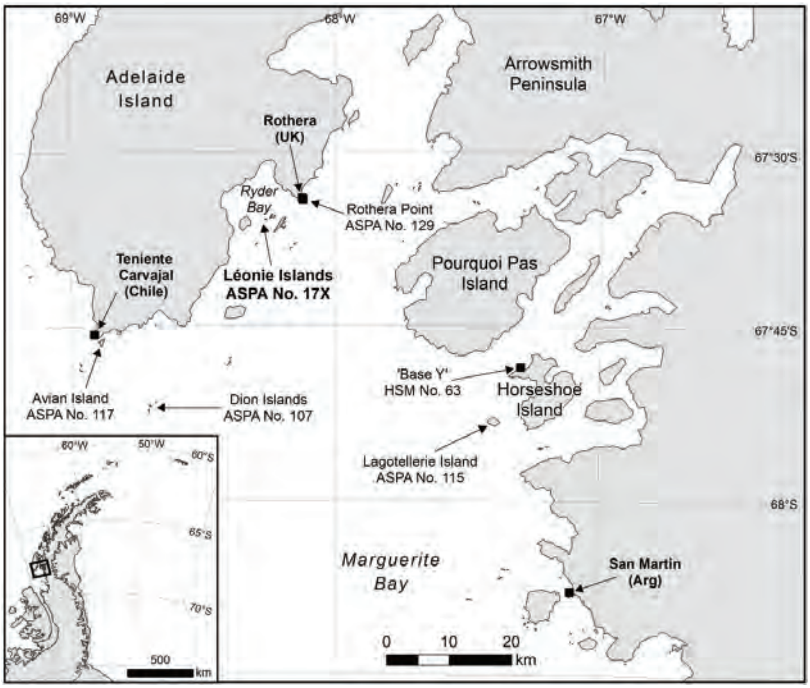
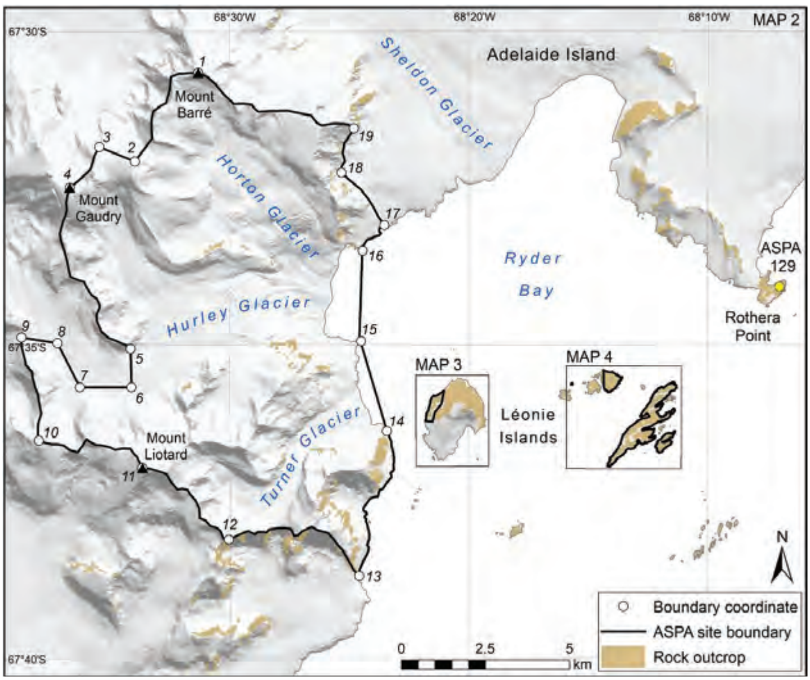
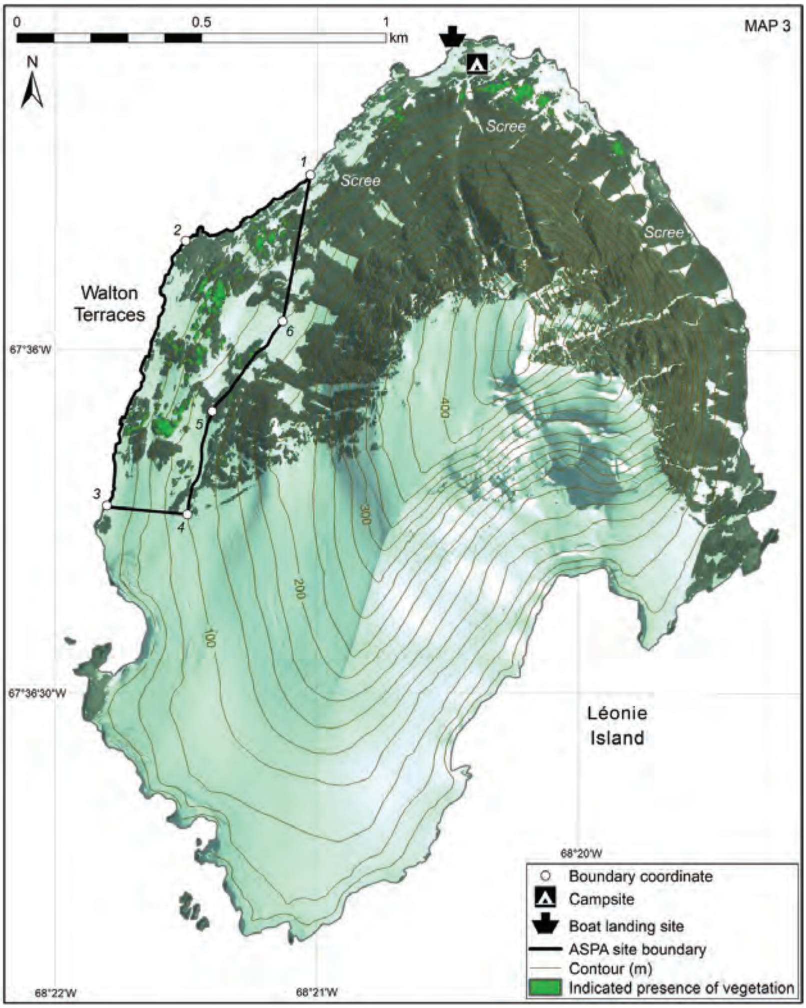
Map 1. Location of ASPA No. 177 Léonie Islands and south-east Adelaide Island, within the wider Marguerite Bay area. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. (Inset map: WGS84 Antarctic Polar Stereographic. Central Meridian 55°W, Standard Parallel: 71°S)



Map 2. Overview map of the multi-site ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula. The Horton, Hurley and Turner Glaciers site is detailed in the map below. The Walton Terraces site on Léonie Island is detailed in Map 3. The Anchorage Island, East Lagoon Island, Donnelly Island and Mucklescarf Island sites are detailed in Map 4. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. Boundary coordinate details can be found in Table 3.



Map 3. Map of the Walton Terraces site which is part of the multi-site ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. Boundary coordinate details can be found in Table 3.



Map 4. Map of the Anchorage Island, East Lagoon Island, Donnelly Island and Mucklescarf Island sites, which are part of the multi-site ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula. Map specifications: WGS84 UTM Zone 19S. Central Meridian 68°W. Boundary coordinate details can be found in Table 3.

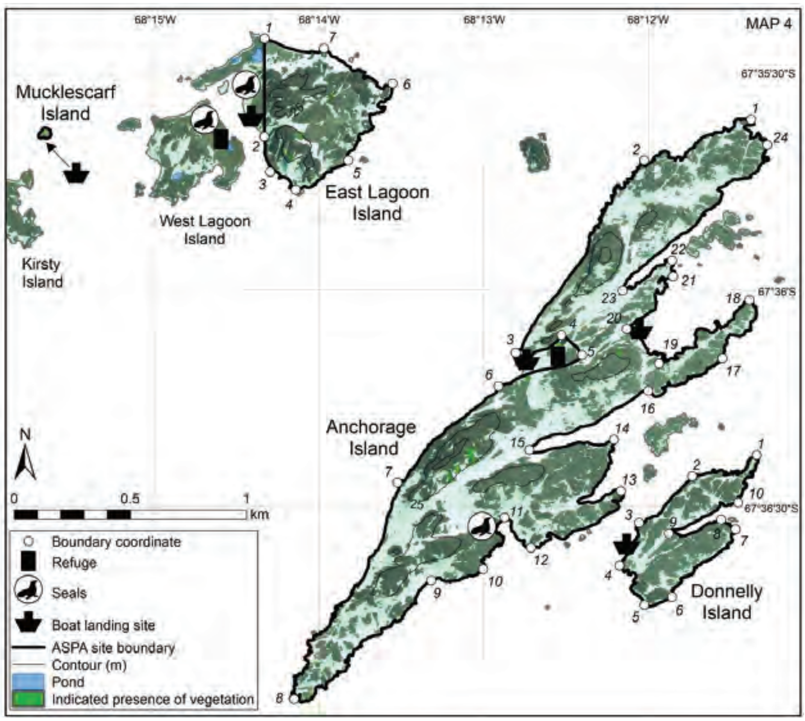


Table 2. Outstanding values present in each of the sites that comprise ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula.

	Values					
	Scientific		Environmental		Wilderness	Aesthetic
	Research	Environmental monitoring control area	Avifauna	Terrestrial communities		
Anchorage Island	✓		✓	✓		
Donnelly Island		✓	✓			
East Lagoon Island			✓	✓		
Walton Terraces, Léonie Island			✓	✓	✓	✓
Mucklescarf Island			✓			
Horton, Hurley and Turner Glaciers					✓	✓

Table 3. Boundary co-ordinates for the five sites that comprise ASPA No. 177 Léonie Islands and south-east Adelaide Island, Antarctic Peninsula.

Area site	**Area (ha)**	**Boundary coordinate number**	**Latitude**	**Longitude**
Anchorage Island	60	1	-67.59343	-68.18966
		2	-67.59500	-68.20047
		3	-67.60244	-68.21346
		4	-67.60175	-68.20882
		5	-67.60252	-68.20673
		6	-67.60373	-68.21517
		7	-67.60744	-68.22540
		8	-67.61580	-68.23586
		9	-67.61121	-68.22198
		10	-67.61078	-68.21674
		11	-67.60879	-68.21456
		12	-67.60996	-68.21190
		13	-67.60777	-68.20280
		14	-67.60578	-68.20351
		15	-67.60617	-68.21206
		16	-67.60390	-68.20002
		17	-67.60264	-68.19252
		18	-67.60040	-68.18981
		19	-67.60285	-68.19893
		20	-67.60151	-68.20222
		21	-67.59949	-68.19752
		22	-67.59887	-68.19763
		23	-67.60003	-68.20262
		24	-67.59441	-68.18798
Donnelly Island	12	1	-67.60637	-68.18904
		2	-67.60719	-68.19556
		3	-67.60899	-68.20094
		4	-67.61063	-68.20291
		5	-67.61216	-68.20040
		6	-67.61185	-68.19761
		7	-67.60923	-68.19119
		8	-67.60886	-68.19263

		9	-67.60940	-68.19792
		10	-67.60820	-68.19092
East Lagoon Island	20	1	-67.59032	-68.23888
		2	-67.59409	-68.23888
		3	-67.59547	-68.23829
		4	-67.59615	-68.23571
		5	-67.59502	-68.23040
		6	-67.59205	-68.22590
		7	-67.59070	-68.23286
Walton Terraces, Léonie Island	15	1	-67.59574	-68.35042
		2	-67.59734	-68.35836
		3	-67.60377	-68.36337
		4	-67.60399	-68.35826
		5	-67.60149	-68.35666
		6	-67.59930	-68.35218
Mucklescarf Island	0.2	1	-67.59410	-68.26058
		2	-67.59376	-68.26123
		3	-67.59413	-68.26170
Horton, Hurley and Turner Glaciers	10100	1	-67.51119	-68.52134
		2	-67.53467	-68.56568
		3	-67.53070	-68.59038
		4	-67.54162	-68.61102
		5	-67.58448	-68.56908
		6	-67.59470	-68.56860
		7	-67.59465	-68.60456
		8	-67.58291	-68.62003
		9	-67.58135	-68.64524
		10	-67.60882	-68.63338
		11	-67.61618	-68.56115
		12	-67.63532	-68.50071
		13	-67.64501	-68.40963
		14	-67.60650	-68.39021
		15	-67.58256	-68.40812
		16	-67.55850	-68.40703
		17	-67.55176	-68.39190
		18	-67.53782	-68.42167
		19	-67.52601	-68.41303

Table 4. Species of vascular plants, mosses, lichens, algae occurring within sites comprising ASPA No. 177 Léonie Islands and south-east Adelaide Island, and other ASPAs in the Marguerite Bay area. Data taken from Cannone et al. (2018) and the British Antarctic Survey database. Data for Donnelly Island and Mucklescarf Islands are unavailable; however, the flora of Donnelly Island is likely to be a subset of the Anchorage Island flora due to their close proximity (115 m separation at their closest point). Plant diversity for Mucklescarf Island is likely to be very low due to the high density of breeding birds, which cover almost all of the terrain, and the small size of the island (55 m at maximum width). No data are available for the Horton, Hurley and Turner Glaciers site, but vegetation diversity is likely to be low due to the altitude and steepness of the available ice-free ground.

Site Name	**Léonie Island***	**Anchorage Island**	**Lagoon Islands***	**ASPA No. 129 Rothera Point**	**ASPA No. 117 Avian Island**	**ASPA No. 115 Lagotellerie Island**
Data Source	BAS	BAS	BAS	Cannone et al. (2018)	BAS	BAS
Vascular Plants						
Deschampsia antarctica	1	1	1	1		1
Colobanthus quitensis	1	1	1	1		1
Hepatics						
Barbilophozia hatchery	1					
Cephaloziella varians	1	1	1		1	1
Lophozia excisa	1		1			
Marchantia berte roana	1					
Mosses						
Andreaea depressinervis	1	1	1	1	1	
Andreaea parallela var. gainii	1					
Andreaea regularis	1	1	1			
Bartramia patens	1	1	1			1
Brachythecium austro-	1	1	1		1	1

salebrosum						
Bryoerythrophyllum recurvirostrum	1					
Bryum archangelicum	1	1	1			1
Bryum argenteum	1		1		1	1
Bryum pallescens	1					1
Bryum pseudotriquetrum	1				1	1
Bryum urbanskyi	1					
Ceratodon purpureus	1	1	1		1	1
Coscinodon reflexidens	1		1			
Didymodon brachyphyllus	1					
Distichium capillaceum	1					
Encalypta rhaptocarpa	1					
Grimmia plagiopodia	1					
Hennediella heimii		1				1
Hypnum revolutum	1		1			1
Orthogrimmia sessitana						
Platydictya jungermannioides	1					1
Pohlia cruda	1		1		1	
Pohlia nutans	1	1	1		1	1
Polytrichastrum alpinum	1		1			
Sanionia uncinata	1	1	1	1	1	1
Schistidium andinum	1					
Schistidium antarctici	1	1	1			
Syntrichia magellanica	1	1	1		1	1
Syntrichia sarconeurum	1					1
Tortella alpicola	1					

Warnstorfia fontinaliopsis					1	
Willia austroleucophaea						1
Lichens						
Acarospora convoluta	1					
Acarospora macrocyclos		1		1		1
Amandinea coniops	1					
Amandinea isabellina				1		
Amandinea petermannii	1	1		1		
Bacidia tubercolata	1					
Bryonora peltata	1					
Buellia anisomera	1		1	1		
Buellia babingtonii				1		
Buellia cladocarpiza	1					
Buellia darbishirei				1		
Buellia falklandica	1					
Buellia illaetabilis				1		
Buellia latemarginata	1	1		1		
Buellia perlata				1		
Buellia pycnogonoides	1					
Buellia russa				1		
Buellia sp.				1		
Caloplaca athallina			1			
Caloplaca cirrochrooides				1		
Caloplaca isidioclada	1			1		1
Caloplaca lucens	1					
Caloplaca psoromatis	1					
Caloplaca sublobulata	1			1		

Caloplaca tiroliensis	1					
Candelariella flava	1			1		
Candelariella vitellina	1					1
Cladonia fimbriata					1	
Cladonia galindezii	1					1
Cladonia pleurota	1		1			
Cladonia pocillum						1
Cladonia pyxidata	1					
Dermatocarpon polyphyllizum	1					
Flavoparmelia gerlachei	1		1			1
Frutidella caesioatra	1					
Huea cerussata						1
Huea corallifera	1			1		
Lecania brialmontii			1			1
Lecanora dispersa agg.	1			1		
Lecanora physciella				1		
Lecanora polytropa	1			1		
Lecidea atrobrunnea	1					1
Lecidea placodiiformis	1					1
Lepraria caesioalba	1	1				
Lepraria sp.				1		
Leproloma cacuminum				1		
Leproloma vouauxii						1
Leptogium puberulum	1		1			1
Massalongia carnosa			1	1		
Mastodia tessellata	1			1		1
Megaspora verrucosa	1					

Ochrolechia frigida	1	1	1	1		
Parmelia saxatilis	1		1			
Phaeophyscia endococcina	1					
Physcia caesia	1		1	1	1	1
Physconia muscigena	1		1			1
Pleopsidium chlorophanum				1		1
Pseudephebe minuscula	1		1	1		
Pseudephebe pubescens			1	1		1
Psoroma cinnamomeum			1			
Psoroma hypnorum	1		1			
Rhizocarpon disporum	1					
Rhizocarpon distinctum				1		
Rhizocarpon geographicum	1					
Rhizocarpon grande				1		
Rhizocarpon griseolum	1					
Rhizoplaca aspidophora	1	1	1			1
Rhizoplaca melanophthalma	1		1	1		1
Rinodina olivaceobrunnea	1		1	1		
Stereocaulon alpinum	1		1			
Stereocaulon antarcticum	1			1		
Umbilicaria antartica	1	1	1			
Umbilicaria decussata	1		1	1		1
Umbilicaria kappeni			1	1		
Umbilicaria nylanderiana	1					
Umbilicaria umbilicarioides	1					
Usnea antartica	1	1	1	1	1	1
Usnea aurantiaco-atra	1	1	1			

Usnea sphacelata	1			1	1
Usnea subantarctica	1	1	1	1	
Xanthoria candelaria	1		1	1	1
Xanthoria elegans	1	1	1	1	1
Other					
Prasiola crispa		1		1	

* Data may include some species on Léonie and Lagoon Islands found outside the boundary of the ASPA.

Table 5. Microarthropods recorded from Anchorage, Lagoon and Léonie Islands.

	Anchorage Island	**Lagoon Islands**	**Léonie Island**
Cryptostigmata			
Austroppia crozetensis			?
Alaskozetes antarcticus	1	1	1
Halozetes belgicae	1	1	1
Globoppia loxolineata	1		1
Globoppia intermedia			?
Magellozetes antarcticus	1	1	1
Mesostigmata			
Gamasellus racovitzai	1	1	1
Prostigmata			
Eupodes exiguus		1	
Eupodes minutus			1
Eupodes parvus			1
Apotriophtydeus sp.	1		
Pretriophtydeus tilbrooki	1	1	
Nanorchestes berryi	1	1	1
Nanorchestes gressitti	1		1
Nanorchestes sp.	1	1	
Stereotydeus villosus	1	1	1
Rhagidia gerlachei	1	1	1
Collembola			
Cryptopygus antarcticus	1	1	1
Cryptopygus badasa	1	1	1
Friesia grisea	1	1	1
Folsomotoma octo-oculatata			1

Management Plan for Antarctic Specially Protected Area No. 178

INEXPRESSIBLE ISLAND AND SEAVIEW BAY, ROSS SEA

Introduction

Inexpressible Island and Seaview Bay is located in Terra Nova Bay, Victoria Land, Western Ross Sea at 74° 54.2' S, 163° 43.5' E (Map 1). The ASPA (hereinafter also referred to as Area) has an approximate area of 3.31 km^2, 0.99 km^2 marine (35 %) and 2.32 km^2 terrestrial (65%) (Map 2) and was proposed by China, Italy and the Republic of Korea. The Area is distinctive and the primary reasons for its designation as an ASPA is the need to protect environmental and outstanding scientific values. In particular, this Area hosts one of the oldest Adélie penguin (*Pygoscelis adeliae*) colony and an important breeding site of South Polar Skua (*Stercorarius maccormicki*). The Area was identified as an important bird area (IBA 178) by BirdLife International on the basis of the South Polar Skua colony and the concentration of seabirds, in particular Adélie Penguin (Resolution 5, 2015). Its particular ecosystem is related to the adjacent Terra Nova Bay polynya and allows comparison with other nearby sites with different sea ice dynamics along the year. Moreover, in the ASPA, several lakes are influenced by guano nutrient inputs, while others are not impacted.

The first documented record of an Adélie penguin breeding group in the Area was in 1963, and continuous monitoring has been carried out from the 1980s to the present, with so far one of the earliest statistical record of the Adélie penguin in the Ross Sea region. The active penguin colony in the Area has had continuous occupation for the past ~7,000 years, which is the longest existing Adélie penguin colony in the Ross Sea region. There are more than 20,000 breeding pairs of Adélie penguins. The proposed ASPA includes crucial penguins' foraging access area to Terra Nova Bay polynya. Concerning South Polar Skuas, while up to 60 breeding pairs were reported in the 80's, recent investigation found no more than 30 breeding pairs, resulting in a quite low breeding success of these species in the area.

The ASPA is located within Domain S (McMurdo-South Victoria Land geologic) based on the Environmental Domains Analysis for the Antarctic continent (Resolution 3, 2008). Moreover, the ASPA sits within Antarctic Conservation Biogeographic Region (ACBR) 8 Northern Victoria Land (Resolution 3, 2017).

The marine area of the ASPA is located within the General Protection Zone of the Ross Sea Region Marine Protected Area. The research and monitoring data generated from the ASPA could benefit the scientific work for the RSRMPA.

1. Description of values to be protected

The exceptional scientific and ecological values of the Area are based on the following:

The Adélie penguin colony of Inexpressible Island is one of the longest monitored (over 30 years) Adélie penguin population in the Ross Sea region (Woehler and Croxall, 1997). Located in Seaview Bay (74°54'04" S, 163°43'20" E) and South Bay (74°54'40" S, 163°43'31" E), the penguin colony is currently made up by more than 20,000 breeding pairs in Seaview Bay, and about 100 breeding pairs in South Bay (Map 3). The latest count gives a total number of 29,899 breeding pairs in 2019 (MOE, 2020). Long-term planned population dynamic monitoring will provide support for studying the dynamics of breeding penguin populations, and the relationship between populations and climate change.

The Adélie penguin breeding colony have the longest continuous occupation history, longer than 7,000 years in the Area (Baroni and Orombelli, 1991, 1994; Lambert et al., 2002; Baroni and Hall, 2004; Shepherd et al. 2005; Emslie et al, 2007; Mazgec et al., 2017). Extraction of ancient DNA from remains is important for estimating and correcting molecular evolution rates, and exploring population historical dynamics, genetic structural changes, as well as climate change (Lambert et al., 2002; 2010; Ritchie et al., 2004; Sheperd et al., 2005; Millar et al., 2008; 2012; Submaranian et al., 2009; Parks et al., 2015). Subfossil bone samples that retain DNA for 7,000 years of the Adélie penguin have been cryopreserved in the area. In fact, in the current breeding grounds, there is high density (1-5/m^2) of well-preserved penguin mummies of different ages, which would provide a rich and unique sample library for studying the historical dynamics, climate change and molecular evolution at geological scale. Additionally, penguin guano input in the lacustrine sediment is also ideal for paleoecology research. Sub-fossil remains of southern elephant seals (*Mirounga leonina*) were also recovered in the area (Hall et al., 2006; Koch et al., 2019).

In Terra Nova Bay and surrounding areas (Wood Bay) three colonies of Adélie penguin are present: Edmonson Point (Wood Bay, ASPA 165), Adélie Cove, and Inexpressible Island (c. 2,000, 11,000 and 25,000 pairs, respectively Lyver et al. 2014; Pezzo et al., 2007) located in a stretch of coast of about 75 km in a straight line (Map 1). The bigger Inexpressible Island penguin's population, located in a high-quality habitat nearby the polynya, may act as a source for smaller neighboring subpopulations of Adélie penguin colonies (Olmastroni, personal communication).

South Polar Skua nests are distributed around Adélie penguin colony of the ASPA (Map 3). The nests are shallow depressions located on flat ground among glacial boulders in the terraces of different heights formed from the moraine ridge. Up to 60 breeding pairs have been recorded in the past (Ainley et al., 1986). More recently, census by Italian (2010) and Chinese (2018) scientists reported 25-29 breeding pairs and 17-34 non-breeders in the penguin colony area. Long-term monitoring and research on the reproductive population dynamics, ecology and interspecific relationships of the top trophic level omnivorous South Polar Skua not only supports the conservation of the species, which is known to have a low breeding success in the Terra Nova Bay area (Pezzo et al., 2001), but also helps to reveal the response of their various preys to climate change (Rehinardt et al., 2000; Hahn et al., 2008).

The vicinity between breeding sites of Adélie penguin and South Polar Skua on Inexpressible Island and Terra Nova Bay polynya could enhance the feeding efficiency and determine the diet composition of Adélie penguins, as presence of polynya has been shown to positively influence the foraging ecology of Adélie penguins elsewhere around the continent (e.g. Widmann et al., 2015). This vicinity to the hot spot of the polynya, could explain the possible differences in breeding success (Davis et al.,2017), trophic position and exposure to pollutants, when Inexpressible Island population is compared with other areas of the Ross Sea (Ainley 2002, Ainley et al., 1998, Olmastroni et al., 2004, Signa et al., 2018, Olmastroni et al., in press). Notably, ASPAs of Edmonson Point and Cape Hallett (No.165 and No.106 respectively), located northward in the Ross Sea both outside the polynya area, include colonies of Adélie penguin and South Polar Skua which are already studied by Italian and Korean scientists, thus representing useful sites for comparisons with similar levels of protection.

This Area is a reference site concerning studies on the marine food-web structure and the effect of sea ice dynamics on the benthic and pelagic marine ecosystem. In effect, the presence of the polynya allows to study the undisturbed marine food-web structure and functioning under ice free conditions allowing comparisons over time and space with what is observed in other nearby areas where sea ice coverage is more persistent (Norkko et al., 2007; Mezgec et al., 2017; Cummings et al., 2018; Calizza et al., 2018). The benthic community of Terra Nova Bay (ASPA 161) has been studied for a long time and could offer opportunity for comparison. This provides an important scientific value to the site of Inexpressible Island.

This Area also hosts several freshwater lakes within the penguin colonies, allowing for comparison studies between lakes receiving nutrient inputs from guano and lakes with no inputs. Higher levels of nutrients coupled with higher-salinity, as a result of sea spray, and higher Chl-a produce particular physiochemical and trophic statuses with respect to the other oligotrophic freshwater bodies in continental Antarctica (Barbaro et al., 2014, Borghini et al., 2007; Michaud et al., 2012; Wei et al., 2016). Rich nutrient conditions and historical deposits of guano may generate distinct aquatic communities with low abundance of pico-cyanobacteria and the consistently pronounced abundance of the Gammaproteobacteria.

The beaches of Inexpressible Island have risen by 30 m in the Holocene (Baroni and Orombelli, 1991), and there are the best-preserved ocean landforms in Terra Nova Bay (Baroni and Hall, 2004). Inexpressible Island and Seaview Bay have 14-level coastal terraces at 0-33 m above sea level, with abandoned penguin nests and/or ancient penguin remains distributed at all levels in ornithogenic soils (Orombelli et al., 1990; Baroni and Orombelli, 1991, 1994; Lambert et al., 2002; Baroni and Hall, 2004; Emslie et al., 2007). This unique geomorphological feature is of great scientific value for studying geological and glacial changes, the evolution of penguin distribution patterns, and Holocene climate change.

Inexpressible Island and Seaview Bay are accessible by land, sea, and air from the new planned Chinese station in the vicinity of the Area and from nearby research stations in Terra Nova Bay. Flight activity in the region is frequent throughout the summer season with mostly helicopter movements.

The ASPA requires long-term special protection because of the outstanding environmental, scientific and ecological values and its potential vulnerability to disturbance from scientific, logistic and tourist activities.

2. Aims and objectives

Management of ASPA 178 Inexpressible Island and Seaview Bay aims to:

- avoid any major changes in the functions and ecosystems of the Area, any degradation of, or substantial risk to, the values of the ASPA by preventing unnecessary human disturbance to the area.
- preserve the environmental values of the ASPA as a reference area for future comparative studies with other breeding populations of Adélie penguins and South Polar Skuas in Terra Nova Bay and neighboring areas, and for research and long-term monitoring of terrestrial, marine and lacustrine ecosystems.
- allow continued studies on historical clues of the evolution of the Adélie penguin and other species subfossil remains and ornithogenic soil.
- allow scientific research respecting the natural ecological system in the Area, promoting international coordination thus ensuring protection from oversampling, especially of soil, fauna and flora to reduce the cumulative impact within the Area.
- allow visits for educational purposes in the Area provided it is for compelling reasons which cannot be served elsewhere and that they will not jeopardize the natural ecological system in the Area.
- prevent, to the maximum extent practicable, the introduction of non-native species and pathogens that may endanger or alter the local pristine ecosystems.
- 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 ASPA:

- Signs showing the location and boundaries of the Area (stating the special restrictions that apply) secured and maintained in good condition, and removed when no longer required. They will be placed in such a way as to respect as much as possible the ASPA’s aesthetic value.
- Copies of this Management Plan shall be made available to all stations located within 50 km of the Area, to all vessels and aircraft visiting the Area and/or operating in the vicinity of the adjacent stations, and all personnel 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 are marked on relevant maps and nautical/aeronautical charts.
- Any abandoned equipment or material shall be removed to the maximum extent possible provided doing so does not adversely affect 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 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 and share information on foreseen activities to be implemented, in view to minimize the overall impact on the Area.

4. Period of designation

Designated for an indefinite period

5. Maps

- **Map 1:** ASPA 178: Inexpressible Island and Seaview Bay – Regional Map.
- **Map 2:** ASPA 178: Inexpressible Island and Seaview Bay – topographic map with access guidance and bathymetry.
- **Map 3:** ASPA 178: Inexpressible Island and Seaview Bay – Adélie Penguin Colony.

6. Description of the Area

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

General description

The ASPA is situated in middle Terra Nova Bay (Map 1). The area lies in the southern portion of the Island, which is bordered by two ice shelves, The Nansen Ice Sheet to the west and the Hells Gate Ice shelf, this latter being fed by marine ice (Baroni, 1988, Sochez et al., 1991). The Area includes an ice-free area with some lakes, facing Seaview Bay and the northern part of South Bay in Inexpressible Island, and a marine coastal area, which defines the eastern border of the Area (Maps 2 and 3). The strong katabatic winds from the Nansen Ice Shelf and Hells Gate Ice shelf opened a large polynya in the eastern waters off the Adélie penguin nesting area, potentially promoting the foraging efficiency and thus the raising of chicks. This Area has a special landform with well-defined raised beaches, marine sediments, wave-cut terraces and wave-washed bedrock characterizing the ice-free land (Baroni et al., 2004) and mainly includes 14-level coastal curved terraces formed by beach ridges at 0-33 m above sea level. These are one of the best-preserved ocean landforms of Terra Nova Bay (Salvatore et al., 1997; Baroni et al., 2005). Marine deposits ranging in size from boulder to gravel are distributed on the terraces. Patches of finer marine deposits retain marine subfossil shells (Adamussium colbecki and Laternula elliptica) suitable for radiocarbon dating of beach deposits.

Boundaries and coordinates

The Area is located in the eastern central part of Inexpressible Island, including the Seaview Bay and the northern part of the South Bay. The total area of the ASPA is 3.31 km^2, of which 2.32 km^2 is terrestrial and 0.99 km^2 is marine area. The total extent of the boundaries is 7.86 km. Eastwards, the boundary of the ASPA is mainly marine, and includes the foraging access routes that penguins use intensively to access the sea. Westwards, the boundary borders the current South Polar skua nesting area and the historical distribution area of the Adélie penguin, including freshwater lakes far away from the birds' nests.

The eastern boundary of the Area at the NE corner extends from the coordinates B1 on the eastern coast of the Seaview Bay due south for to B8 of the South Bay (Table 1, Map 2). The northern boundary from B1 follows along the coastline to B2, then to B3 and B4, along the foot of the hill to B5. The western boundary is from B5 to B6 (the same longitude with B5), and then to B7 (the same latitude with B8).

Table1. Boundary coordinates of ASPA 178 (see map 2 and 3 for the site)

name	Latitude	Longitude
B1	74°53'46.13"S	163°45'00.00"E
B2	74°53'40.41"S	163°44'31.07"E
B3	74°53'29.99"S	163°43'44.97"E
B4	74°53'14.17"S	163°43'30.65"E
B5	74°53'14.17"S	163°42'11.02"E
B6	74°54'28.93"S	163°42'11.02"E
B7	74°54'46.54"S	163°43'11.11"E
B8	74°54'46.54"S	163°45'00.00"E

Climate

Eight weather stations have been set up in the southern and central parts of Inexpressible Island, with two of them directly inside of the boundaries of the proposed ASPA. According to the data of Manuela Automatic Weather Station (74°56'45.6" S, 163°41'13.2" E, 78 m above sea level), the annual average temperature in the Area is -18.5°C. The number of days below -40 °C does not exceed 0.1%, the number of days between -30 ~ -15°C is about 63%, and the number of days between -15 ~ 0°C is 33%. The minimum annual average temperature is -19.2°C (1998), and the maximum is -17.4°C (2012). The average daily temperature in winter is below -35°C, the lowest is -40.6°C (September 2, 1992); the average daily maximum temperature in summer exceeds 0°C, the highest value is 6.9 °C. The average temperature in December was the highest, at -3.6 ± 1.26 °C, the lowest in August, at -26.66 ± 2.87 °C.

The annual average wind speed is 14.2 m/s, the daily average maximum wind speed is 34.2 m/s (July 1989), and the maximum instantaneous wind speed is 45 m/s (February 1985) (Bromwich, 1988). In November, December and January, wind speeds below 15 m/s accounted for 90%. The wind speed has varied according to seasonal changes. The highest monthly average wind speed is in August (16.54 m/s), and the lowest in December (5.20 m/s). A total of 298 strong katabatic wind events occurred in 10 years, of which 49.8% occurred in winter (21% in July), and the average duration was about 10 hours. No strong katabatic wind events were recorded in December and January. The monthly average wind speed of strong katabatic wind is between 25~30 m/s, with the maximum wind speed of above 40 m/s.

According to the observation data of weather stations (74°54′04.02″S, 163°43′45.85″E) located in the ASPA, the average temperature in January is -4.8°C, the average instantaneous wind speed is 5.7 m/s, with the maximum instantaneous wind speed of 18.1 m/s.

Marine area and polynya

Terra Nova Bay is one of the deepest water basins in the Ross Sea, with a maximum depth of about 1,100 m (Buffoni et al., 2002). The ocean circulation in the bay moves parallel to the north through the upper layer in summer, parallel to the coast, and rotates clockwise with depth (Vacchi et al., 2012). The strong katabatic wind and the blocking of the ice floe by Drygalski Ice Tongue forms a huge polynya in the Terra Nova Bay (Bromwich and Kurtz, 1984; Van Woert,1999), with an average area about 1,300 km^2 (0-5,000 km^2, Kurtz and Bromwich, 1983), and up to 2,500 km^2 in December 2017. The salt discharged from the ice formation increased the salinity of the seawater (up to 34.87 ‰), and the sea surface freezing point was -1.9°C.

The marine portion of the ASPA includes the coastal area facing the Adélie penguin colony, extending for 0.99 km^2 and less than 50 meters depth (Map 2). The benthic communities of this area are poorly known. Preliminary surveys through underwater cameras indicate a rich macroalgae coverage consisting mainly of *Iridaea cordata* at 5-10 meters depth (M.C. Chiantore, pers.comm.), and associated rich coverage of filamentous aggregates of unknown composition. Some animal organisms were observed during the survey. These include the two small-size fish species *Trematomus bernacchii* and *T. pennellii*, the sea star *Odontaster validus* and amphipods possibly belonging to the family Lysianassidae (M. Vacchi and E. Calizza, pers. comm.).

Freshwater lakes and brackish lagoon

The Area presents a distribution of 6 freshwater lakes and 1 brackish lagoon (Map 3) with a distance from the coast from 0.130 km to 1.16 km, and an estimated total surface of 17,780 m^2 (range from 97 m^2 to 8,162 m^2). Some of them, in vicinity of the Adélie penguin colony and South Polar Skua, are influenced by guano nutrient input, while others located at a greater distance, may serve as reference of present conditions and for long term comparisons (Blais et al., 2005; Borghini et al., 2007).

Six freshwater lakes in this area were investigated in both 2017/2018 and 2018/2019 summer seasons and an incredibly high concentration of nutrients was recorded. The concentration of NH_4-N ranged from 0.40 mg/L to 61.22 mg/L, the concentration of NO_2^- ranged 0.8 to 0.49mg/L and the freshwater PO_4^{3-} concentration ranged from 0.08 to 17.72 mg/L. The concentration of TOC ranged from 5.12 mg/L to 33.38 mg/L. These concentrations are high compared to the ones of other typical ultra-oligotrohphic polar lakes, including the ones of three freshwater lakes sampled at a greater distance outside of the area in 2018/2019 summer season too. There were 42 phytoplanktons detected, and the *Bacillariophyta, Cyanophyta,* Chlorophyta were the dominant phytoplankton taxa. The density ranged from 1.65×10^4~1.02×10^7cells/L. The Prorodon viridis, Urotricha farcta, Lacrymaria minima, Trachelophyllum sigmoides, Colpoda cucullus, Vorticella sp. and Strobilidium gyrans were the dominant zooplankton species (Zhang, pers. comm.).

Birds

The latest count of 2017 reported 25,089 breeding pairs of Adélie penguins (*Pygoscelis adeliae*) (MOE, 2019). The penguins are mainly distributed in the central part of Seaview Bay, and there are about 100 breeding pairs (131 breeding pairs in 2017) in South Bay (Map 3). There is not significant genetic divergence of the penguins between the South Bay and Seaview Bay on the basis of Single Nucleotide Polymorphism analysis (Zhang, pers. comm.). The first documented record of Adélie penguin with 11,000 breeding pairs in the area was published in 1963, one of the earliest statistical record of Adélie penguin in the Ross Sea (Stonehouse, 1969; Woehler and Croxall, 1997). Since the ‘80s, scientists from New Zealand, Italy, Korea and China have monitored the population. GPS tracking in 2019 showed that penguins disperse to Ross Island within a given breeding season (Xia and Zhang, pers. comm.).

Table 2. The population size of Adélie penguins in ASPA 178 (breeding pairs).

Year	Population Size	Reference
1963	11,000	Stonehouse, 1969
1982	9,217	Woehler and Croxall, 1997
1983	17,120	He et al., 2017
1984	24,864	Wilson et al., 2017
1987	28,715	Woehler and Croxall, 1997
1989	23,528	Woehler and Croxall, 1997
1991	20,029	Woehler and Croxall, 1997
2001	24,142	Olmastroni et al., in press
2012	24,450	Lyver et al., 2014
2017	25,089	MOE, 2019
2019	29,899	MOE, 2020

In Seaview Bay, the penguins breeding grounds are distributed on 10-700 m wide slopes along the coastline. The nest site is 0.5-33 meters above sea level, and more than 80% of the breeding individuals are distributed between 0.5-10 meters above sea level. During the breeding period, the Adélie penguins carrying food reach the core colony area and then travel 14.4±19.3 minutes to reach the highest breeding area. Adélie penguins’ nests were built along the low-to-high terraces, composed of many hilly nests of different heights. Later in the season, “crèches” ranging from a dozen to thousands of chicks form on the hills. Studies carried out on chick-rearing Adélie penguin showed that diet composition in the Terra Nova Bay area consisted mainly of Antarctic silverfish (*Pleuragramma antarctica*) and also of ice krill (*Euphausia crystallorophias*), and Antarctic krill (*E. superba*) to a lesser extent (Olmastroni et al, in press).

In South Bay, the nesting site is located on the southern slope 5-10 meters from the shoreline, 3-10 meters above sea level, and the nesting area is no more than 1000 m^2. Chicks form a single “crèche” there.

Penguin remains have attracted scientific interest from Italy, United States and other countries in the past 30 years (Stuiver, 1981; Whitehouse et al., 1989; Orombelli et al. 1990; Baroni and Orombelli, 1987, 1991, 1994; Baroni and Hall, 2004; Lambert et al., 2002; 2010; Ritchie et al., 2004; Sheperd et al., 2005; Emslie et al., 2007; Millar et al., 2008; Submaranian et al., 2009; Lorenzini et al., 2009; 2010, 2011, 2012, 2014; Parks et al., 2015; Megzec et al., 2017).

Scientists from Italy and New Zealand have extracted in the past 15 individual Adélie penguin sub-fossils, dating from about 6,100 years ago and have carried out genetic analysis and phylogeny (Lambert et al., 2002; 2010; Ritchie et al., 2004; Shepherd et al., 2005; Millar et al., 2008; Submaranian et al., 2009). Several samples of guano and other remains of Adélie penguins, dug in the 14th terrace of Seaview Bay, South Bay and in the outskirts of the colonized area, have been collected by Italian researchers (Orombelli et al., 1990; Baroni and Orombelli, 1991; 1994; Baroni and Hall, 2004). Orrnithogenic soils allowed to retrieve relevant information on past environmental conditions and on Holocene Adélie penguin diet, through eggshells, bones, and prey remains (fish bones and otholiths, squid beeks, etc.; Lorenzini et al., 2009; 2010, 2014). Chinese scientists in the last 5 years, collected more than 130 samples (see supplementary material). These precious materials can provide the possibility for studying climate change and molecular evolution.

Up to 60 breeding pairs of South Polar skua were recorded in the Area (Ainley et al., 1986). The number of mature South Polar Skuas globally is 6,000-15,000 (Birdlife International, 2017), or 5,000-8,000 breeding pairs (de Hoyo et al., 1996). The South Polar skuas mainly breed in the rock belt around the Adélie penguin breeding colony, and in some areas the nests of both bird species present a mosaic distribution (Map 3 for 2018 breeding points). Groups of 20-30 South Polar Skuas are sometimes observed. The investigations in late December 2016 and 2017 found that there were 2 eggs and/or 2 chicks in each nest of South Polar skuas. An investigation conducted in January 2018 showed that no more than one chick was found in each nest (Zhang and Xia, pers. comm.), suggesting conspecific predation (de Hoyo et al., 1992). Similarly, South Polar skuas of Edmonson Point produce 1.9±0.2 eggs, but the reproductive success is limited to 0.2±0.4 chicks. Conspecific aggressive behavior, siblicide (large chicks kill small ones), harsh weather, and late egg laying are the main causes of low reproductive success (Pezzo et al., 2001). The breeding success and the factors affecting skua reproduction at Inexpressible Island require further investigation.

In the Area, Emperor penguins (*Aptenodytes forsteri*), Wilson's Storm petrels (*Oceanites oceanicus*), Snow petrels (*Pagodroma nivea*), Antarctic petrels (*Thalassoica antarctica*) can also be observed occasionally. No breeding record for the above avian species in the area exists.

Mammals

Weddell seals (*Leptonychotes weddellii*), Leopard seals (*Hydrurga leptonyx*) and less frequently Crabeater seals (*Lobodon carcinophagus*) can be observed in the seawaters near the Area. Weddell seals are often found resting in the penguin colony. Leopard seals have been observed regularly preying on penguins (adults and juveniles) in the seawaters in front of the colony (2001- onwards, Olmastroni pers. comm.). In 2017, two unusual attacks by Weddell seals against Adélie penguins were observed (Miao, pers. comm.). Subfossil remains of elephant seals indicate a large presence of this species in the past (Hall et al., 2006). At the present time, the occurrence of elephant seals (*Mirounga leonina*) is very rare in Terra Nova Bay (just one record in the last two decades).

Seals remains (bones, skin, internal organ and blubber) were found in the beaches (Baroni and Hall, 2004; Hall et al., 2006; de Bruyn et al., 2009, 2014). Mummified elephant seals (Mirounga leonina) in various state of preservation rest on Holocene raised beaches and testify Holocene breeding colonization of the area that crashed ca 1000 yrs ago (Koch et al., 2019).

Terrestrial invertebrates

Only *Gressittacantha terranova* (Collembola, Entognatha) were recorded by Fanciulli et al. (2001) in the first study on population genetics of Antarctic soil microarthropods and *Acutuncus antarcticus* (Eutardigrada, Hypsibiidae) recorded by Cesari et al. (2016).

Mosses and lichens

Scientists have determined that the biodiversity of mosses and lichens was high in specialized terrestrial habitats in this region (Castello, 2003; Cannone and Seppelt, 2008). A total of nine different lichens were recorded in 2016-2017, including the widely-distributed species *Buellia frigida* (as the constructive species), and other species as *Acarospora gwynnii, Candelariella flava, Lecanora expectans, Lecanora fuscobrunnea, Umbilicaria decussata, Xanthoria elegans and Xanthomendoz*a *borealis*. In the south rock ridge of the penguin colony in Seaview Bay, *Bryum argenteum* is sparsely distributed. Lichens develop on marine boulders and cobbles with individual thalli increasing in size as a function of e1evation. The maximum size *Buellia* sp. thalli is > 290 mm at 24 m a.s.l. and testifies the increasing age of raised beaches as a function of progressive emersion of coastal areas (Baroni and Orombelli, 1987; Baroni, 1994).

Terrestrial algae and microorganisms

The cold-tolerant fungi as *Chrysosporium verrucosum* Tubaki, *Thelebolus microspores* Kimbrough and White yeasts were found from penguin guano and soil in the Area (Del Frate and Caretta, 1990). A fungal strain, isolated from Inexpressible Island, was plate-screened for its ability to produce extracellular enzymes (Fenice et al., 1997). The bacteria in five different lakes from this Area were recorded in 2017/2018 summer season by Illumina Miseq sequencing, genera *Flavobacterium* within Bacteroidetes was the most occurring in all the lakes, and other genera, such as *Polaribacter* (Bacteroidetes) and Cyanobacteria were very abundant in two of those lakes. Michaud et al. (2012) have documented in a lake of Inexpressible Island the consistently pronounced abundance of the Gammaproteobacteria (which are typically marine), the lack of Actinobacteria (which are of major importance in freshwater environments), as well as the low abundance of pico-cyanobacteria (whose presence is not favored by relatively high N: P ratio).

Algal species diversity in lakes of the Area is similar to that of Lake Gondwana and of Dry Valleys lakes. The typical prokaryotic (*Synechococcus*) and eukaryotic (*Chlorella*) genera were determined by both flow cytometry and electron microscopy (Andreoli et al., 1992).

In lacustrine sediments pigments confirmed that Cyanophyta was the most important algal group, followed by Chlorophyta and Bacillariophyta (Borghini et al., 2011). Microbial eukaryotes in five different lakes from this area were recorded in 2017/2018 summer season by microscopy and Illumina Miseq sequencing. Genus *Geminigera* (Cryptophyceae) was significantly predominant in three lakes, and in the other two lakes *Chlamydomonas* (Chlorophyta) and *Spumella* (Chrysophyta) were dominant.

Geology

The land basement is glacial boulder, the main intrusive rock type is quartz monzonite, and a small amount of quartz monzobiorite. The main outcrops in this area are Quaternary hail deposits and modern coastal accumulation and the Caledonian Paleozoic Ordovician intrusive monzonites and granites (Wang et al., 2014). The surface of the wavy boulders in Seaview Bay and South Bay is the Holocene wind-selected surface (Baroni and Hall, 2004). A coastal terrace at an altitude of 0-33 meters and a coastline of 0-700 meters is formed.

HSM14

The Historic Site and Monument HSM14 is just outside the boundaries of the Area and related to the Robert Falcon Scott's Terra Nova Expedition (1910-1913), in which the Northern Party, led by Victor Campbell, forcibly overwintered in 1912. The snow cave of 3.7 m × 2.7 m and a height of 1.7 m was dug in March 1912, and it offered repair to the crew during the winter under extreme conditions. The snow cave site was designated as the No.14 Antarctic historical site or monument (HSM14) in 1995. An anchorage point for boats is suggested in Map 2 and access to HSM14 is encouraged by small boat. Landing is suggested along the shoreline outside of ASPA borders. The HSM14 location can then be reached on foot from the preferred landing point. The orography of the site and the ice conditions do not allow having a clearly indicated pathway.

Human activities

Since the 80s there have been regular human activities in the Terra Nova Bay area. Gondwana Station (Germany, 74°38'07″S, 164°13'15″E), established in 1983, operates in occasional summers with capacity for approximately 25 personnel, and is 35 km from the Area. Mario Zucchelli Station (Italy, 74°41'43″S, 164°06'55″E), established in 1985, operates in summer only with a complement of up to 100 personnel, and is 27 km from the Area. Jang Bogo Station (ROK, 74°37'26″S, 164°13'40″E), 36 km from the Area, operates as a year-round station, with a complement of 17 winter personnel and up to 60 in summer since 2014. China intends to establish a year-round scientific research station (74°56'04″S, 163°42'52″E) with a complement of 30 winter personnel and up to 80 personnel in summer on Inexpressible Island, which will be about 3 km away from the Area.

The current research activities in the Area of nearby scientific stations are focused on the remains of penguins and excavation of ornithogenic soils, the genetic flux, ecology and quantitative monitoring of Adélie penguins and South Polar skua, molecular ecology, paleogeology, plankton, biodiversity survey in terrestrial and marine environment and food web ecology. In the past 10 years, tourists have visited Inexpressible Island, with an average of 100 individuals per year, between 2003 and 2017 and up to 480 visitors in the 2005-2006 season (see supplementary material) (IAATO, https://iaato.org/tourism-statistics)

6(ii) Access to the Area

The Area can be accessed by land, sea or air. There is no specific route to enter the Area by land. Helicopter access is recommended at the suggested landing sites (Map 2) outside the Area. Access from the sea may be by small boats. Transiting through the Area by a small boat should be limited to reduce disturbance to wildlife. Small boats entering the waters should preferably anchor between B1-B2, while large vessels should not enter the Area. See section 7(ii) for details. Access should always be chosen so as to exceed minimum wildlife separation distance and, as far as possible, to minimize disturbance on approach.

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

No permanent structures are present within or adjacent to the Area. A total of four weather stations are installed around the Area and provide detailed weather data. Two weather stations from Korea (74°54'01.00"S, 163°43'33.00"E) and China (74°54'04.02"S, 163°43'45.85"E) are present in the Area (see Map 2). The other two are located outside the proposed ASPA region (USA-Manuela, ITA-Virginia) and could not be shown in Maps. In Terra Nova Bay area, other weather stations are also located in nearby research stations.

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

- Other protected areas in the vicinity include (see Map 1):
- HSM 14, Site of ice cave at Inexpressible Island,74°54'S, 163°43'E, on the northern boundary of the Area.
- ASPA 161, Terra Nova Bay, 74°45' S, 164°01' E, 16 km to the north.
- ASPA 173, Cape Washington & Silverfish Bay, 74° 37' 06" S, 164° 57' 36" E, 48 km to the northwest.
- ASPA 175, High Altitude Geothermal sites of the Ross Sea Region, Mount Melbourne, 74°21' S, 164° 42' E, 68 km to the north.
- ASPA 165, Edmonson Point, 74° 20' S, 165° 08' E, 76 km to the north.
-

Besides the abovementioned-protected areas, CCAMLR has established Ross Sea Region Marine Protected Area. The marine area of the ASPA is located within the General Protection Zone of the RSRMPA.

6(v) Special zones within the ASPA

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 conservation, scientific, educational or outreach reasons which cannot be served elsewhere, or for reasons essential to the management of the Area.
- the activities permitted will give due consideration via the environmental impact assessment procedures to the continued protection of the scientific and ecological values of the Area.
- the actions permitted are in accordance with this Management Plan.
- the permit shall be issued for a definite 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 helicopter only for compelling reasons, as authorized by the issued permit. Clothing (particularly all footwear and outer clothing) and field equipment shall be thoroughly cleaned before entering the Area.

Access on foot

No special access routes are designated for access to the Area on foot but it is required to avoid walking across the raised beaches unless permitted for a compelling scientific purpose. Every reasonable effort should be made to minimize disturbance. A minimum distance of 5 m from wildlife is required. If disturbance of wildlife is observed, separation distance should be increased or the activity modified until there is no visible disturbance. Exceptions to this are only allowed when a closer approach distance is authorized in a permit.

Access by vehicle

Vehicles are prohibited within the Area.

Access by aircraft

The Guidelines for the Operation of Aircraft near Concentrations of Birds in Antarctica Resolution 2 (2004) should be followed at all times. According to the breeding habitats in this area, restrictions on helicopter apply during the period from 15 October through to 15 February inclusive according to strict observance of the following conditions:

- The preferred helicopter approach route and landing sites out of the Area are designated as shown in Map 2. Pilots should avoid overflight of the penguin colony and breeding skua territories. Pilots 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 penguin colony.
- Landing by helicopter within the Area is prohibited, unless authorized by permit for purposes allowed for by this Management Plan
- Overflight of the area below 2,000 feet (~610 m) is prohibited, unless authorized by permit for purposes allowed for by the Management Plan. Helicopters with two engines are due to respect a minimum overflight height and horizontal distance of 3,281 feet (1,000 m) to limit disturbance.
- If due to weather conditions or other safety consideration, pilots could not follow the designated approach route and landing sites, pilots should return to the take off point if possible or land outside the Area. It is allowed to land within the Area only in emergency.
- 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 a permit issued by an appropriate national authority, and consulting and following as appropriate recommendations contained in the Environmental Guidelines for Operation of RPAS in Antarctica (Resolution 4, 2018).

Access by ships/small boat

There is no designated landing area for small boats that refers to the boats with capacity of 15 personnel or less, such as Zodiac inflatable dinghies or similar size. The ships are suggested to anchor outside of the Area as shown on Map 2（74°54'02.03"S, 163°45'52.31"E）. During the penguin breeding period from 15 October to 15 February small boats should only land on the coastline to the northeast of Seaview Bay between boundary points B1 and B2. During that period small boat landings in other locations are prohibited, unless authorized by permit for compelling scientific reasons. Approaching to the landing site between boundary points B1 and B2 s required to be at low speed to minimize disturbance and avoid contact with penguins.

Suggested landing point（74°53′50.96″S,163°45′20.85″E）for visiting the HSM14 is shown on Map 2.

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

Activities which may be conducted within the Area shall not jeopardize scientific and ecological values of the Area. Activities which may be conducted within the Area include:

- compelling scientific research which cannot be undertaken elsewhere.

- sampling, which should be the minimum required for approved research programs.
- 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 and outreach resources or services.

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

- No structures are to be erected within the Area except for compelling scientific or management reasons and for a pre-established period, as specified in a permit.
- All structures, scientific equipment or markers installed in the Area shall be 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.
- Structures and installations must be removed when they are no longer required, or on the expiry of the permit, whichever is the earlier.
- 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. There has a campsite (74°54'34.76"S, 163°42'03.22"E) locating outside of the Area.

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, 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 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 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), and in the *SCAR's Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica* (Resolution 5, 2018).
- No fresh eggs or fresh poultry products shall be introduced in the Area. Cooked poultry wastes shall be completely removed from the Area.
- no herbicides or pesticides shall be brought into 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 minimizes 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.

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's *Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica* (Resolution 4, 2019).

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

Unless specifically authorized by permit, visitors to the Area are prohibited from interfering with or from handling, taking or damaging any anthropogenic material. Similarly, relocation or removal of artefacts for the purposes of preservation and protection is allowable only by permit. Any new or newly identified anthropogenic materials found should be notified to the appropriate national authority.

Collection or removal of anything should be conducted to following conditions:

- 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, 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.

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 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).
- 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 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.

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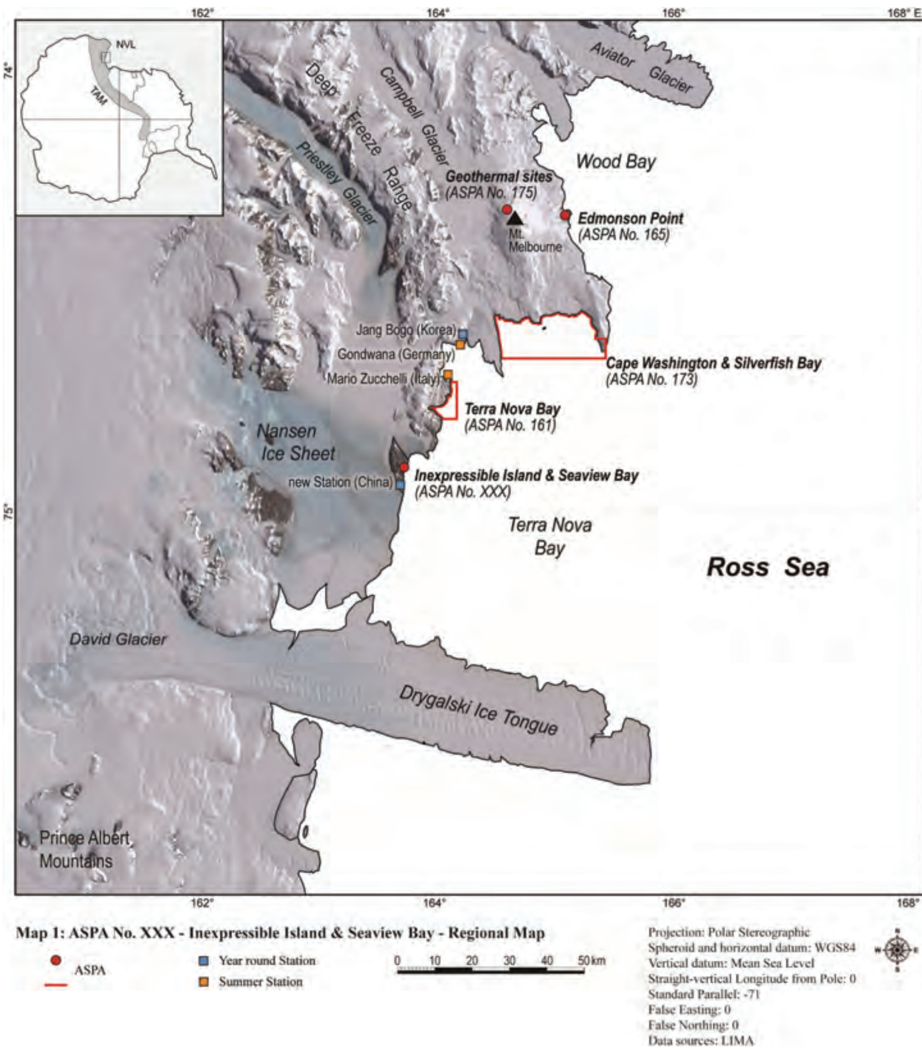
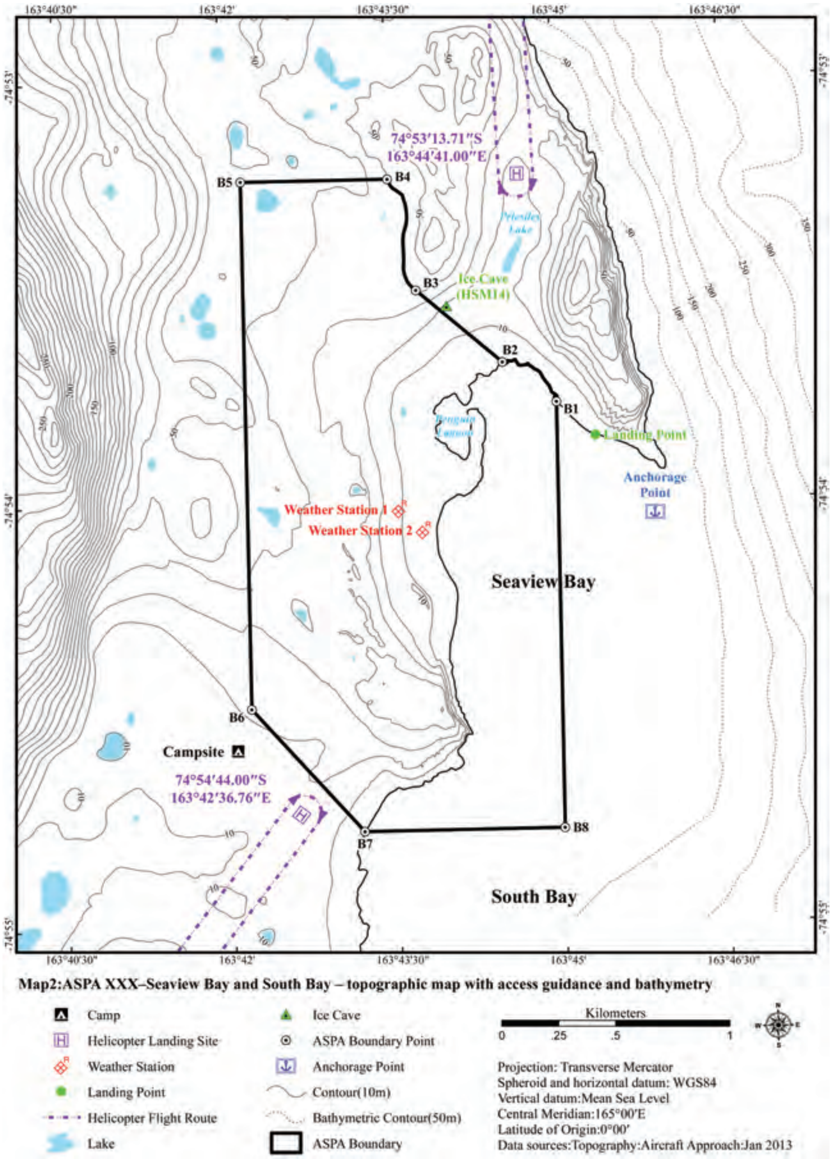
SUPPLEMENTARY MATERIAL

Supplementary Material of *Proposal for a new Antarctic Specially Protected Area at Inexpressible Island and Seaview Bay, Ross Sea* can be found at the link, including "A Summary of Dated Penguin Guano and Remains on Inexpressible Island" and "Figure: The number of visitors to Inexpressible Island since 2003". http://www.chinare.org.cn/en/difDetailPublic/?id=9800

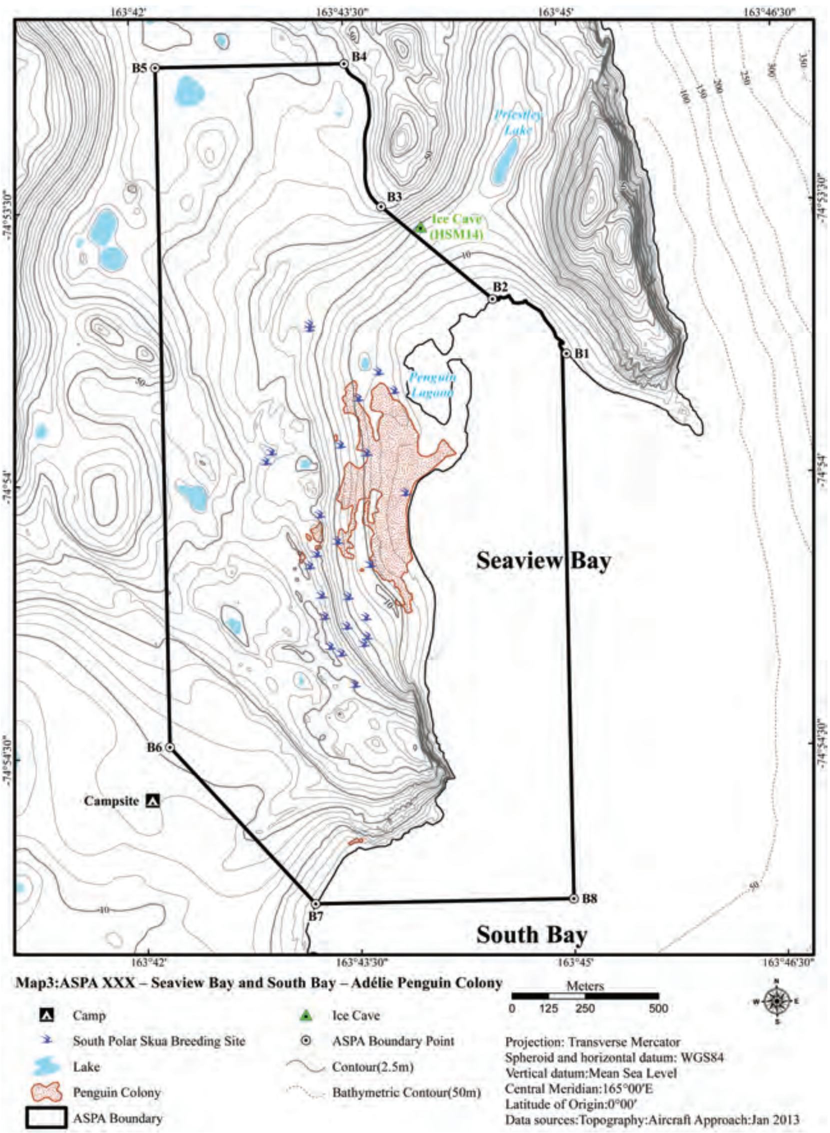
Map 1. ASPA 178: Inexpressible Island and Seaview Bay – Regional Map



Map 2. ASPA 178: Inexpressible Island and Seaview Bay – topographic map with access guidance and bathymetry



Map 3. ASPA 178：Inexpressible Island and Seaview Bay – Adélie Penguin Colony



PART III

Opening and Closing Addresses and Reports

1. Opening and Closing Addresses

Welcoming Remarks by the Prime Minister of France Mr. Jean Castex

Paris, Maison de la Mutualité – 15 June 2021

Ladies, Gentlemen,

We have good reason to be pleased and proud to host the 43rd Antarctic Treaty Consultative Meeting in France, for the third time in the history of the Treaty and for the first time in the 21st century. We are delighted to now see 54 States gathered under this Treaty, which will celebrate the 60th anniversary of its entry into force on 23 June 1961, during our meeting in Paris.

This encounter is also the opportunity to assess how far we have come since this date, and in particular since the previous ATCM organized in France in 1989, for it was on that occasion that the decision was made to reinforce environmental protection in Antarctica. That decision materialized through the adoption of the Madrid Protocol. I would like to take this opportunity to pay tribute to Michel Rocard, the then Prime Minister, who played an instrumental role alongside his Australian counterpart Bob Hawke in these negotiations and whose forthcoming 30th anniversary of its signing we will celebrate on 4 October next. Let us not forget that my predecessor was our first Ambassador to the Poles, and he remained so until his passing in 2016.

Gathering the Parties to the Treaties today, when the Consultative Meeting planned for 2020 was cancelled, is another source of satisfaction, even though the pandemic still keeps us at a distance from each other and forces us to carry out our work by videoconference. It is, I know, a significant and unprecedented constraint that weighs on our exchanges, but I do not doubt that we will manage to overcome this through the unfailing involvement of all the delegations, whose virtual presence I warmly salute, despite their online presence being spread over 18 time zones. In addition, nothing would have been possible without the invaluable support of the Antarctic Treaty Secretariat, and it is for this reason that I wish to salute the presence of the Secretary, here with us today. This international meeting is a feat and I wish to express my congratulations to the teams that have made it possible.

We have been ready for a long time to host and celebrate this event, and to make known the challenges of the Antarctic to our fellow citizens. This work of discovery and education was led by public agencies such as the French Polar Institute Paul-Emile Victor (IPEV) and thanks to educational exhibitions prepared in Paris by the Ministries for Europe and Foreign Affairs, for the Ecological Transition and for Overseas France. Not to be outdone, civil society has also become involved. A major cultural and scientific event entitled “2021, l’Été polaire” (“2021, Polar Summer”), will take place in France, over the coming four months in more than 25 major towns and cities and will target several million participants. Our town halls and official buildings will bear the colours of the Antarctic for this event.

France has developed a real history with the Antarctic, despite the distance that separates them. It was from our shores that Kerguelen and Dumont d’Urville set off to find the southern continent. It was the accounts of expeditions undertaken by Charcot and Paul-Emile Victor that revealed this distant place to the French people, who then made it a national dream. Today, it is the internationally recognized work of our researchers, engineers and technicians in our scientific bases in Antarctica that allows us to keep watch over its integrity while furthering our scientific knowledge. My country understands the importance of improving this knowledge of these distant lands and seas, as part of our future is being determined there: the future level of the seas greatly depends on the processes at work at the heart of the white continent, and the ability of biodiversity to regenerate itself finds some of the answers on the Antarctic’s coastlines.

This difficult and demanding research cannot come to fruition without having a solid scientific base. In the Arctic and the Antarctic, the French Polar Institute Paul-Emile Victor plays this role for the French State. As head of the French government, I also intend to attach the greatest importance to the renovation of our Antarctic base, which obviously will be undertaken with a high level of environmental standards, in keeping with the spirit of the Madrid Protocol. I wish to pay tribute to the IPEV and the CNRS, to the National Museum of Natural History and to French universities for their decisive contributions to scientific research, protecting the environment and international polar diplomacy, all of which are of great importance to our societies.

On the strength of this lengthy experience, and in response to current challenges, our country must develop an ambitious polar strategy, the first in its history. This will cover both our engagement in the Antarctic and our action in the Arctic. From the outset it will be part of a synergy with our EU partners and other countries that share our will to make the Poles a place of concord and progress. I have therefore asked our new Ambassador to the Poles and Maritime Issues, Olivier Poivre d’Arvor, to steer and coordinate the drafting, with all the experts and policy makers, of this road map that will be presented to me by the end of this year.

The Antarctic remains a unique continent that the vast majority of us will never visit. Perhaps this is a good thing for its preservation, and yet this place has definitively marked the women and men who have managed to travel there.

The first distinctive feature of this continent is to have long remained just a hypothesis: from Aristotle to Mercator, the southern continent was firstly just an assumption, or even a dream. Then, thanks to modern-day navigators, this *terra incognita* became a vast territory of exploration and discovery. This is a region of the globe where humans are never more than just passing through.

Lastly, since the 20th century, the Antarctic has mainly been a space reserved for nature, science and peace. That is the great merit and the burden incumbent on the Treaty that brings us together here today.

The Antarctic Treaty and the system built around it are therefore a precious legacy, one that we must preserve and ensure it bears fruit.

By showing that the States could overcome their conflicting antagonisms by seeking the collective interest, the signature of this Treaty was all the more remarkable as it occurred at the height of what History termed the “Cold War”. It was a remarkable success for the negotiators of that period, promoting the spirit of cooperation imparted by the International Geophysical Year over the warring tendencies of that time. And above all, it sets a good precedent, proving that it is possible to resolve differences through negotiation rather than through a show of force. In this respect, the Antarctic Treaty remains a wonderful example of effective multilateralism.

But this Treaty is also commendable due to the major and sustainable scope of its provisions. First and foremost, it plays a key role by excluding the Antarctic from any non-peaceful activity. The banning of military exercises, testing or constructions in Antarctica is both an achievement and an asset benefiting all of us today, and we must preserve this collectively.

This cooperation concerns above all scientific research: the exchange of information, staff, observations and results are part of the scientific presence in Antarctica and must remain so to minimize the resources deployed and optimize the results obtained. Whether it concerns observing the Antarctic and its ecosystem, or research requiring specific conditions linked to its situation or its environment, scientific activity in these extreme conditions must benefit everyone.

We must realize that our digital and globalized era has also made our contemporaries particularly attentive to the state of our planet, and in this context, they too are focused on Antarctica. Today, everyone is well aware that the impact of human activity can even be felt in the poles and that corrective action must also be global, including in Antarctica.

By committing to ensure the global protection of the environment in the Antarctic and its dependent and associated ecosystems, the States Parties to the Antarctic Treaty have marked their determination to place this objective above other considerations. By declaring Antarctica a “natural reserve, devoted to peace and science”, they clearly defined the framework that must remain that of human presence on this continent.

The Washington Treaty laid the foundations for the Antarctic Treaty System, whose main pillar consists of the ATCM, the second one being the Commission for the Conservation of Antarctic Marine Living Resources, or CCAMLR which, as its name indicates, deals with the protection of the southern seas. Although this topic is not on the agenda of your debates, as it falls within the authority of CCAMLR, allow me to mention the importance for France of the adoption of projects concerning marine protected areas in East Antarctica and in the Weddell Sea, representing more than two million square kilometers of biodiversity, whose resilience must be ensured.

The task awaiting the delegations over the coming days is clearly not an easy one, particularly in the restricted context of a virtual meeting. But it carries ambition and hope for all countries, whether or not parties to the Treaty, as it does for their citizens, both current and future. The ambition and hope that we can repeat the feat of our predecessors, by transcending any reflexes of appropriation and exploitation that may emerge.

In difficult conditions and a complex international environment there is a major risk, given these challenges, of experiencing the optical phenomenon that is well known in polar environments: the whiteout that appears when white light, snow and a low cloud layer obscure any contrast and make it difficult to distinguish the horizon and discern shapes. This is to the Antarctic what the mirage is to the desert.

In such circumstances, all explorers will tell you that there is only one solution: remaining calm and united to overcome the obstacles together.

Thank you.

Welcoming Remarks by the Minister of Europe and Foreign Affairs Mr Jean-Yves Le Drian

Prime Minister,

Madame Minister,

Heads of Delegation,

Excellencies,

Ladies and Gentlemen,

It is a **great honour** for France to once again host the deliberations of the **Consultative Meeting of the States Parties to the Washington Treaty on Antarctica**.

Sixty years after its entry into force, I believe that we are today in a position, better than ever before, to gauge **the *historic* scope of that collective decision**, which was extended, thirty years later, by the ***Madrid Protocol on Environmental Protection***.

In a particularly tense and divided world, those who came before us recognised, *together*, the need to **place Antarctica above all power struggles**, in the name of **international peace** and **stability**, of **scientific progress** and the **preservation of our planet's biodiversity**. While there was still time, they decided to make Antarctica **a *common good*.**

Since then, our world has changed significantly, but these same issues are just as important as ever. They have even become – as we all know – **a matter of urgency.**

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This is why, in my opinion, the meeting that is being inaugurated today is so absolutely crucial.

It is *crucial*, firstly, because our **battle for the climate and for biodiversity is the battle of our century**, and this year, with its calendar of major negotiations, is critical: the IUCN World Conservation Congress from 4 to 7 September; the COP15 on biodiversity in October; followed by the COP26 on climate change in November. It is imperative that all countries boost their climate commitments before the COP26 in Glasgow, as the Paris Agreement requires of us. This upsurge in ambition is necessarily going to entail new objectives for 2030. We shall be waging some of this battle's key struggles on the *southern continent* and – just as vital – in its adjacent oceans. We must spare no effort to safeguard **its ecosystems, so precious and yet so threatened by human activity**. We must fight back, and fight back swiftly, notably by establishing **managed or protected areas.**

Crucial is also an apt description of this meeting because **the scientific research being conducted in Antarctica is also** *crucial***.**

And I should like to take this opportunity to **acknowledge all of the scientists working *in situ***, and especially our researchers currently on assignment in our two stations: the ***Dumont d'Urville*** station and the ***Concordia*** station, which we are delighted to share with our friends from Italy.

This research needs to be continued with due respect – obviously – for the continent's unique conditions.

Some of the **observations and experiments** conducted in Antarctica cannot be envisaged in any other location on the planet.

Yet they are **crucial**, especially for the struggle against climate change and for the preservation of biodiversity that I have just mentioned.

In particular, I am thinking of the studies being carried out under the aegis of the ***Committee for Environmental Protection*** [CEP], notably as part of the *Climate Change Response Work Programme* in liaison with **SCAR** [Scientific Committee on Antarctic Research].

On the occasion of the **thirtieth anniversary of the Madrid Protocol**, I am pleased to announce our decision to award a **special medal** to **Professor Steven Chown** from the *Monash University*, Melbourne. Indeed, the **French Polar Institute** [*Institut Polaire Paul Emile Victor*, or IPEV] and the **French Committee for Arctic and Antarctic Research** [CNFRA] wish to honour him for the quality of his work and signal our esteem and our appreciation.

Finally, it is the **development of tourism in Antarctica** that furthermore makes this meeting *crucial*.

While perfectly understandable, this newfound interest is, for all of us, a source of major concern. There is one number that says it all: in just two decades, the number of visitors has risen by **450%**! You heard that correctly: 450%! We all know what this might mean.

Our collective responsibility is to **ensure that this trend never infringe upon the principles of which we are the guardians,** those of the *Antarctic Treaty* and its *Protocol on Environmental Protection.*

This issue warrants the Parties' full attention, and I welcome the efforts already under way to conduct discussions thereupon, as well as the very reasonable conduct of some polar and maritime cruise operators.

*

Owing to the **pandemic** – ladies and gentlemen – it was not possible for us all to meet here in Paris in person, but I should like to reassure you that **France's capital and several of our major cities have seized this opportunity to celebrate the *White Continent***, through a number of beautiful **exhibitions** and **events** which look very exciting, both on the banks of the River Seine and on the shores of the Atlantic. We are, indeed, very proud of this **cultural and educational season that has been dubbed "*2021, a polar summer*"**, through which millions of people will be able to discover not only the myriad facets of this fascinating world, but also **the value of the scientific work undertaken in Antarctica daily by our researchers based there**. We believe that if we are to protect our common good then the first step is **awareness-raising**, as broad as possible, as to what makes it unique and what is required in order to safeguard its future.

France's commitment to our common good is also at the very heart of our diplomacy. This is true, naturally, in the case of Antarctica, thanks to the endeavours of our new *Ambassador for Polar and Maritime Issues*, **Olivier Poivre d'Arvor**, who shall be chairing your work.

Upon my request, he has already been **on assignment with our partners outside France** so as to discuss our priorities, and especially the priority that crowns them all: **the creation of new marine protected areas around Antarctica**, the need for which I mentioned a moment ago. This ambition has now garnered broad consensus across the international community. It is my hope that soon the two major countries that we have yet to convince will also come to see the wisdom of such an aspiration.

And these visits and these exchanges of course form the basis of our work, as the Prime Minister was saying, **on the first French polar strategy**, which is to be submitted to me in September, encompassing our Arctic and Antarctic policy and which will serve as our roadmap in the coming years.

*

Antarctica today – my dear friends – no longer stands as an inaccessible horizon or a separate, otherworldly place. Because we recognise that to a considerable extent **our planet's**

future, and therefore **our own future**, is going to depend on it. Although uninhabited, this continent is clearly **a treasure for all of humanity**.

It is therefore my hope that, together, we shall be up to the task of fulfilling the **immense responsibilities** incumbent upon all of us.

Thank you.

2. Reports by Depositaries and Observers

Report of the Depositary Government of the Antarctic Treaty and its Protocol in accordance with Recommendation XIII-2

Information Paper submitted by the United States

This report covers events with respect to the Antarctic Treaty and the Protocol on Environmental Protection to the Antarctic Treaty.

Since the last report, there have been no accessions to the Treaty and one approval of the Protocol. Colombia deposited an instrument of approval of the Protocol on February 13, 2020, and the Protocol entered into force for Colombia on March 14, 2020. There are fifty-four (54) Parties to the Treaty and forty-one (41) Parties to the Protocol.

Lists of Parties to the Treaty, to the Protocol, Annex V, Annex VI, and of Recommendations/Measures and their approvals are attached.

Date of most recent action: April 22, 2019

The Antarctic Treaty

Done: Washington; December 1, 1959

Entry into force: June 23, 1961
In accordance with Article XIII, the Treaty was subject to ratification by the signatory States and is open for accession by any State which isa Member of the United Nations, or by any other State which may be invited to accede to the Treaty with the consent of all the Contracting Parties whose representatives are entitled to participate in the meetingsprovided for under Article IX of the Treaty; instruments of ratificationand instruments of accession shall be deposited with the Government of the United States of America. Upon the deposit of instruments of ratification by all the signatory States, the Treaty entered into force forthose States and for States which had deposited instruments of accession to the Treaty. Thereafter, the Treaty enters into force for any acceding State upon deposit of its instrument of accession.

Legend: (no mark) = ratification; **a** = accession; **d** = succession; **w** = withdrawal orequivalent action

Participant	Signature	Consent to be bound		Other Action	Notes
Argentina	December 1, 1959	June 23, 1961			
Australia	December 1, 1959	June 23, 1961			
Austria		August 25, 1987	a		
Belarus		December 27, 2006	a		
Belgium	December 1, 1959	July 26, 1960			
Brazil		May 16, 1975	a		
Bulgaria		September 11, 1978	a		
Canada		May 4, 1988	a		
Chile	December 1, 1959	June 23, 1961			
China		June 8, 1983	a		
Colombia		January 31, 1989	a		
Cuba		August 16, 1984	a		
Czech Republic		January 1, 1993	d		1
Denmark		May 20, 1965	a		
Ecuador		September 15, 1987	a		
Estonia		May 17, 2001	a		
Finland		May 15, 1984	a		
France	December 1, 1959	September 16, 1960			
Germany		February 5, 1979	a		2
Greece		January 8, 1987	a		
Guatemala		July 31, 1991	a		
Hungary		January 27, 1984	a		
Iceland		October 13, 2015	a		

Participant	Signature	Consent to be bound		Other Action	Notes
India		August 19, 1983	a		
Italy		March 18, 1981	a		
Japan	December 1, 1959	August 4, 1960			
Kazakhstan		January 27, 2015	a		
Korea (DPRK)		January 21, 1987	a		
Korea (ROK)		November 28, 1986	a		
Malaysia		October 31, 2011	a		
Monaco		May 31, 2008	a		
Mongolia		March 23, 2015	a		
Netherlands		March 30, 1967	a		3
New Zealand	December 1, 1959	November 1, 1960			
Norway	December 1, 1959	August 24, 1960			
Pakistan		March 1, 2012	a		
Papua New Guinea		March 16, 1981	d		4
Peru		April 10, 1981	a		
Poland		June 8, 1961	a		
Portugal		January 29, 2010	a		
Romania		September 15, 1971	a		5
Russian Federation	December 1, 1959	November 2, 1960			6
Slovak Republic		January 1, 1993	d		7
Slovenia		April 22, 2019	a		
South Africa	December 1, 1959	June 21, 1960			
Spain		March 31, 1982	a		
Sweden		April 24, 1984	a		
Switzerland		November 15, 1990	a		
Turkey		January 24, 1996	a		
Ukraine		October 28, 1992	a		
United Kingdom	December 1, 1959	May 31, 1960			
United States	December 1, 1959	August 18, 1960			
Uruguay		January 11, 1980	a		8
Venezuela		March 24, 1999	a		

[1] Effective date of succession by the Czech Republic. Czechoslovakia deposited an instrument of accessionto the Treaty on June 14, 1962. On December 31, 1992, at midnight, Czechoslovakia ceased to exist and was succeeded by two separate and independent states, the Czech Republic and the Slovak Republic.

[2] The Embassy of the Federal Republic of Germany in Washington transmitted to the Department of State adiplomatic note, dated October 2, 1990, which reads as follows:

"The Embassy of the Federal Republic of Germany presents its compliments to the Department of State and has the honor to inform the Government of the United States of America as the depositary Governmentof the Antarctic Treaty that, t[h]rough the accession of the German Democratic Republic to the Federal Republic of Germany with effect from October 3, 1990, the two German states will unite to form one sovereign state which, as a contracting party to the Antarctic Treaty, will remain bound by the provisions of the Treaty and subject to those recommendations adopted at the 15 consultative meetings which the FederalRepublic of Germany has approved. From the date of German unity, the Federal Republic of Germany willact under the designation of "Germany" within the framework of the [A]ntarctic system.

"The Embassy would be grateful if the Government of the United States of America could inform all contracting parties to the Antarctic Treaty of the contents of this note.

"The Embassy of the Federal Republic of Germany avails itself of this opportunity to renew to the Department of State the assurances of its highest consideration."

Prior to unification, on November 19, 1974, the German Democratic Republic deposited an instrument of accession to the Treaty, accompanied by a declaration, a Department of State English translation of whichreads as follows:

"The German Democratic Republic takes the view that Article XIII, paragraph 1, of the Treaty is inconsistent with the principle that all States which are guided in their policies by the purposes and principles of the United Nations Charter have the right to become parties to treaties which affect the interest of all States."

Subsequently, on February 5, 1979, the Federal Republic of Germany deposited an instrument of accessionto the Treaty accompanied by a statement, an English translation of which, provided by the Embassy of theFederal Republic of Germany, reads as follows:

"My dear Mr. Secretary,

"In connection with the deposit today of the instrument of accession to the Antarctic Treaty signed in Washington December 1, 1959, I have the honor to state on behalf of the Federal Republic of Germany thatwith effect from the day on which the treaty enters into force for the Federal Republic of Germany it will also apply to Berlin (West) subject to the rights and responsibilities of the French Republic, the United Kingdom of Great Britain and Northern Ireland and the United States of America including those relating to disarmament and demilitarization.

"Accept, Excellency, the expression of my highest consideration."

[3] The instrument of accession to the Treaty by the Netherlands states that the accession is for the Kingdomin Europe, Suriname and the Netherlands Antilles.

Suriname became an independent state on November 25, 1975.

The Royal Netherlands Embassy in Washington transmitted to the Department of State a diplomatic note,dated January 9, 1986, which reads as follows:

"The Royal Netherlands Embassy presents its compliments to the Department of State and has the honor torequest the Department's attention for the following with respect to the Department's capacity of depositary of [the Antarctic Treaty].

"Effective January 1, 1986 the island of Aruba – formerly part of the Netherlands Antilles – obtained internal autonomy as a country within the Kingdom of The Netherlands. Consequently the Kingdom ofThe Netherlands as of January 1, 1986 consists of three countries, to wit: the Netherlands proper, the Netherlands Antilles and Aruba.

"Since the abovementioned event concerns only a change in internal constitutional relations within the Kingdom of The Netherlands, and as the Kingdom as such, under international law, will remain the subjectwith which treaties are concluded, the aforementioned change will have no consequences in international law with regard to treaties concluded by the Kingdom, the application of which (treaties) were extended tothe Netherlands Antilles, including Aruba.

"These treaties, thus, will remain applicable for Aruba in its new status as autonomous country within theKingdom of The Netherlands effective January 1, 1986.

“Consequently the [Antarctic Treaty] to which the Kingdom of the Netherlands is a Party, and which [has]been extended to the Netherlands Antilles will as of January 1, 1986 apply to all three countries of the Kingdom of The Netherlands.

“The Embassy would appreciate if the other Parties concerned would be notified of the above.

“The Royal Netherlands Embassy avails itself of this opportunity to renew to the Department of State theassurance of its highest consideration.”

The Royal Netherlands Embassy in Washington transmitted to the Department of State a diplomatic note,dated October 6, 2010, which reads in pertinent part as follows:

“The Kingdom of the Netherlands currently consists of three parts: the Netherlands, the Netherlands Antilles and Aruba. The Netherlands Antilles consists of the islands of Curaçao, Sint Maarten, Bonaire,Sint Eustatius and Saba.

“With effect from 10 October 2010, the Netherlands Antilles will cease to exist as a part of the Kingdom ofthe Netherlands. From that date onwards, the Kingdom will consist of four parts: the Netherlands, Aruba, Curaçao and Sint Maarten. Curaçao and Sint Maarten will enjoy internal self-government within the Kingdom, as Aruba and, up to 10 October 2010, the Netherlands Antilles do.

“These changes constitute a modification of the internal constitutional relations within the Kingdom of the Netherlands. The Kingdom of the Netherlands will accordingly remain the subject of international law with which agreements are concluded. The modification of the structure of the Kingdom will therefore notaffect the validity of the international agreements ratified by the Kingdom for the Netherlands Antilles; these agreements will continue to apply to Curaçao and Sint Maarten.

“The other islands that have until now formed part of the Netherlands Antilles – Bonaire, Sint Eustatius andSaba – will become part of the Netherlands, thus constituting ‘the Caribbean part of the Netherlands’. The agreements that now apply to the Netherlands Antilles will also continue to apply to these islands; however, the Government of the Netherlands will now be responsible for implementing these agreements.”

[4] Date of deposit of notification of succession by Papua New Guinea; effective September 16, 1975, thedate of its independence.

[5] The instrument of accession to the Treaty by Romania was accompanied by a note of the Ambassador of the Socialist Republic of Romania to the United States of America, dated September 15, 1971, which readsas follows:

“Dear Mr. Secretary:

“Submitting the instrument of adhesion of the Socialist Republic of Romania to the Antarctic Treaty,signed at Washington on December 1, 1959, I have the honor to inform you of the following:

‘The Council of State of the Socialist Republic of Romania states that the provisions of the first paragraphof the article XIII of the Antarctic Treaty are not in accordance with the principle according to which the multilateral treaties whose object and purposes are concerning the international community, as a whole, should be opened for universal participation.’

“I am kindly requesting you, Mr. Secretary, to forward to all parties concerned the text of the Romanianinstrument of adhesion to the Antarctic Treaty, as well as the text of this letter containing the above mentioned statement of the Romanian Government.

“I avail myself of this opportunity to renew to you, Mr. Secretary, the assurances of my highest consideration.”

Copies of the Ambassador’s letter and the Romanian instrument of accession to the Treaty were transmittedto the Antarctic Treaty parties by the Secretary of State’s circular note dated October 1, 1971.

[6] The Treaty was signed and ratified by the former Union of Soviet Socialist Republics. By a note datedJanuary 13, 1992, the Russian Federation informed the United States Government that it “continues to perform the rights and fulfil the obligations following from the international agreements signed by the Union of Soviet Socialist Republics.”

[7] Effective date of succession by the Slovak Republic. Czechoslovakia deposited an instrument of accession to the Treaty on June 14, 1962. On December 31, 1992, at midnight, Czechoslovakia ceased toexist and was succeeded by two separate and independent states, the Czech Republic and the Slovak Republic.

[8] The instrument of accession to the Treaty by Uruguay was accompanied by a declaration, a Department ofState English translation of which reads as follows:

"The Government of the Oriental Republic of Uruguay considers that, through its accession to the Antarctic Treaty signed at Washington (United States of America) on December 1, 1959, it helps to affirm the principles of using Antarctica exclusively for peaceful purposes, of prohibiting any nuclear explosion or radioactive waste disposal in this area, of freedom of scientific research in Antarctica in the service of mankind, and of international cooperation to achieve these objectives, which are established in said Treaty. "Within the context of these principles Uruguay proposes, through a procedure based on the principle of legal equality, the establishment of a general and definitive statute on Antarctica in which, respecting the rights of States as recognized in international law, the interests of all States involved and of the international community as a whole would be considered equitably.

"The decision of the Uruguayan Government to accede to the Antarctic Treaty is based not only on the interest which, like all members of the international community, Uruguay has in Antarctica, but also on a

special, direct, and substantial interest which arises from its geographic location, from the fact that its Atlantic coastline faces the continent of Antarctica, from the resultant influence upon its climate, ecology, and marine biology, from the historic bonds which date back to the first expeditions which ventured to explore that continent and its waters, and also from the obligations assumed in conformity with the Inter- American Treaty of Reciprocal Assistance which includes a portion of Antarctic territory in the zone described in Article 4, by virtue of which Uruguay shares the responsibility of defending the region.

"In communicating its decision to accede to the Antarctic Treaty, the Government of the Oriental Republic of Uruguay declares that it reserves its rights in Antarctica in accordance with international law."

Date of most recent action: February 13, 2020

Protocol on Environmental Protection to the Antarctic Treaty, with Annexes I-IV

Done: Madrid; October 4, 1991

Opened for Signature: Madrid, October 4, 1991; and thereafter at Washington until October 3, 1992

Entry into force: January 14, 1998
The Protocol entered into force on the thirtieth date following the dateof deposit of instruments of ratification, acceptance, approval or accession by all States which were Antarctic Treaty Consultative Parties at the date on which this Protocol was adopted (Article 23)

Legend: (no mark) = ratification; **a** = accession; **c** = acceptance; **d** = succession; **p** = approval; **w** = withdrawal or equivalent action

Participant	Signature	Consent to be bound		EIF Date	Notes
Argentina	October 4, 1991	October 28, 1993		January 14, 1998	1
Australia	October 4, 1991	April 6, 1994		January 14, 1998	
Austria	October 4, 1991				
Belarus		July 16, 2008	a	August 15, 2008	
Belgium	October 4, 1991	April 26, 1996		January 14, 1998	
Brazil	October 4, 1991	August 15, 1995		January 14, 1998	
Bulgaria		April 21, 1998	a	May 21, 1998	
Canada	October 4, 1991	November 13, 2003		December 13, 2003	
Chile	October 4, 1991	January 11, 1995		January 14, 1998	
China	October 4, 1991	August 2, 1994		January 14, 1998	
Colombia	October 4, 1991	February 13, 2020	p	March 14, 2020	
Czech Republic	January 1, 1993	August 25, 2004		September 24, 2004	2
Denmark	July 2, 1992				
Ecuador	October 4, 1991	January 4, 1993		January 14, 1998	
Finland	October 4, 1991	November 1, 1996	c	January 14, 1998	
France	October 4, 1991	February 5, 1993	p	January 14, 1998	
Germany	October 4, 1991	November 25, 1994		January 14, 1998	
Greece	October 4, 1991	May 23, 1995		January 14, 1998	
Hungary	October 4, 1991				
India	July 2, 1992	April 26, 1996		January 14, 1998	
Italy	October 4, 1991	March 31, 1995		January 14, 1998	
Japan	September 29, 1992	December 15, 1997	c	January 14, 1998	
Korea (DPRK)	October 4, 1991				
Korea (ROK)	July 2, 1992	January 2, 1996		January 14, 1998	
Malaysia		August 15, 2016	a	September 14, 2016	

Participant	Signature	Consent to be bound		EIF Date	Notes
Monaco		July 1, 2009	a	July 31, 2009	
Netherlands	October 4, 1991	April 14, 1994	c	January 14, 1998	3
New Zealand	October 4, 1991	December 22, 1994		January 14, 1998	
Norway	October 4, 1991	June 16, 1993		January 14, 1998	
Pakistan		March 1, 2012	a	March 31, 2012	
Peru	October 4, 1991	March 8, 1993		January 14, 1998	
Poland	October 4, 1991	November 1, 1995		January 14, 1998	
Portugal		September 10, 2014	a	October 10, 2014	
Romania	October 4, 1991	February 3, 2003		March 5, 2003	
Russian Federation	October 4, 1991	August 6, 1997		January 14, 1998	
Slovak Republic	January 1, 1993				4
South Africa	October 4, 1991	August 3, 1995		January 14, 1998	
Spain	October 4, 1991	July 1, 1992		January 14, 1998	
Sweden	October 4, 1991	March 30, 1994		January 14, 1998	
Switzerland	October 4, 1991	May 2, 2017		June 1, 2017	5
Turkey		September 27, 2017	a	October 27, 2017	
Ukraine		May 25, 2001	a	June 24, 2001	
United Kingdom	October 4, 1991	April 25, 1995		January 14, 1998	6
United States	October 4, 1991	April 17, 1997		January 14, 1998	
Uruguay	October 4, 1991	January 11, 1995		January 14, 1998	
Venezuela		August 1, 2014	a	August 31, 2014	

[1] Accompanied by declaration, with informal translation provided by the Embassy of Argentina, which reads as follows: "The Argentine Republic declares that in as much as the Protocol to the Antarctic Treatyon the Protection of the Environment is a Complementary Agreement of the Antarctic Treaty and that its Article 4 fully respects what has been stated in Article IV, Subsection 1, Paragraph A) of said Treaty, noneof its stipulations should be interpreted or be applied as affecting its rights, based on legal titles, acts of possession, contiguity and geological continuity in the region South of parallel 60, in which it has proclaimed and maintained its sovereignty."

[2] The Czech & Slovak Federal Republic signed the Protocol on October 2, 1992 and accepted the jurisdiction of the International Court of Justice and the Arbitral Tribunal for the settlement of disputes in accordance with Article 19, paragraph 1 of the Protocol. On December 31, 1992, at midnight, the Czech &Slovak Federal Republic ceased to exist and was succeeded by two separate and independent states, the Czech Republic and the Slovak Republic. January 1, 1993 is the effective date of succession by the Czech Republic in respect of signature of the Protocol by the Czech & Slovak Federal Republic.

The instrument of ratification of the Protocol deposited by the Czech Republic was accompanied by adeclaration, with informal translation provided by the Embassy of the Czech Republic, which reads asfollows: "The Czech Republic accepts the jurisdiction of the International Court of Justice and of theArbitral Tribunal under Article 19, paragraph 1, of the Protocol on Environmental Protection to the Antarctic Treaty, done at Madrid on October 4, 1991."

[3] Acceptance is for the Kingdom in Europe. At the time of its acceptance, the Kingdom of the Netherlands stated that it chooses both means for the settlement of disputes mentioned in Article 19, paragraph 1 of the Protocol, i.e. the International Court of Justice and the Arbitral Tribunal.

On October 27, 2004, the Kingdom of the Netherlands deposited an instrument, dated October 15, 2004,declaring that the Kingdom of the Netherlands accepts the Protocol for the Netherlands Antilles with a statement confirming that it chooses both means for the settlement of disputes mentioned in Article 19,paragraph 1 of the Protocol.

The Royal Netherlands Embassy in Washington transmitted to the Department of State a diplomatic note,dated October 6, 2010, which reads in pertinent part as follows:

"The Kingdom of the Netherlands currently consists of three parts: the Netherlands, the Netherlands Antilles and Aruba. The Netherlands Antilles consists of the islands of Curaçao, Sint Maarten, Bonaire,Sint Eustatius and Saba.

"With effect from 10 October 2010, the Netherlands Antilles will cease to exist as a part of the Kingdom ofthe Netherlands. From that date onwards, the Kingdom will consist of four parts: the Netherlands, Aruba, Curaçao and Sint Maarten. Curaçao and Sint Maarten will enjoy internal self-government within the Kingdom, as Aruba and, up to 10 October 2010, the Netherlands Antilles do.

"These changes constitute a modification of the internal constitutional relations within the Kingdom of the Netherlands. The Kingdom of the Netherlands will accordingly remain the subject of international law with which agreements are concluded. The modification of the structure of the Kingdom will therefore notaffect the validity of the international agreements ratified by the Kingdom for the Netherlands Antilles; these agreements will continue to apply to Curaçao and Sint Maarten.

"The other islands that have until now formed part of the Netherlands Antilles – Bonaire, Sint Eustatius andSaba – will become part of the Netherlands, thus constituting 'the Caribbean part of the Netherlands'. The agreements that now apply to the Netherlands Antilles will also continue to apply to these islands; however,the Government of the Netherlands will now be responsible for implementing these agreements."

[4] The Czech & Slovak Federal Republic signed the Protocol on October 2, 1992 and accepted the jurisdiction of the International Court of Justice and the Arbitral Tribunal for the settlement of disputes in accordance with Article 19, paragraph 1 of the Protocol. On December 31, 1992, at midnight, the Czech &Slovak Federal Republic ceased to exist and was succeeded by two separate and independent states, the Czech Republic and the Slovak Republic. January 1, 1993 is the effective date of succession by the SlovakRepublic in respect of signature of the Protocol by the Czech & Slovak Federal Republic.

[5] Included in the instrument of ratification of the Protocol by Switzerland is a declaration, in accordance with Article 19, paragraph 1 of the Protocol, that Switzerland chooses the International Court of Justice forthe settlement of disputes.

[6] Ratification is on behalf of the United Kingdom of Great Britain and Northern Ireland, the Bailiwick of Jersey, the Bailiwick of Guernsey, the Isle of Man, Anguilla, Bermuda, the British Antarctic Territory, Cayman Islands, Falkland Islands, Montserrat, St. Helena and Dependencies, South Georgia and the SouthSandwich Islands,Turks and Caicos Islands and British Virgin Islands.

Date of most recent action: February 13, 2020

Annex V on Area Protection and Management to the Protocolon Environmental Protection to the Antarctic Treaty

Done: Bonn October 17, 1991

Opened for Signature: Not subject to signature. Done at Bonn on October 17, 1991, as Recommendation 10 adopted by the XVIth Antarctic Treaty Consultative Meeting.

Entry into force: May 24, 2002

The Annex became effective upon the date on which both the Protocolon Environmental Protection entered into force and Recommendation 10 adopted by the XVIth Antarctic Treaty Consultative Meeting was approved by all Consultative Parties entitled to attend the XVIth Antarctic Treaty Consultative Meeting.

Legend: (no mark) = ratification**;** a = accession; d = succession; c = acceptance;p = approval; h =adherence

Participant	Consent to be bound		EIF Date	Notes
Argentina	August 4, 1995	c	May 24, 2002	
Australia	June 7, 1995	p	May 24, 2002	
Belarus	November 4, 2019	p	November 4, 2019	
Belgium	October 23, 2000	p	May 24, 2002	
Brazil	May 20, 1998	p	May 24, 2002	
Bulgaria	May 5, 1999	p	May 24, 2002	
Chile	March 25, 1998	p	May 24, 2002	
China, People's Republic of	January 26, 1995	p	May 24, 2002	
Colombia	February 13, 2020	p	March 14, 2020	
Czech Republic	April 23, 2014	p	April 23, 2014	
Ecuador	November 15, 2001	p	May 24, 2002	
Finland	April 2, 1997	p	May 24, 2002	
France	April 26, 1995	p	May 24, 2002	
Germany	September 1, 1998	p	May 24, 2002	
India	May 24, 2002	p	May 24, 2002	
Italy	February 11, 1998	p	May 24, 2002	
Japan	December 15, 1997	p	May 24, 2002	
Korea (ROK)	June 5, 1996	p	May 24, 2002	
Netherlands	March 18, 1998	p	May 24, 2002	
New Zealand	October 21, 1992	p	May 24, 2002	
Norway	October 13, 1993	p	May 24, 2002	
Peru	March 17, 1999	p	May 24, 2002	
Poland	September 20, 1995	p	May 24, 2002	
Romania	February 3, 2003	c	March 5, 2003	

Participant	Consent to be bound		EIF Date	Notes
Russian Federation	June 19, 2001	p	May 24, 2002	
South Africa	June 14, 1995	p	May 24, 2002	
Spain	February 18, 2000	p	May 24, 2002	
Sweden	April 7, 1994	p	May 24, 2002	
Switzerland	May 2, 2017	c	June 1, 2017	
Ukraine	May 25, 2001	c	May 24, 2002	
United Kingdom	May 21, 1996	p	May 24, 2002	
United States	May 6, 1998	p	May 24, 2002	
Uruguay	May 15, 1995	p	May 24, 2002	

Date of most recent action: February 13, 2020

Annex VI on Liability Arising from Environmental Emergencies to the Protocol on Environmental Protection to the Antarctic Treaty

Done: Stockholm June 17, 2005

Opened for Signature: Not subject to signature. Done at Stockholm on June 17, 2005, as Measure 1 adopted by the XXVIIIth Antarctic Treaty ConsultativeMeeting.

Entry into force: not yet in force

The Annex becomes effective upon the date on which Measure 1 adopted at the XXVIIIth Antarctic Treaty Consultative Meeting hasbeen approved by all Consultative Parties entitled to attend the XXVIIIth Antarctic Treaty Consultative Meeting.

Legend: (no mark) = ratification; **a** = accession**;** **d** = succession; **c** = acceptance; **p** = approval; **h** = adherence

Participant	Consent to be bound		EIF Date	Notes
Australia	May 15, 2014	p		
Colombia	February 13, 2020	p		
Ecuador	May 11, 2016	p		
Finland	December 14, 2010	p		
Germany	September 15, 2017	p		
Italy	October 12, 2011	p		
Netherlands	April 28, 2014	p		1
New Zealand	May 31, 2013	p		
Norway	May 24, 2013	p		
Peru	July 10, 2007	p		
Poland	January 15, 2009	p		
Russian Federation	April 24, 2013	p		
South Africa	November 12, 2013	p		
Spain	December 17, 2008	p		
Sweden	June 8, 2006	p		
Ukraine	June 14, 2018	p		
United Kingdom	April 18, 2013	p		
Uruguay	August 23, 2017	p		

[1] April 28, 2014 approval is for the European part of the Netherlands. On September 3, 2014, the Netherlands approved Measure 1 (2005) for the Caribbean part of the Netherlands (the islands of Bonaire,Sint Eustatius and Saba).

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	16 Recommendations adopted at First Meeting (Canberra 1961)	10 Recommendations adopted at Second Meeting (Buenos Aires 1962)	11 Recommendations adopted at Third Meeting (Brussels 1964)	28 Recommendations adopted at Fourth Meeting (Santiago 1966)	9 Recommendations adopted at Fifth Meeting (Paris 1968)	15 Recommendations adopted at Sixth Meeting (Tokyo 1970)
	Approved	**Approved**	**Approved**	**Approved**	**Approved**	**Approved**
Argentina	ALL	ALL	ALL	ALL	ALL	ALL
Australia	ALL	ALL	ALL	ALL	ALL	ALL
Belgium	ALL	ALL	ALL	ALL	ALL	ALL
Brazil (1983)+	ALL	ALL	ALL	ALL	ALL	ALL except 10
Bulgaria (1998)+						
Chile	ALL	ALL	ALL	ALL	ALL	ALL
China (1985)+	ALL	ALL	ALL	ALL	ALL	ALL except 10
Czech Rep. (2014)+	1-7, 10 & 12-14	1, 4, 6-7 & 9	1-2, 7 & 11	14-15, 18, 21-24 & 27	2-3 & 6-7	1, 3, 5-7 & 10-13
Ecuador (1990)+						
Finland (1989)+						
France	ALL	ALL	ALL	ALL	ALL	ALL
Germany (1981)+	ALL	ALL	ALL except 8	ALL except 16-19	ALL except 6	ALL except 9
India (1983)+	ALL	ALL	ALL except 8***	ALL except 18	ALL	ALL except 9 & 10
Italy (1987)+	ALL	ALL	ALL	ALL	ALL	ALL
Japan	ALL	ALL	ALL	ALL	ALL	ALL
Korea, Rep. (1989)+	ALL	ALL	ALL	ALL	ALL	ALL
Netherlands (1990)+	ALL except 11 & 15	ALL except 3, 5, 8 & 10	ALL except 3, 4, 6 & 9	ALL except 20, 25, 26 & 28	ALL except 1, 8 & 9	ALL except 15
New Zealand	ALL	ALL	ALL	ALL	ALL	ALL
Norway	ALL	ALL	ALL	ALL	ALL	ALL
Peru (1989)+	ALL	ALL	ALL	ALL	ALL	ALL
Poland (1977)+	ALL	ALL	ALL	ALL	ALL	ALL
Russia	ALL	ALL	ALL	ALL	ALL	ALL
South Africa	ALL	ALL	ALL	ALL	ALL	ALL
Spain (1988)+	ALL	ALL	ALL	ALL	ALL	ALL
Sweden (1988)+						
U.K.	ALL	ALL	ALL	ALL	ALL	ALL
Uruguay (1985)+	ALL	ALL	ALL	ALL	ALL	ALL
U.S.A.	ALL	ALL	ALL	ALL	ALL	ALL

* IV-6, IV-10, IV-12, and V-5 terminated by VIII-2
*** Accepted as interim guideline
\+ Year attained Consultative Status. Acceptance by that State required to bring into force Recommendations or Measures of meetings from that year forward.

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	9 Recommendations adopted at Seventh Meeting (Wellington 1972)	14 Recommendations adopted at Eighth Meeting (Oslo 1975)	6 Recommendations adopted at Ninth Meeting (London 1977)	9 Recommendations adopted at Tenth Meeting (Washington 1979)	3 Recommendations adopted at Eleventh Meeting (Buenos Aires 1981)	8 Recommendations adopted at Twelfth Meeting (Canberra 1983)
	Approved	**Approved**	**Approved**	**Approved**	**Approved**	**Approved**
Argentina	ALL	ALL	ALL	ALL	ALL	ALL
Australia	ALL	ALL	ALL	ALL	ALL	ALL
Belgium	ALL	ALL	ALL	ALL	ALL	ALL
Brazil (1983)+	ALL except 5	ALL	ALL	ALL	ALL	ALL
Bulgaria (1998)+						
Chile	ALL	ALL	ALL	ALL	ALL	ALL
China (1985)+	ALL except 5	ALL	ALL	ALL	ALL	ALL
Czech Rep. (2014)+	4 & 6-8	1, 4, 6-10, 12 & 14	1 & 2	1-3 & 8	ALL except 2	ALL except 3-5
Ecuador (1990)+						
Finland (1989)+						
France	ALL	ALL	ALL	ALL	ALL	ALL
Germany (1981)+	ALL except 5	ALL except 2 & 5	ALL	ALL	ALL	ALL
India (1983)+	ALL	ALL	ALL	ALL except 1 & 9	ALL	ALL
Italy (1987)+	ALL except 5	ALL	ALL	ALL except 1 & 9		
Japan	ALL	ALL	ALL	ALL	ALL	ALL
Korea, Rep. (1989)+	ALL	ALL	ALL	ALL	ALL	ALL
Netherlands (1990)+	ALL	ALL	ALL except 3	ALL except 9	ALL except 2	ALL
New Zealand	ALL	ALL	ALL	ALL	ALL	ALL
Norway	ALL	ALL	ALL	ALL	ALL	ALL
Peru (1989)+	ALL	ALL	ALL	ALL	ALL	
Poland (1977)+	ALL	ALL	ALL	ALL	ALL	ALL
Russia	ALL	ALL	ALL	ALL	ALL	ALL
South Africa	ALL	ALL	ALL	ALL	ALL	ALL
Spain (1988)+	ALL	ALL	ALL	ALL except 1 & 9	ALL except 1	ALL
Sweden (1988)+						
U.K.	ALL	ALL	ALL	ALL	ALL	ALL
Uruguay (1985)+	ALL	ALL	ALL	ALL	ALL	ALL
U.S.A.	ALL	ALL	ALL	ALL	ALL	ALL

* IV-6, IV-10, IV-12, and V-5 terminated by VIII-2
*** Accepted as interim guideline
+ Year attained Consultative Status. Acceptance by that State required to bring into force Recommendations or Measures of meetings from that year forward.

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	16 Recommendations adopted at Thirteenth Meeting (Brussels 1985)	10 Recommendations adopted at Fourteenth Meeting (Rio de Janeiro 1987)	22 Recommendations adopted at Fifteenth Meeting (Paris 1989)	13 Recommendations adopted at Sixteenth Meeting (Bonn 1991)	4 Recommendations adopted at Seventeenth Meeting (Venice 1992)	1 Recommendation adopted at Eighteenth Meeting (Kyoto 1994)
	Approved	**Approved**	**Approved**	**Approved**	**Approved**	**Approved**
Argentina	ALL	ALL	ALL	ALL	ALL	ALL
Australia	ALL	ALL	ALL	ALL	ALL	ALL
Belgium	ALL	ALL	ALL	ALL	ALL	ALL
Brazil (1983)+	ALL	ALL	ALL	ALL	ALL	ALL
Bulgaria (1998)+				XVI-10		
Chile	ALL	ALL	ALL	ALL	ALL	ALL
China (1985)+	ALL	ALL	ALL	ALL	ALL	ALL
Czech Rep. (2014)+	1-3, 5-6, 8, 11 & 15-16	1, 3, 5, 7-8 & 10	2, 5, 12-19 & 21	1, 2, 5-6 & 10-12	ALL except 2	ALL
Ecuador (1990)+				1, 2, 5, 6, 10 & 12	ALL except 2 & 3	ALL
Finland (1989)+			ALL	ALL	ALL	ALL
France	ALL	ALL	ALL	ALL	ALL	ALL
Germany (1981)+	ALL	ALL	ALL except 3, 8, 10, 11 & 22	ALL	ALL	ALL
India (1983)+	ALL	ALL	ALL	ALL	ALL	ALL
Italy (1987)+		ALL	ALL	ALL	ALL	ALL
Japan	ALL	ALL	ALL	ALL except 3-9 & 13	ALL except 1-2 & 4	ALL
Korea, Rep. (1989)+	ALL	ALL	ALL except 1-4,6-11,16,18&19	ALL	ALL except 1	ALL
Netherlands (1990)+	ALL	ALL except 9	ALL except 22	ALL	ALL	ALL
New Zealand	ALL	ALL	ALL	ALL	ALL	ALL
Norway	ALL	ALL	ALL	ALL	ALL	ALL
Peru (1989)+			ALL except 22	ALL except 13	ALL	ALL
Poland (1977)+	ALL	ALL	ALL	ALL	ALL	ALL
Russia	ALL	ALL	ALL	ALL	ALL	ALL
South Africa	ALL	ALL	ALL	ALL	ALL	ALL
Spain (1988)+	ALL	ALL	ALL	ALL	ALL	ALL
Sweden (1988)+			ALL	ALL	ALL	ALL
U.K.	ALL	ALL except 2	ALL except 3, 4, 8, 10 & 11	ALL except 4, 6, 8 & 9	ALL	ALL
Uruguay (1985)+	ALL	ALL	ALL	ALL	ALL	ALL
U.S.A.	ALL	ALL	ALL except 1-4, 10 & 11	ALL	ALL	ALL

* IV-6, IV-10, IV-12, and V-5 terminated by VIII-2
*** Accepted as interim guideline
\+ Year attained Consultative Status. Acceptance by that State required to bring into force Recommendations or Measures of meetings from that year forward.

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	5 Measures adopted at Nineteenth Meeting (Seoul 1995)	**2 Measures adopted at Twentieth Meeting (Utrecht 1996)**	**5 Measures adopted at Twenty-First Meeting (Christchurch 1997)**	**2 Measures adopted at Twenty-Second Meeting (Tromso 1998)**	**1 Measure adopted at Twenty-Third Meeting (Lima 1999)**
	Approved	**Approved**	**Approved**	**Approved**	**Approved**
Argentina	ALL	ALL	ALL	ALL	ALL
Australia	ALL	ALL	ALL	ALL	ALL
Belgium	ALL	ALL	ALL	ALL	ALL
Brazil (1983)+	ALL	ALL	ALL	ALL	ALL
Bulgaria (1998)+					
Chile	ALL	ALL	ALL	ALL	ALL
China (1985)+	ALL	ALL	ALL	ALL	ALL
Czech Rep. (2014)+	ALL except 1 & 2	ALL except 1	ALL except 1 & 2	ALL except 1	
Ecuador (1990)+	XIX-3		XXI-3		
Finland (1989)+	ALL	ALL	ALL	ALL	ALL
France	ALL	ALL	ALL	ALL	ALL
Germany (1981)+	ALL	ALL	ALL	ALL	ALL
India (1983)+	ALL	ALL	ALL	ALL	ALL
Italy (1987)+	ALL	ALL			
Japan	ALL (except 2&5)	ALL (except 1)	All (except 1-2 & 5)		
Korea, Rep. (1989)+	ALL	ALL	ALL	ALL	ALL
Netherlands (1990)+	ALL	ALL	ALL	ALL	ALL
New Zealand	ALL	ALL	ALL	ALL	ALL
Norway	ALL	ALL	ALL		
Peru (1989)+	ALL	ALL	ALL	ALL	ALL
Poland (1977)+	ALL	ALL	ALL	ALL	ALL
Russia	ALL	ALL	ALL	ALL	ALL
South Africa	ALL	ALL	ALL	ALL	ALL
Spain (1988)+	ALL	ALL	ALL	ALL	ALL
Sweden (1988)+	ALL	ALL	ALL	ALL	ALL
U.K.	ALL	ALL	ALL	ALL	ALL
Uruguay (1985)+	ALL	ALL	ALL	ALL	ALL
U.S.A.	ALL	ALL	ALL	ALL	ALL

"+Year attained Consultative Status. Acceptance by that state required to bring into force Recommendations or Measures of meetings from that Year forward."

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	2 Measures adopted at Twelfth Special Meeting (The Hague 2000)	**3 Measures adopted at Twenty-Fourth Meeting (St. Petersburg 2001)**	**1 Measure adopted at Twenty-Fifth Meeting (Warsaw 2002)**	**3 Measures adopted at Twenty-Sixth Meeting (Madrid 2003)**	**4 Measures adopted at Twenty-Seventh Meeting (Cape Town 2004)**
	Approved	**Approved**	**Approved**	**Approved**	**Approved**
Argentina			*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
Australia	ALL	ALL	ALL	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
Belgium	ALL	ALL	ALL	ALL	ALL
Brazil (1983)+	ALL	ALL	ALL	ALL	XXVII-1, XXVII-2, XXVII-3
Bulgaria (1998)+			*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **
Chile	ALL	ALL	ALL	ALL	ALL
China (1985)+	ALL	ALL	ALL	ALL	XXVII-1 *, XXVII-2 *, XXVII-3 **
Czech Rep. (2014)+	ALL	ALL	ALL	ALL	ALL
Ecuador (1990)+	SATCM XII-1	XXIV-3	*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
Finland (1989)+	ALL	ALL	*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
France	ALL (except SATCM XII-2)	ALL	*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1, XXVII-2 *, XXVII-3, XXVII-4
Germany (1981)+	ALL	ALL	ALL	ALL	XXVII-1 *, XXVII-2 *, XXVII-3 **
India (1983)+	ALL	ALL	ALL	ALL	XXVII-1 *, XXVII-2 *, XXVII-3 **
Italy (1987)+			*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **
Japan		ALL	*	ALL	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
Korea, Rep. (1989)+	ALL	ALL	*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **
Netherlands (1990)+	ALL	ALL	ALL	ALL	ALL
New Zealand	ALL	ALL	ALL	ALL	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
Norway		ALL	*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
Peru (1989)+	ALL	ALL	ALL	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **
Poland (1977)+		ALL	ALL	ALL	ALL
Russia	ALL	ALL	ALL	XXVI-1, XXVI-2, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
South Africa	ALL	ALL	ALL	ALL	ALL
Spain (1988)+			*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **
Sweden (1988)+	ALL	ALL	ALL	ALL	XXVII-1 *, XXVII-2 *, XXVII-3 **
Ukraine (2004)+					XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
U.K.	ALL (except SATCM XII-2)	ALL (except XXIV-3)	ALL	ALL	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
Uruguay (1985)+	ALL	ALL	*	XXVI-1, XXVI-2 *, XXVI-3	XXVII-1 *, XXVII-2 *, XXVII-3 **, XXVII-4
U.S.A.	ALL	ALL	*	XXVI-1, XXVI-2 *, XXVI-3 **	XXVII-1 *, XXVII-2 *, XXVII-3 **

"+Year attained Consultative Status. Acceptance by that state required to bring into force Recommendations or Measures of meetings from that Year forward."

* Management Plans annexed to this Measure were deemed to have been approved in accordance with Article 6(1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

** Revised and updated List of Historic Sites and Monuments annexed to this Measure was deemed to have been approved in accordance with Article 8(2) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	5 Measures adopted at Twenty-Eighth Meeting (Stockholm 2005)	**4 Measures adopted at Twenty-Ninth Meeting (Edinburgh 2006)**	**3 Measures adopted at Thirtieth Meeting (New Delhi 2007)**	**14 Measures adopted at Thirty-first Meeting (Kyiv 2008)**
	Approved	**Approved**	**Approved**	**Approved**
Argentina	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Australia	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Belgium	ALL except Measure 1	ALL	ALL	ALL
Brazil (1983)+	ALL except Measure 1	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Bulgaria (1998)+	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Chile	ALL except Measure 1	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
China (1985)+	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Czech Rep. (2014)+	ALL except Measure 1	ALL	ALL	ALL except Measure 8
Ecuador (1990)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Finland (1989)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
France	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Germany (1981)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
India (1983)+	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Italy (1987)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Japan	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Korea, Rep. (1989)+	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Netherlands (1990)+	ALL	ALL	ALL	ALL
New Zealand	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Norway	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Peru (1989)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Poland (1977)+	ALL	ALL	ALL	XXXI-1 - XXXI-14 *
Russia	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
South Africa	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	ALL	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Spain (1988)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Sweden (1988)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Ukraine (2004)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
U.K.	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
Uruguay (1985)+	XXVIII-1, XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *
U.S.A.	XXVIII-2 *, XXVIII-3 *, XXVIII-4 *, XXVIII-5 **	XXIX-1 *, XXIX-2 *, XXIX-3 **, XXIX-4 ***	XXX-1 *, XXX-2 *, XXX-3 **	XXXI-1 - XXXI-14 *

"+Year attained Consultative Status. Acceptance by that state required to bring into force Recommendations or Measures of meetings from that Year forward."

* Management Plans annexed to this Measure deemed to have been approved in accordance with Article 6(1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

** Revised and updated List of Historic Sites and Monuments annexed to this Measure deemed to have been approved in accordance with Article 8(2) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

*** Modification of Appendix A to Annex II to the Protocol on Environmental Protection to the Antarctic Treaty deemed to have been approved in accordance with Article 9(1) of Annex II to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	16 Measures adopted at Thirty-second Meeting (Baltimore 2009)	15 Measures adopted at Thirty-third Meeting (Punta del Este 2010)	12 Measures adopted at Thirty-fourth Meeting (Buenos Aires 2011)	11 Measures adopted at Thirty-fifth Meeting (Hobart 2012)	21 Measures adopted at Thirty-sixth Meeting (Brussels 2013)
	Approved	Approved	Approved	Approved	Approved
Argentina	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Australia	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Belgium	ALL	ALL	ALL	ALL	ALL
Brazil (1983)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Bulgaria (1998)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Chile	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
China (1985)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Czech Rep. (2014)+	ALL except 2 and 16	ALL	ALL	ALL	ALL
Ecuador (1990)+	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Finland (1989)+	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15 - XXXII-16	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
France	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Germany (1981)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
India (1983)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Italy (1987)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Japan	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Korea, Rep. (1989)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Netherlands (1990)+	XXXII-1 - XXXII-13 and XXXII-14; XXXII-15 - XXXII-16	ALL	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	ALL	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
New Zealand	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Norway	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Peru (1989)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Poland (1977)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Russia	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
South Africa	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Spain (1988)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Sweden (1988)+	XXXII-1 - XXXII-13* and XXXII-14**	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Ukraine (2004)+	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
U.K.	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15 - XXXII-16	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
Uruguay (1985)+	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-15	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**
U.S.A.	XXXII-1 - XXXII-13* and XXXII-14**; XXXII-16	XXXIII-1 - XXXIII-14* and XXXIII-15**	XXXIV-1 - XXXIV-10* and XXXIV-11 - XXXIV-12**	XXXV-1 - XXXV-10* and XXXV-11**	XXXVI-1 - XXXVI-17* and XXXVI-18 - XXXVI-21**

"+Year attained Consultative Status. Acceptance by that state required to bring into force Recommendations or Measures of meetings from that Year forward."

* Management Plans annexed to these Measures deemed to have been approved in accordance with Article 6(1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

** Modifications and/or additions to List of Historic Sites and Monuments deemed to have been approved in accordance with Article 8(2) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	16 Measures adopted at Thirty-seventh Meeting (Brasilia 2014)	**19 Measures adopted at Thirty-eighth Meeting (Sofia 2015)**	**9 Measures adopted at Thirty-ninth Meeting (Santiago 2016)**	**8 Measures adopted at Fortieth Meeting (Beijing 2017)**	**6 Measures adopted at Forty-first Meeting (Buenos Aires 2018)**
	Approved	**Approved**	**Approved**	**Approved**	**Approved**
Argentina	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Australia	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Belgium	ALL	ALL	ALL	ALL	XLI-1 - XLI-6*
Brazil (1983)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Bulgaria (1998)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Chile	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
China (1985)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Czech Rep. (2014)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Ecuador (1990)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Finland (1989)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
France	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Germany (1981)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
India (1983)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Italy (1987)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Japan	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Korea, Rep. (1989)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Netherlands (1990)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
New Zealand	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Norway	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Peru (1989)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Poland (1977)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Russia	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
South Africa	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Spain (1988)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Sweden (1988)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Ukraine (2004)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
U.K.	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
Uruguay (1985)+	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*
U.S.A.	XXXVII-1 - XXXVII-16*	XXXVIII-1 - XXXVIII-18* and XXXVIII-19**	XXXIX-1 - XXXIX-8* and XXXIX-9**	XL-1 - XL-8*	XLI-1 - XLI-6*

"+Year attained Consultative Status. Acceptance by that state required to bring into force Recommendations or Measures of meetings from that Year forward."

* Management Plans annexed to these Measures deemed to have been approved in accordance with Article 6(1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

** Modifications and/or additions to List of Historic Sites and Monuments deemed to have been approved in accordance with Article 8(2) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

Approval, as notified to the Government of the United States of America, of measures relating to the furtherance of the principles and objectives of the Antarctic Treaty

	12 Measures adopted at Forty-second Meeting (Prague 2019) Approved
Argentina	XLII-1 - XLII-11* and XLII-12**
Australia	XLII-1 - XLII-11* and XLII-12**
Belgium	XLII-1 - XLII-11* and XLII-12**
Brazil (1983)+	XLII-1 - XLII-11* and XLII-12**
Bulgaria (1998)+	XLII-1 - XLII-11* and XLII-12**
Chile	XLII-1 - XLII-11* and XLII-12**
China (1985)+	XLII-1 - XLII-11* and XLII-12**
Czech Rep. (2014)+	XLII-1 - XLII-11* and XLII-12**
Ecuador (1990)+	XLII-1 - XLII-11* and XLII-12**
Finland (1989)+	XLII-1 - XLII-11* and XLII-12**
France	XLII-1 - XLII-11* and XLII-12**
Germany (1981)+	XLII-1 - XLII-11* and XLII-12**
India (1983)+	XLII-1 - XLII-11* and XLII-12**
Italy (1987)+	XLII-1 - XLII-11* and XLII-12**
Japan	XLII-1 - XLII-11* and XLII-12**
Korea, Rep. (1989)+	XLII-1 - XLII-11* and XLII-12**
Netherlands (1990)+	XLII-1 - XLII-11* and XLII-12**
New Zealand	XLII-1 - XLII-11* and XLII-12**
Norway	XLII-1 - XLII-11* and XLII-12**
Peru (1989)+	XLII-1 - XLII-11* and XLII-12**
Poland (1977)+	XLII-1 - XLII-11* and XLII-12**
Russia	XLII-1 - XLII-11* and XLII-12**
South Africa	XLII-1 - XLII-11* and XLII-12**
Spain (1988)+	XLII-1 - XLII-11* and XLII-12**
Sweden (1988)+	XLII-1 - XLII-11* and XLII-12**
Ukraine (2004)+	XLII-1 - XLII-11* and XLII-12**
U.K.	XLII-1 - XLII-11* and XLII-12**
Uruguay (1985)+	XLII-1 - XLII-11* and XLII-12**
U.S.A.	XLII-1 - XLII-11* and XLII-12**

"+Year attained Consultative Status. Acceptance by that state required to bring into force Recommendations or Measures of meetings from that Year forward."

* Management Plans annexed to these Measures deemed to have been approved in accordance with Article 6(1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

** Modifications and/or additions to List of Historic Sites and Monuments deemed to have been approved in accordance with Article 8(2) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty and the Measure not specifying a different approval method.

Office of the Assistant Legal Adviser for Treaty Affairs
Department of State
Washington, February 5, 2021.

Report of the Depositary Government for the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)

Summary

Australia as Depositary of the *Convention on the Conservation of Antarctic Marine Living Resources* 1980 provides a report on the status of the Convention.

Depositary report

Australia as depositary of the *Convention on the Conservation of Antarctic Marine Living Resources* 1980 (the Convention) is pleased to report to the Forty-Third Antarctic Treaty Consultative Meeting on the status of the Convention.

Australia advises the Antarctic Treaty Parties that no new States have acceded to the Convention since Panama in 2013. The number of Contracting Parties to the Convention is thirty-six (36).

On 7 May 2020, the People's Republic of China (PRC) advised the depositary of the following declaration:

> *In accordance with the Basic Law of the Hong Kong Special Administrative Region of the PRC, the Government of the PRC decides that the Convention will apply to the Hong Kong Special Administrative Region of the PRC from 1 July 2020.*

A copy of the status list for the Convention is available on the Australian Treaties Database at the following address:
http://www.austlii.edu.au/au/other/dfat/treaty_list/depository/CCAMLR.html

Report of the Depositary Government for the Agreement on the Conservation of Albatrosses and Petrels (ACAP)

Information paper submitted by Australia

Summary

Australia as Depositary of the *Agreement on the Conservation of Albatrosses and Petrels* 2001 provides a report on the status of the Agreement.

Depositary report

Australia as Depositary of the *Agreement on the Conservation of Albatrosses and Petrels* 2001 (‘the Agreement’) is pleased to report to the Forty-Third Antarctic Treaty Consultative Meeting on the status of the Agreement.

Australia advises Antarctic Treaty Parties that no Parties have joined the Agreement since Uruguay acceded in 2008. There are currently thirteen (13) Parties to the Agreement.

A copy of the status list for the Agreement is available on the Australian Treaties Database at the following address:

http://www.austlii.edu.au/au/other/dfat/treaty_list/depository/consalbnpet.html

Report by the United Kingdom as Depositary Government for the Convention for the Conservation of Antarctic Seals (CCAS) in Accordance with Recommendation XIII-2, Paragraph 2(d) 2018/19 and 2019/20

Parties to the Convention and new accessions

The United Kingdom, as Depositary Government for the Convention for the Conservation of Antarctic Seals (CCAS), has not received any requests to accede to the Convention, or any instruments of accession, since the previous report (ATCM XLII (2019) IP001).

In ATCM XLII WP069 Ukraine stated its intention to accede to the Convention. However, Ukraine has since formally confirmed to the United Kingdom, as Depositary Government, that accession will now not be pursued.

The full list of countries that were original signatories to the Convention, and countries that have subsequently acceded, is attached to this report (Annex A).

CCAS Annual Returns for 2018/2019 and 2019/2020

Annex B lists all capturing and killing of Antarctic seals by Contracting Parties to CCAS for the reporting year 1 March 2018 to 28 February 2019. All reported captures were for scientific research.

Annex C lists all capturing and killing of Antarctic seals by Contracting Parties to CCAS for the reporting year 1 March 2019 to 29 February 2020. All reported captures were for scientific research.

Next CCAS Annual Return

The United Kingdom would like to remind Contracting Parties to CCAS that the Exchange of Information, referred to in Paragraph 6(a) in the Annex to the Convention, for the reporting period of 1 March 2020 to 28 February 2021 is due by **30 June 2021.** CCAS Parties should submit their returns, including nil returns, to both the United Kingdom and SCAR. The United Kingdom would like to encourage all Contracting Parties to CCAS to submit their returns on time.

The CCAS report for the reporting period 2020/2021 will be submitted to ATCM XLIV, once the June 2021 deadline for exchange of information has passed.

ANNEX A

Parties to the Convention for the Conservation of Antarctic Seals (CCAS)

London, 1 June-31 December 1972; the Convention entered into force on 11 March 1978.

State	Date of Signature	Date of Deposit (Ratification or Acceptance)
Argentina*	9 June 1972	7 March 1978
Australia	5 October 1972	1 July 1987
Belgium	9 June 1972	9 February 1978
Chile*	28 December 1972	7 February 1980
France**	19 December 1972	19 February 1975
Japan	28 December 1972	28 August 1980
Norway	9 June 1972	10 December 1973
Russia****	9 June 1972	8 February 1978
South Africa	9 June 1972	15 August 1972
United Kingdom**	9 June 1972	10 September 1974***
United States of America	28 June 1972	19 January 1977

Accessions

State	Date of deposit of Instrument of Accession
Brazil	11 February 1991
Canada	4 October 1990
Germany	30 September 1987
Italy	2 April 1992
Poland	15 August 1980
Pakistan	25 March 2013

* Declaration or Reservation
** Objection
*** The instrument of ratification included the Channel Islands and the Isle of Man
**** Former USSR

ANNEX B

Annual CCAS Report 2018/2019

Synopsis of reporting in accordance with Article 5 and the Annex of the Convention: Capturing and killing of seals during the period 1 March 2018 to 28 February 2019.

Contracting Party	Antarctic Seals Captured	Antarctic Seals Killed
Argentina	159 (a)	0
Australia	0	0
Belgium	0	0
Brazil	No return received	No return received
Canada	0	0
Chile	56 (b)	0
France	116 (c)	1 (d)
Germany	0	0
Italy	0	0
Japan	17 (e)	0
Norway	No return received	No return received
Pakistan	No return received	No return received
Poland	No return received	No return received
Russia	0	0
South Africa	No return received	No return received
United Kingdom	19 (f)	0
United States of America	1 351 (g)	0

All reported capturing was for scientific research.

(a) **Southern Elephant Seals:** 100 weaned and 13 juveniles (sex unknown). **Leopard Seals:** 13 adults (sex unknown). **Weddell Seals:** 15 adults and 3 pups (sex unknown). **Crabeater Seals**: 10 adult (sex unknown). **Antarctic Fur Seals**: 5 adults (sex unknown).
(b) **Southern Elephant Seals**: 42 adult females, 10 adult males and 4 juveniles.
(c) **Weddell Seals**: 19 adult males, 41 adult females; 2 adults (sex unknown), 19 male pups, 16 female pups, 19 pups (sex unknown)
(d) **Weddell Seal**: 1 pup (sex unknown) accidentally killed during weighing and blood sampling procedure.
(e) **Weddell Seals:** 10 adult females, 4 adult males, 3 juvenile males
(f) **Southern Elephant Seals**: 2 females. **Weddell Seals:** 17 adult/juveniles (sex unknown)
(g) **Antarctic Fur Seals:** 26 adults/juveniles and 460 pups (sex unknown). **Leopard Seals:** 29 adults/juveniles. **Weddell Seals**: 372 adults and 464 pups (sex unknown).

ANNEX C

Annual CCAS Report 2019/2020

Synopsis of reporting in accordance with Article 5 and the Annex of the Convention: Capturing and killing of seals during the period 1 March 2019 to 29 February 2020.

Contracting Party	Antarctic Seals Captured	Antarctic Seals Killed
Argentina	No return received	No return received
Australia	No return received	No return received
Belgium	No return received	No return received
Brazil	No return received	No return received
Canada	0	0
Chile	50 (a)	0
France	No return received	No return received
Germany	No return received	No return received
Italy	No return received	No return received
Japan	0	0
Norway	No return received	No return received
Pakistan	No return received	No return received
Poland	No return received	No return received
Russia	No return received	No return received
South Africa	0	0
United Kingdom	12 (b)	0
United States of America	1,286 (c)	1 (d)

All reported capturing was for scientific research.

(a) **Weddell Seals:** 40 (age and sex unknown). **Leopard Seals: 10** (age and sex unknown).
(b) **Elephant Seals**: 4 (3 males and 1 female). **Weddell Seals**: 8 (7 males and 1 female)
(c) **Antarctic Fur Seals:** 22 adult/juvenile and 395 pups (sex unknown). **Leopard Seals:** 23 adult/juveniles (sex unknown). **Southern Elephant Seals:** 4 juveniles (sex unknown). **Weddell Seals:** 236 adults and 606 pups (sex unknown).
(d) **Weddell Seals:** 1 pup (sex unknown) during permitted activity investigating thermal adaption in young pups).

Report by the CCAMLR Observer to the Forty Third Antarctic Treaty Consultative Meeting

CCAMLR-38 (October 2019)

1. The 38th Annual Meeting of CCAMLR (CCAMLR-38) was held in Hobart, Australia, from 21 October to 1 November 2019 and was chaired by Mr Fernando Curcio Ruigómez (Spain).

2. The Report of the Meeting is in the public domain (https://www.ccamlr.org/en/ccamlr-38).

3. Australia, as the Depositary State, reported that the Netherlands became a Member of the Commission on 8 October 2019. The Commission welcomed the Netherlands to its first meeting as a Member.

Implementation and compliance

4. The Commission endorsed a new non-Contracting Party (NCP) Engagement Strategy and Action Plan for 2020–2022 and agreed to extend the compliance evaluation process to Acceding States as a trial for 2020.

5. The Commission noted that the number of illegal, unreported and unregulated (IUU) vessel sightings in the Convention Area had shown a steady decline over time with the last reported sighting in 2016. No additional vessels were added to the CCAMLR IUU lists.

Administration and Finance

6. The Commission agreed to changes in the formula used to calculate the fees that accompany notifications to fish for krill, toothfish and other species in the Convention Area, including notifications to undertake research fishing.

Management of marine resources

7. The Commission noted that up to 13 September 2019 the total catch of krill reported for the 2018/19 fishing season was **381 922 tonnes**. Five Members and 11 vessels fished.

8. The Commission noted that a multi-Member synoptic krill survey undertaken in the austral summer of 2018/19 assessed the biomass of krill in Area 48 to be 62.6 million tonnes. (Note for ATCM: This is similar to the biomass estimated by the last synoptic survey undertaken in 2000.)

9. The Commission noted the progress of the Scientific Committee to develop a new management strategy for krill, and emphasised the importance of providing advice on the new strategy by 2021. The strategy will be based on the following key priority elements:

(i) a stock assessment to estimate precautionary harvest rates
(ii) regular updates of biomass estimates, initially at the subarea scale, but potentially at multiple scales
(iii) a risk assessment framework to inform the spatial allocation of catch.

10. In 2018/19, 13 Members fished for Patagonian toothfish (*Dissostichus eleginoides*) and/or Antarctic toothfish (*D. mawsoni*). Members also conducted research fishing for toothfish in closed areas. The reported total catch in the Convention Area of *D. eleginoides* to 13 September 2019 was **8 340** tonnes and that of *D. mawsoni* was **4 097** tonnes.

11. The Commission agreed catch limits for toothfish and icefish. However, it was unable to reach consensus on research proposals in Division 58.4.1, which therefore remains closed.

12. The Commission noted that the 103 seabirds estimated killed in the 2018/19 season was the third-lowest mortality figure on record.

Spatial management

13. The Commission agreed to give its prior approval to the draft management plans for new Antarctic Specially Protected Areas (ASPA) at the Rosenthal Islands and at Inexpressible Island. **ATCM should note this approval which has also been transmitted to the CEP**.

14. The Commission noted that in May 2019, the UK notified all Members that the area of the Pine Island Glacier had reduced by 15.1% since 2017, thus meeting the criteria for designation of a Special Area for Scientific Study. The Pine Island Glacier area became a Stage 1 designation on 1 June 2019. Under Conservation Measure (CM) 24-04, paragraph 24, **the attention of ATCM is drawn to the details of the Stage 1 designation,** and ATCM is encouraged to consider whether to take any appropriate steps to complement and facilitate scientific study within the area.

15. The South Orkney Islands southern shelf marine protected area (MPA) was adopted by CCAMLR in 2009 (CM 91-03). In line with the requirement of CM 91-03, the EU and its member States presented the second 5-yearly review of the MPA. There was no consensus in the Commission to endorse the review. CM 91-03 will remain in its current form until the next review due in 2024.

16. The Commission also discussed the Ross Sea region MPA research and monitoring plan, and proposals for an East Antarctica MPA, a Weddell Sea MPA and an Antarctic Peninsula Region MPA. There was no consensus on these items.

Climate change

17. The Commission noted the importance of climate change considerations in its procedures and discussed a range of suggestions for an increased inclusion of its implications in its management approaches.

Implementation of Convention objectives

18. The Commission welcomed the Prague Declaration made by the Antarctic Treaty Consultative Parties on 8 July 2019.

19. The Commission agreed to establish a General Capacity Building Fund (GCBF) to support specific projects, activities or travel support, or to address special needs of Members if the Commission so decides, aimed at enhancing Members' capacity to better achieve the objective of the CAMLR Convention. Applications to the fund are open to all Members, and to Acceding States or NCPs cooperating with the CDS where an application has the support of a Member.

CCAMLR-39 (October 2020)

1. The 39th Annual Meeting of CCAMLR (CCAMLR-39) was held online from 27 to 30 October 2020 and was chaired by Mr Fernando Curcio Ruigómez (Spain).

2. The Report of the Meeting is in the public domain (www.ccamlr.org/node/107598).

3. The Standing Committee on Implementation and Compliance (SCIC) and the Standing Committee on Administration and Finance (SCAF) had informal virtual meetings and did not adopt a report, however, the Chair (SCIC) and Acting Chair (SCAF) presented summaries of the e-group discussions to the Commission for consideration.

4. Australia, as the Depositary State, reported that on 7 May 2020, the People's Republic of China (PRC) made a declaration that in accordance with the Basic Law of the Hong Kong Special Administrative Region of the PRC, the Government of the PRC decides that the Convention will apply to the Hong Kong Special Administrative Region of the PRC from 1 July 2020.

5. The Commission remembered Professor Denzil Miller who died on 30 November 2019, and who played a central role in CCAMLR and Antarctic affairs for over forty years.

Implementation and compliance

6. The Commission added the vessel *Nika* to the Contracting Party IUU list. Panama subsequently informed the Commission that the *Nika* had been removed from the Panamanian shipping vessel register.

7. The Commission considered the recommendation from New Zealand to include the Russian-flagged vessel *Palmer* on the Contracting Party IUU list, but could not reach consensus on including it on the List in 2020.

8. Due to the fact that SCIC had only informal virtual meetings in 2020, the Commission concluded that it was not possible to adopt the 2020 Compliance Report.

Administration and Finance

9. The Commission approved the recommendations of the General Capacity Building Fund Panel and agreed to fund two capacity building projects, from Ukraine and Uruguay. The Commission noted that the terms of reference for the General Science Capacity Fund (GSCF) will be finalised for presentation in 2021.

10. The Commission reappointed Dr Agnew as Executive Secretary for 2022–2026.

Management of marine resources

11. The Commission noted that up to 1 October 2020 the total catch of krill reported for the 2019/20 fishing season was **446 783 tonnes**, and that this was the largest catch ever reported in Area 48. The total catch of *Dissostichus eleginoides* was **11 924 tonnes** and of *Dissostichus mawsoni* was **4 399 tonnes**.

12. The Commission welcomed the significant amount of focussed work that has been undertaken by the Scientific Committee and its working groups in 2020 on developing the revised krill management strategy.

13. Norway presented the preliminary results of a trial of measures to mitigate seabird interactions with net monitoring cables on krill fishing vessels. A dedicated correspondence

group has been organised in the 2020/21 intersessional period to address issues regarding seabird strikes on net monitoring cables and warps.

14. The Commission renewed all the conservation measures that were due to lapse in 2020. The revised schedule is available at: www.ccamlr.org/node/112002.

Other business

15. Due to the constraints of the online meeting, several items that would normally be considered in the main agenda of the Commission were discussed instead under other business.

16. The Commission agreed to establish an e-group aimed at facilitating discussions on reinforcing the objective of the Convention, to pave the way for the Commission's 40th meeting.

17. The Commission noted that the designation of the newly exposed marine area adjacent to Pine Island Glacier as a Stage 1 Special Area for Scientific Study (see paragraph 14 in the report of CCAMLR-38 above) will expire on 31 May 2021. The Commission could not reach agreement on a proposal to extend this deadline by one further year or to designate the area as a Stage 2 Special Area for Scientific Study.

18. The Commission noted revised proposals to establish MPAs in Domain 1 (Antarctic Peninsula), the East Antarctic and in the Weddell Sea region.

19. The Commission also noted the development of new terms of reference for the climate change e-group in order to further the development of mechanisms to ensure the latest climate change research is integrated into the work of the Scientific Committee and considered in the development of management advice for the Commission.

Next meeting

20. Sweden (Dr J. Granit) will Chair the Commission for the 2021 and 2022 meetings. Argentina (Mr M. Gowland) will continue to serve as Vice-Chair. Ms M. Engelke-Ros (USA) was elected to the Chair of SCIC and Ms S. Langerock (Belgium) to the Chair of SCAF for the years 2021–2022.

21. The 40th Meeting of the Commission will be held in Hobart, Australia, from 18 to 29 October 2021, unless the Commission decides otherwise. The Commission asked that planning for the meetings begin early, and include planning for formal meetings of SCIC and SCAF.

The Scientific Committee on Antarctic Research Annual Report 2021 to the Antarctic Treaty Consultative Meeting XLIII

Summary

This paper presents the annual report of The Scientific Committee on Antarctic Research (SCAR) to the Antarctic Treaty Consultative Meeting. For ease of consideration, the main features of the report are presented as an infographic (attachment 1).

Background

The mission of SCAR is to advance Antarctic research, including observations from Antarctica, and to promote scientific knowledge, understanding and education on any aspect of the Antarctic region. To this end, SCAR is charged with the initiation and international coordination of Antarctic and Southern Ocean research beneficial to global society. SCAR provides independent and objective scientific advice and information to the Antarctic Treaty System and other bodies, and acts as the main international exchange of Antarctic information within the scientific community. Descriptions of SCAR's activities and scientific outputs are available at: https://www.scar.org/.

Science Priorities

Three new flagship scientific research programmes (SRPs) were approved in 2020 and six existing SRPs came to an end. The new SRPs are:

- **Integrated Science to Inform Antarctic and Southern Ocean Conservation (Ant-ICON)** will answer fundamental science questions (as identified by the SCAR Horizon Scan), relating to the conservation and management of Antarctica and the Southern Ocean and focus on research to drive and inform international decision-making and policy change.
- **INStabilities and Thresholds in ANTarctica (INSTANT)** will address a first-order question about Antarctica's contribution to sea level. Encompassing geoscience, physical sciences and biological sciences, it aims to quantify the Antarctic ice sheet's contribution to past and future global sea-level change.
- **Near-term Variability and Prediction of the Antarctic Climate System (AntClim^{now})** will investigate the prediction of near-term conditions in the Antarctic climate system on timescales of years to multiple decades. Taking an integrated approach, it will consider the Antarctic environment as a whole.

Details of these programmes can be found at https://www.scar.org/science/srp/.

Recent Developments

Key outcomes and activities of SCAR are presented in Attachment 1. SCAR's three science groups, scientific research programmes, and specialized subsidiary groups have undertaken a wide variety of activities and produced many outputs, a range of which are formally presented at this meeting.

In January 2020, SCAR took over the hosting of the Antarctic Environments Portal from the University of Canterbury, New Zealand. Further details can be found in WP 19 *Antarctic Environments Portal*.

Following the cancellation of SCAR's biennial Open Science Conference in Hobart in August 2020 as a result of the pandemic, in August 2020 SCAR hosted SCAR 2020 Online, which featured many of the highlights of the Hobart meeting and attracted 2712 participants from 60 countries. Further details are available from https://www.scar2020.org/.

SCAR, through its Antarctic Biodiversity Portal, is coordinating a community effort to contribute to the UN Decade of Ocean Science for Sustainable Development (2021-2030) through the development of a Southern Ocean Action Plan. This is a partnership with the Southern Ocean Observing System (SOOS) and many other groups and organisations collectively termed the Southern Ocean Task Force. A website has recently been launched (https://www.sodecade.org) to share information about the process and further detail is provided in IP 136 *The Southern Ocean contribution to the United Nations Decade of Ocean Science for Sustainable Development*.

In order to further understand the complex and far-reaching consequences of the COVID-19 pandemic for the Antarctic community, SCAR's Standing Committee on the Humanities and Social Sciences (SC-HASS) has initiated a research programme to assess the pandemic's impacts on Antarctic research and researchers, as well as the long-term implications of COVID-19 for Antarctic operations, tourism and governance, with the overarching aim to help inform decisions on how to mitigate adverse impacts. Further information can be found at https://www.scar.org/science/hass/covid-project/info/.

In March 2021, the first virtual meeting of the SCAR Delegates took place. At the meeting, the Czech Republic and Turkey were upgraded from Associate to Full Membership of SCAR, and Mexico was admitted as an Associate Member. In addition, two new Executive Committee members were elected by the Delegates: Dr Yeadong Kim (Republic of Korea) was elected as SCAR President, and Prof Deneb Karentz (USA) was elected as Vice President and takes on responsibility for Science. Prof Jefferson Simoes (Brazil) was re-elected for a second term as Vice President and retains responsibility for Finance. Two Vice Presidents remain in position: Dr M. Ravichandran (India) as Vice President for Capacity Building, Education and Training, and Dr Gary Wilson (New Zealand) as Vice President for Administration. Prof Steven Chown remains on the Executive Committee for two years as immediate Past President.

Dr Chandrika Nath is SCAR's Executive Director. Dr Susie Grant is SCAR's representative to the Committee for Environmental Protection. Dr Grant took over this role from Dr Aleks Terauds in September 2020.

Selected Forthcoming Meetings

The 2022 Open Science Conference and SCAR Meetings will be hosted by India in the city of Hyderabad from August 19th – 28th. The meetings are currently being planned as in-person and contingencies are being included for online and hybrid options for the meetings due to uncertainties arising from the pandemic.

The 2024 Open Science Conference and SCAR Meetings will be hosted by Chile in the city of Pucón. The 2026 Open Science Conference and SCAR Meetings will be hosted by Norway in the city of Oslo. Dates for both meetings will be confirmed at a later stage.


Scientific Committee on Antarctic Research Annual Report 2020-2021
SCAR
SCAR 2020 Online
3-7 August 2020, www.scar2020.org
21
584
2712
New Scientifc Research Programmes
INTEGRATED SCIENCE TO INFORM ANTARCTIC AND SOUTHERN OCEAN CONSERVATION (ANT-ICON)
Answering fundamental questions relating to the conservation and management of Antarctica and the Southern Ocean.
INSTABILITIES AND THRESHOLDS IN ANTARCTICA (INSTANT)
Aiming to quantify the ice sheet's contribution to past and future global sea-level change.
NEAR-TERM VARIABILITY AND PREDICTION OF THE ANTARCTIC CLIMATE SYSTEM (ANTCLIMNOW)
Investigating the prediction of near-term conditions in the Antarctic climate system.
Membership
Turkey and Czech Republic became Full Members
Mexico became Associate Member
XXXVI SCAR Delegates' Meeting
In March 2021, the first virtual SCAR Delegates' Meeting was held online. Delegates agreed that participation at all future meetings could be virtual.
Dr Yeadong Kim was elected as as SCAR President, Prof Deneb Karentz as Vice-President for Science and Prof Jefferson Simões was re-elected as Vice-President for Finance. Ongoing office bearers are Dr M Ravichandran, Vice-President for Capacity Building, and Prof Gary Wilson, Vice-President for Administration. Prof Steven Chown will stay on the Executive Committee as the immediate Past-President for a term of two years.
SCAR Medals
EXCELLENCE IN ANTARCTIC RESEARCH
Dr W Berry Lyons
EDUCATION AND COMMUNICATION
Dr Huw Griffiths
INTERNATIONAL SCIENTIFIC COORDINATION
Dr Carlota Escutia
SCAR PRESIDENT'S MEDAL FOR OUTSTANDING ACHIEVEMENT IN ANTARCTIC SCIENCE
Dr Valérie Masson-Delmotte
Year in Numbers
45 MEMBER COUNTRIES
6 NEW GROUPS CREATED
4 EARLY CAREER FELLOWSHIPS AWARDED
2 VISITING SCHOLARS APPOINTED

Annual Report for 2020/21 of COMNAP

15 March 2020 – 30 June 2021

Background Information

Our Membership

Formally established on 15 September 1988, COMNAP brings together the national officials responsible for planning, conducting and managing support to Antarctic research on behalf of their respective governments. COMNAP is an international association whose Members are the 30 National Antarctic Programs from the countries of Argentina, Australia, Belgium, Brazil, Bulgaria, Chile, China, Czech Republic, Ecuador, Finland, France, Germany, India, Italy, Japan, Netherlands, New Zealand, Norway, Peru, Poland, Republic of Belarus, Republic of Korea, Russian Federation, South Africa, Spain, Sweden, Ukraine, United Kingdom, United States and Uruguay. The National Antarctic Programs of Canada (from August 2016), Colombia (from April 2021), Malaysia (from August 2017), Portugal (from August 2015), Switzerland (from April 2018), Turkey (from April 2018) and Venezuela (from August 2015) are COMNAP Observers.

Our Purpose

COMNAP's purpose is to develop and promote best practice in managing the support of scientific research in the Antarctic. As an organisation, COMNAP acts to add value to National Antarctic Programs' efforts by serving as a forum to develop practices that improve effectiveness of activities in an environmentally responsible manner, by facilitating international partnerships, and through information exchange.
COMNAP strives to provide the Antarctic Treaty System with objective, practical, technical and non-political advice drawn from the National Antarctic Programs' expertise and their first-hand Antarctic knowledge, contributing 38 Working Papers, 121 Information Papers to date.

Our Leadership

COMNAP is a Member-driven organisation with an elected Executive Committee (EXCOM) led by Dr Kelly K. Falkner (US Antarctic Program) as Chair, with Vice Chairs Manuel Burgos (Uruguayan Antarctic Institute), John Guldahl (Norwegian Polar Institute), Agnieszka Kruszewska (Institute of Biochemistry and Biophysics Polish Academy of Sciences), Uwe Nixdorf (Alfred Wegener Institute (AWI) Helmholtz Center for Polar and Marine Research, Germany) and Gen Hashida (National Institute of Polar Research, Japan). Michelle Rogan-Finnemore is the Executive Secretary. The University of Canterbury, Christchurch, New Zealand, hosts the COMNAP Secretariat under a renewed MOU through September 2027.

COMNAP Operations 2020/2021: Proactively addressing challenges

COVID-19 Preparedness

Recognising the severity of the emerging global situation, the COMNAP EXCOM met online under urgency on 9 March 2020. The meeting had only one agenda item and objective, to: "Focus on devising a strategy that collectively strengthens national efforts to avoid introducing the coronavirus (COVID-19) disease to Antarctica; Outline major points of consideration for our collective strategy and action items toward an implementation plan; Ensure we are engaging as EXCOM with the COMNAP Membership in regards to information exchange on COVID-19 and also with others in the Antarctic community (in particular with IAATO), on prevention practices, ability to respond on Antarctic stations, and media/communications plans."

On 9 March 2020, three days before the WHO declared the COVID-19 pandemic, the EXCOM established the **COVID-19 *ad hoc* Sub-committee** led by Dr Tim Heitland (AWI) with Dr Pradip Malhotra (NCPOR, India) and Dr Fabio Catalano (ENEA, Italy) and in collaboration with Dr Anne Hicks (BASMU, UK, & the Joint Expert Group on Human Biology and Medicine (JEGHBM) Leader). With the Executive Secretary, the Sub-committee developed the "COMNAP SARS-CoV-2 / COVID-19 Recommendations (non-mandatory) in the context of Antarctic Operations" Working Paper (released 16 March 2020). The key message was "Act Early, Act Strongly as containment and prevention must be the priority to prevent introduction of SARS-CoV-19 in Antarctica."

The Sub-committee remains convened and the guidelines, now known as the "COMNAP COVID-19 Outbreak Prevention & Management Guidelines" (version 14 January 2021) continue to be reviewed and evolved based on current research, WHO guidance and the situation globally. Regular and open communications continue with our Members, Observers and other stakeholders.

Planning for medical emergency and response is a risk addressed in National Antarctic Program planning in normal circumstances. The 2020/2021 Antarctic season, however, was unprecedented. The inability to respond to a highly infectious novel virus with significant mortality and morbidity in the extreme and austere environment of Antarctica with limited sophistication of medical care and public health responses was identified early. Therefore, National Antarctic Programs were proactive in their recognition of the importance of a rapid development and implementation of COVID-19 protocols.

COMNAP programs prioritise safety of human life in all planning, operations, and activities. All National Antarctic Programs acted to mitigate the risk presented by the global pandemic. Several programs cancelled their 2020/21 Antarctic seasons. The majority significantly reduced their planned activity while continuing to maintain critical Antarctic infrastructures, exchange personnel, and provide operations, logistics and science support that enabled globally significant Antarctic research to continue. All implemented protocols to keep their team members safe with many altering their usual transportation method or route for transiting personnel to/from Antarctica and up-scaled their medical pre-deployment criteria (see also IP082).

COMNAP Operations 2020/2021: Highlights and Achievements

Annual General Meeting (AGM) XXXII (2020)

The AGM was scheduled for 3–6 August 2020 in Hobart, Australia, hosted by the Australian Antarctic Division (AAD). Due to the COVID-19 global pandemic, the in-person meetings were cancelled and the AGM moved to an online platform across the same dates. This marked the first time in our 32-year history that the AGM was not held in-person. The online platform proved very successful, 151 people from all 30 Member programs participated.

Plenary business and regional break-out sessions were the main components. Members, Observers and other operators exchanged pre-season 2020/21 information and discussed risk management, particularly in the context of operations in the global COVID-19 pandemic. Regional sessions were: Peninsula, Ross Sea, East Antarctica, Larsemann Hills Management Group, Dronning Maud Land, and the inaugural High Plateau. Phase II of the COMNAP project "Efficiency taskforce: Peninsula" was placed on hold due to the scaled-back nature of the Antarctic summer season.

Symposium

The 19th COMNAP Symposium "Antarctic Station Modernisation: Future-proofing infrastructure to support research and to reduce environmental impact" was held via the COMNAP YouTube Channel from 7 August 2020. Proceedings are published (see BP010).

Antarctic Aviation Project
This project continues (https://www.comnap.aq/projects/Antarctic-aviation) under a revised timeframe. The Antarctic Aviation Workshop is cancelled as an in-person meeting (15–16 July 2021, Toyama, Japan). The intention is to now focus on key issues related to the ATCM review of Resolution 1 (2013) (see WP8), minimum survival equipment on aircraft, and the technology review in advance of an in-person workshop (see IP059) to be held in late April/early May 2022 (likely combined with the COMNAP SAR Workshop V).

COMNAP Award 2020/21

Awarded by the COMNAP Chair for outstanding contribution to the goals and principles of COMNAP, the co-recipients are Valery Lukin, former MNAP of AARI/RAE, and Heinz Miller, former MNAP AWI.

10th COMNAP Antarctic Research Fellowship

COMNAP Antarctic Research Fellow 2020, is Cinthya Elizabeth Bello Chirinos, (National Agrarian University La Molina, Peru, & the Division of Antarctic Affairs under the Ministry of Foreign Affairs of Peru) "Surface velocity and facies classification of Znosko glacier, King George Island, Antarctica, using SAR satellite data time series". The fellowship will be used to undertake collaborative research with the Institute of Oceanography Federal University of Rio Grande, Brazil. This year, a second Antarctic Research Fellowship was made possible under an arrangement between IAATO and COMNAP. The Fellow is Miguel González Pleiter (University of Alcala, Spain) "Understanding the consequences of microplastics introduction in the Antarctic environment: the Plastisphere Resistome". With support provided by the Uruguayan Antarctic Institute, Miguel will work as a team member on the University of the Republic Uruguay's AntarPLAST program.

COMNAP Products and Tools

COMNAP Database
The Quickbase database includes information from all Members on facilities, vessels, program contacts and details which is used to inform COMNAP products including e-AFIM, ATOM and the "Station Catalogue". Data is shared with the Antarctic Treaty Secretariat.
Publicly available data at https://www.comnap.aq/antarctic-information/ and also at https://github.com/PolarGeospatialCenter/comnap-antarctic-facilities/releases and https://github.com/PolarGeospatialCenter/comnap-antarctic-vessels.

Antarctic Flight Information Manual (e-AFIM)
COMNAP AFIM general information
e-AFIM is a handbook of aeronautical information published in PDF format as a tool towards safe air operations in Antarctica as per ATCM Resolution 1 (2013). Releases were 15 September, 1 December 2020 and 15 March 2021.

COMNAP Asset Tracking System (CATS)
COMNAP Asset Tracking System general information
CATS is a voluntary system for exchange of ship and aircraft position data developed by the AAD. For the 2020/2021 season at its peak use, it contained positions for 36 assets (20 aircraft and 16 vessels). The CATS is not fully utilised. We invite greater reporting from all vessels and aircraft working in the Antarctic Treaty Area.

Antarctic Telecommunications Operators Manual (ATOM)

ATOM is the handbook of contact details to which ATCM Recommendation X-3 refers. COMNAP Members, Observers and SAR authorities have access via the COMNAP website and via the CATS.

Search and Rescue (SAR)
As per ATCM Resolution 4 (2013), COMNAP provides a SAR webpage of all RCC contacts. Planning for the next triennial COMNAP Antarctic SAR Workshop (V/2022) is underway. The focus will be on aviation.

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www.comnap.aq
@comnap1
YouTube Channel: https://www.youtube.com/channel/UCjzR1uM_ZP62eEy6QLCbHxw

Attachment 1: COMNAP officers, projects, expert groups and meetings

Table 1: COMNAP Executive Committee (EXCOM)
The COMNAP Chair and Vice Chairs are the elected officers of COMNAP. The elected officers plus the Executive Secretary, compose the COMNAP EXCOM:

Position	Officer	Term expires close of
Chair	Kelly K. Falkner (USAP) kfalkner@nsf.gov	AGM 2021
Vice Chairs	Manuel Burgos (IAU) mburgos@iau.gub.uy	AGM 2023
	John Guldahl (NPI) john.guldahl@npolar.no	AGM 2021
	Agnieszka Kruszewska (PAS IBB) agnieszkak@ibb.waw.pl	AGM 2021
	Uwe Nixdorf (AWI) uwe.nixdorf@awi.de	AGM 2021
	Gen Hashida (NIPR) gen@nipr.ac.jp	AGM 2023
Executive Secretary	Michelle Rogan-Finnemore michelle.finnemore@comnap.aq	

Table 2: COMNAP Projects

Project	Project Manager	EXCOM Officer (oversight)
19th Symposium "Antarctic Station Modernisation: Future-proofing Infrastructure to Support Research and to Reduce Environmental Impact"	Charlton Clark (Convener) & Andrea Colombo	Agnieszka Kruszewska
Antarctic Aviation	Paul Sheppard	John Guldahl
COMNAP Asset Tracking System (CATS)	Robb Clifton	John Guldahl
Database	Andrea Colombo	Michelle Rogan-Finnemore
Efficiency Task Force: Peninsula (Phase 2)	Antonio Quesada	Agnieszka Kruszewska

Fire Suppression / Fire Safety	Simon Trotter & Mike Gencarelli	Agnieszka Kruszewska
New Vessel Builds	Michelle Rogan-Finnemore	Manuel Burgos

Table 3: COMNAP Expert Groups

Expert Group (topic)	Expert Group Leader	EXCOM Officer (oversight)
Air Operations (includes the RPA-WG)	Paul Sheppard	John Guldahl
Advancing Critical Technologies	Pavel Kapler	Uwe Nixdorf
Environmental Protection	Ceisha Poirot	Gen Hashida
Education, Outreach & Training	Dragomir Mateev	Agnieszka Kruszewska
Joint Expert Group on Human Biology & Medicine (JEGHBM)	Anne Hicks	Kelly Falkner
Marine Platforms	Miguel Ojeda	Manuel Burgos
Safety	Simon Trotter	Agnieszka Kruszewska
Science Facilitation	Robb Clifton	Kelly Falkner

Meetings – all online

From 15 March 2020 through 1 April 2021

- COMNAP EXCOM Extraordinary Meetings: Addressing challenges presented by COVID-19,
  1: 9 March 2020
  2: 3 April 2020
  3: 3 June 2020
  4: 9 July 2020
  5: 18 November 2020
  6: 22 December 2020
  7: 28 January 2021
  8: 17 March 2021.

- COMNAP EXCOM Annual Meeting, 7 & 21 October 2020.
- COMNAP Secretariat/IAATO Secretariat information exchange discussions 12 March 2020, 28 April 2020, 19 June 2020, 1 September 2020, and 23 October 2020.
- COMNAP Meetings Round 1 “Townhall Meetings”, 7, 8 and 15 April 2020 (various times).
- COMNAP COVID-19 Medical advice/updates, 8 June 2020, 8 July 2020, 22 September 2020 and 21 February 2021.
- COMNAP Meetings Round 2 “Advanced Planning Forums”, 9–12 June 2020 (various times).
- COMNAP and “Other Operators” 30 June 2020.
- COMNAP Secretariat and Chair / SCAR Secretariat and President discussions, 1 July 2020.
- COMNAP Annual General Meeting (AGM) XXXII (2020) including Regional Break-out Groups, 3–6 August 2020.

- Joint SCAR / COMNAP Panel Discussion: Impact of COVID-19 on Antarctic Research, 5 August 2020.
- The 19th COMNAP Symposium "Antarctic Station Modernisation: Future-proofing Infrastructure to Support Research and to Reduce Environmental Impact", 7 August 2020.

Upcoming (from 1 April 2021 through 30 June 2022)

- COMNAP Meetings Round 1 "Townhall Meetings", 7, 8, 13 and 14 April 2021 (online/various times).
- COMNAP EXCOM Extraordinary Meeting 9 (online): Addressing challenges presented by COVID-19, 12 May 2021.
- COMNAP Annual General Meeting (AGM) XXXIII (2021) (online) including Expert Groups/Topical Discussion Forums (2, 3, 9 and 10 June 2021), Regional Break-out Groups (12, 13 and 14 July 2021) and the plenary business session 14 July 2021.
- COMNAP EXCOM Annual Meeting (online, dates to be confirmed).
- COMNAP Antarctic Aviation Workshop (SAR Workshop V), late April/early May 2022 (possibly in-person venue and dates to be confirmed).

3. Reports by Experts

ASOC report to the ATCM

Introduction

ASOC is pleased to be attending the XLIII Antarctic Treaty Consultative Meeting. This report briefly describes ASOC's work over the past two years.

ASOC's Secretariat is in Washington, DC, USA, and its website is https://www.asoc.org. ASOC has 23 member groups representing a wide range of ATS countries. We are pleased to report that three new groups have joined since the 2019 ATCM: Blue Marine Foundation, Global Choices, and World Parks Inc.

Intersessional activities

Since the XLII ATCM in Prague in 2019, much has changed in the Antarctic world. While the 2019 CCAMLR meeting was held in person, the 2020 ATCM meeting was cancelled, and CCAMLR was held virtually for the first time in its history. This necessitated significant changes to ASOC's work. Although our international team is used to connecting virtually, not having periodic occasions to meet in person has dramatically changed our work.

Online engagement

For example, last year, during the time period that the ATCM would have been held, we prepared a variety of social media content under the theme "ATCM Week" to share with the public. This included interviews with ATCM experts, infographics, and animations on climate change in the Antarctic. The animations, which were in Spanish and English, were produced by the Chilean Antarctic Institute (INACH), who graciously partnered with ASOC so that we could share them on social media simultaneously and reach a wider audience.

ASOC also hosted two well-attended webinars on Antarctic issues, *What's holding back protection of the Antarctic Ocean?* and *The future of Antarctic Peninsula protection*. The webinars included panellists with a variety of backgrounds in policy, science, industry and nature photography who provided a diverse range of perspectives on how to protect the Antarctic environment. Many audience members subsequently provided feedback expressing their appreciation for the interesting and at times provocative discussions.

ASOC presented at the virtual SCAR meeting and the virtual Polar Law Symposium. ASOC also participated in the virtual CCAMLR meeting in October of 2020. During the meeting, as a substitute for the usual reception that we sponsor, we invited delegates to virtual film festival featuring several short films on Antarctica.

In April 2021, The Pew Charitable Trusts and the Wilson Center's Polar Institute convened an online expert working group of Antarctic scientists from a range of disciplines to explore how changes in the Southern Ocean impact global climate regulation, marine ecosystems, and human communities, and to explore the short-term management and government actions needed to address climate risks.

ASOC plans to have a public virtual event later in the year to celebrate the 30th Anniversary of the Protocol.

Support for policy-relevant science

WWF supported the Retrospective Analysis of Antarctic Tracking Data (RAATD) project led by SCAR, with support from the Centre de Synthèse et d'Analyse sur la Biodiversité, France. RAATD is an impressive demonstration of the spirit of international cooperation of Antarctic science, bringing together 4060 individual animal tracks from 17 predator species including humpback whales, emperor penguins, southern elephant seals and wandering albatross collected by more than 70 scientists across 12 national Antarctic programmes. While this work is expected to be helpful in the design of marine protected areas (MPAs) it can also be useful for understanding which coastal and terrestrial areas habitats are critical to Antarctic species, and therefore inform ATCM action as well.

Greenpeace undertook an expedition with two of its vessels, facilitating research on declining chinstrap populations in relatively remote colonies, recording a decline of up to 70% in some areas. It also exposed the underlying issues with regulation of transhipment activities, observing a number of transhipments around the South Orkney Islands and releasing a report, Fishy Business, detailing the many problems it has encountered in this area.

Engagement with other organizations

ASOC continues to engage in the virtual meetings of the International Maritime Organization (IMO) through ASOC members with Consultative Status at the IMO, with a focus on the development of safety measures for non-SOLAS vessels, in particular fishing vessels and private yachts operating in polar waters. Guidelines for fishing vessels over 24m in length (i.e. all Southern Ocean fishing vessels) and for private yachts of 300 gross tonnage and above and not engaged in commercial trade have recently been adopted. These Guidelines are of importance to ship operations south of 60ºS since over 50% of vessels qualify as non-SOLAS vessels and it will be important that ATPs and ATCPs encourage the application of the IMO guidelines to fishing vessels and private yachts sailing south of 60ºS. ASOC continues to engage in the IMO’s work to introduce mandatory navigation and voyage planning provisions for these same vessels, and also in other aspects of IMO’s work that will have relevance to vessel operations in the Southern Ocean including addressing marine plastic litter, underwater noise and ships’ climate (CO_2 and black carbon) emissions.

Greenpeace, Pew and WWF have worked with the Association of Responsible Krill Operators (ARK) and a number of independent scientists to review the voluntary restricted zones agreed by the krill industry in 2018, including agreeing an expansion to an area closed year-round around Hope Bay.

Concluding remarks

The pandemic has undoubtedly made the work of the ATCM more difficult. However, along with the 30th anniversary of the Protocol, the pandemic gives us a reason to reflect on our current relationship with the natural world. The signing of the Protocol was a watershed moment for environmental protection. The world is now reckoning with new, urgent threats to the entire planet. ASOC believes the ATCM and the Protocol have a vital role to play in responding to these threats. One message we have been pleased to receive during our enhanced online engagement with the public is that Antarctic continues to inspire people all over the world. Even if they have not visited in person, they are fascinated by the region and its incredible species and want it to remain intact. Likewise, it has been rewarding to see the dedication and commitment of colleagues, including our fellow Observers and Experts, who have found creative ways to continue doing work related to the ATCM and CEP despite the limitations of the pandemic.

ASOC is looking forward celebrating the anniversary of the Protocol this year, and urges ATCPs, and the ATS as a whole, to not only reflect on the Protocol's successes, but recommit to its implementation. If we are to address the challenges and threats to the health of Antarctica and the Southern Ocean, the ATCM and CCAMLR must increase their ambition and adopt new comprehensive protection measures such as MPAs and ASPAs. We have no doubt that it is possible to ensure that the next thirty years are even more successful than the first thirty, but only with sufficient political will.

In closing, ASOC would also like to express our deepest sympathies to the family of Adrian Dahood-Fritz, who passed away in a tragic accident in September of 2019. A brilliant scientist as well as a dedicated ATCM rapporteur, Adrian was well known to many of us within ASOC and we will greatly miss her passion for Antarctica.

Report of the International Association of Antarctica Tour Operators 2020-21

Under Article III (2) of the Antarctic Treaty

Introduction

The International Association of Antarctica Tour Operators (IAATO) is pleased to report its activities to ATCM XLIII.

IAATO continues to focus activities in support of its mission statement to advocate and promote the practice of safe and environmentally responsible private sector travel to Antarctica. Further information on IAATO, its mission statement, primary activities and recent developments can be found at: www.iaato.org.

Overview

Thirty years ago, IAATO was created with a commitment to safe and environmentally responsible private sector travel. IAATO has maintained that focus through three major growth periods and their ensuing downturns, drawing on the strength of its membership and stakeholders to enhance procedures and management. The 2019-20 season saw a record number of visitors travelling with IAATO Operators (74,401). The 2020-21 season was in sharp contrast to that with only two individual expeditions, comprised of three yachts and a total of 15 guests due to the SARS CoV-2 (COVID-19) pandemic.

While it is difficult to say when operations will return to levels approaching pre-COVID-19, IAATO's commitment to safe and environmentally responsible private sector travel is unchanged and enduring. During the last twelve months, there has been a significant focus on addressing operational changes due to COVID-19, but the association has also been looking ahead to address the future growth that is anticipated post-pandemic. Recent actions include the strengthening of requirements for field staff experience, the creation of new working groups and committees, a refresh of the Antarctic Ambassadors program and strengthening of operations in the vicinity of whales.

For further information on IAATO operators' activities can be found in *ATCM XLIII IPxx IAATO Overview of Antarctic Tourism: A Historical Review of Growth, the 2020-21 Season and Preliminary Estimates for 2021-22*

COVID-19 Response and impact on IAATO Membership

When the 2019-20 season was curtailed due to global concerns around COVID-19, IAATO and its members began preparing for the 2020-21 season with a focus on emerging challenges related to the pandemic. The IAATO COVID-19 Steering Group (now the IAATO COVID-19 Advisory Group) was formed to share information regularly with the membership, including updates from gateway ports and information regarding the evolving advice on how to operate safe and environmentally responsible travel during the pandemic. Additionally, two virtual Town Halls were hosted by IAATO to allow the membership to share perspectives and lessons learned on operating in this new environment which is key to the development of industry best practice.

The COVID-19 Advisory Group also provided Operators with a framework to assist them in preparing their own risk assessment. Since IAATO Operators each have their own specific operating environments, each must individually analyze every element of their operation in order to address the challenges that COVID-19 has presented, taking into account the relevant requirement of their respective national competent authorities, flag requirements where applicable, as well as the perspective and input given to them from the gateway ports.

Additionally, during this time, IAATO welcomed engaging regularly with COMNAP and SCAR in the spirit of sharing best practice, knowledge and to enhance understanding of the impact of the pandemic on Antarctica.

The majority of IAATO Operators had made the decision not to operate during the 2020-21 season by November 2020 and, ultimately, the season was limited to only two expeditions.

Following IAATO's 2020 Annual Meeting, IAATO membership comprised 42 Operators, 14 Provisional Operators and 53 Associates (totalling 113 members). Subsequently, there has been an increase in Provisional Operators but a net decrease in membership due to several Associate Members leaving as a result of the pandemic. Currently there are 109 members. It is anticipated that there will be additional changes to IAATO's membership if IAATO Operators are unable to operate during the northern summer season and if those challenges continue into the 2021-22 Antarctic season.

IAATO members organise or depart from 15 Antarctic Treaty Consultative Parties. During the 2019-20 season, the majority of nationals (95.5%) carried by IAATO Operators came from 51 Treaty Parties; the remainder came from a further 53 non-Treaty Party countries.

The Membership Directory and additional information on IAATO member activities can be found at www.iaato.org.

IAATO Annual Meeting

IAATO's 2021 Annual Meeting was held virtually on 11-13 May 2021. Prior to the Annual Meeting were two COVID-19 focused Town Halls and three other Town Hall meetings to address priority items such as enhancing certain bylaws and reviewing terms of reference for IAATO committees. Agenda items at these Town Halls and the Annual Meeting included:

- Creation of the Deep Field/Air Operations and Climate Change Committees (both previously Working Groups)
- Creation of the Submersible Working Group
- Strengthening of requirements regarding field staff experience, as well as the establishing the requirement that all expedition team members take and pass the relevant IAATO Field Staff Assessment.
- Revision and strengthening of the Mandatory Observer Programme checklists.
- Review and updates to the guidelines related to biosecurity and wildlife viewing with a focus on bird and seal watching guidelines.
- Agreement to make mandatory the previously voluntary speed limit of 10 knots within IAATO's geofenced-time areas, with certain emergency and safety exceptions available to mitigate against whale strikes. Agreement to develop process to regularly evaluate the effectiveness of the geofenced time area.
- Approval of collaboration between SOOS DueSouth and IAATO.

IAATO Support of Research & Conservation

IAATO encourages collaborative opportunities with scientific organisations particularly where these enhance the Antarctic community's understanding of human activities in the region and support IAATO in delivering safe, environmentally responsible private-sector travel. Projects include(d):

- IAATO/SCAR Systematic Conservation Plan – Expansion of human activity in the Antarctic Peninsula combined with a need to better understand and protect important areas for terrestrial biodiversity led IAATO and SCAR to propose the development of a Systematic Conservation Plan. The SCP is a support tool for decision-making and management, capable of utilising a huge amount of data to generate different scenarios depending on questions being asked or uncertainties being addressed. IAATO is expecting delivery of a final report from Monash University during Q3 2021. IAATO will discuss use of the tool with its members and work with SCAR on communicating the outcomes of the SCP with stakeholders.
- SC-HASS Research Project: The impact of COVID-19 on Antarctica – IAATO is involved in the SCAR Standing Committee on Humanities and Social Sciences research project, Work Package 3, to better understand the impact of COVID-19 on Antarctic tourism, including operations, policy and permitting.
- IAATO/COMNAP Fellowships – IAATO, in partnership with COMNAP, will invest in the development of early-career researchers by awarding its third $15,000 Fellowship in 2021. IAATO and COMNAP jointly awarded a 2020 fellowship to early career researcher Miguel González Pleiter from the University of Alcala, Spain for his work on microplastics.
- Support in Antarctica – IAATO Operator expeditions during the 2020-21 season were limited to two individual expeditions, comprised of three yachts. One of these expeditions collected data for the long-term monitoring project Penguin Lifelines, University of Oxford. Three IAATO Operators also provided dedicated air or vessel support to National Antarctic Programs.

Other Work and Activities

IAATO also continues to prioritise activities that strengthen its institutional structure and help position it as a reputable, valued partner in the wider polar community. Over the past year these have included:

- Development of an awareness campaign regarding IAATO's 30th Anniversary which highlights past accomplishments and discusses ambitions for the future
- Completion of Phase 1 of the IAATO database to facilitate efficient tools and reporting capabilities
- Development of the Antarctic Ambassadors landing page on IAATO's website and strategic plan to further strengthen the engagement with visitors to Antarctica
- Continued collaboration with the Association of Arctic Expedition Cruise Operations (AECO) regarding Polar Field Staff Standards and joint Town Hall session with polar field staff

In addition, IAATO Secretariat staff and Operator representatives participated in internal and external meetings, liaising with Treaty Party Representatives, National Antarctic Programs personnel, and governmental, scientific, environmental, and industry organisations, including but not limited to:

- **COMNAP Annual Meeting**, Online, August 2020
- **SCAR2020 Online**, August 2020
- **Association of Arctic Expedition Cruise Operators (AECO) Conference & Annual Meeting**, Online, October 2020

- **Thirty-ninth Meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)**, Online, October 2020

Tourism Incidents 2020-21

IAATO's policy is to disclose incidents to ensure risks are understood and appropriate lessons are learned for all Antarctic Operators. There were no major incidents involving IAATO Operators during the 2020-21 season.

With Thanks

IAATO appreciates the opportunity to work cooperatively with Antarctic Treaty Parties, COMNAP, SCAR, CCAMLR, IHO/HCA, WMO, ASOC and others toward the long-term protection of Antarctica.

Report by the Secretariat of the International Hydrographic Organization as Chair of the IHO Hydrographic Commission on Antarctica

ATCM Resolutions 5 (2008), 5 (2014) and 6 (2019) – What's next?

Introduction

The International Hydrographic Organization (IHO) is an intergovernmental consultative and technical organization. It comprises 94 Member States. Each State is normally represented by its National Hydrographer.

The IHO coordinates on a worldwide basis the setting of standards for hydrographic data and the provision of hydrographic services in support of safety of navigation and the protection and sustainable use of the marine environment. The principal aim of the IHO is to ensure that all the world's seas, oceans and navigable waters are surveyed and charted.

Importance of Hydrography in Antarctica

Hydrographic information is a fundamental pre-requisite for the development of successful and environmentally sustainable human activities in the seas and oceans. Unfortunately, there is little or no hydrographic information for a number of parts of the world, especially in Antarctica.

IHO Hydrographic Commission on Antarctica (HCA) and even more

The HCA is the main body in the hands of the IHO to deal with Antarctica matters.

The HCA comprises 24 IHO Member States (Argentina, Australia, Brazil, Chile, China, Colombia, Ecuador, France, Germany, Greece, India, Italy, Japan, Republic of Korea, New Zealand, Norway, Peru, Russian Federation, South Africa, Spain, United Kingdom, Uruguay, USA, Venezuela), all of them have acceded to the Antarctic Treaty and are therefore also directly represented in the ATCM.

The IHO Hydrographic Commission on Antarctica (HCA) was formed in 1998 aimed at coordinating activities between its Member States to improve the quality, coverage and availability of nautical charting and other marine geospatial and hydrographic information and services covering the Antarctic region.

The IHO is engaged in Polar Regions activities in general, through the HCA for the Antarctic, but also through the Arctic Regional Hydrographic Commission (ARHC) for the Arctic Region in support of the Arctic Council and its Working Group for the Protection of the Arctic Marine Environment Working Group (PAME) in particular. This dual commitment in Polar Regions in the IHO is a key enabler for the development of synergies in various domains (seabed mapping autonomous technologies, development of new S-100 operational services and geospatial portals in support of user requirements).

HCA and GEBCO IBCSO

Dr Boris Dorschell (Alfred Wegener Institute for Polar and Marine Research, Germany) is responsible for the compilation of the 2nd version of the GEBCO[1] International Bathymetric Chart of the Southern Ocean (IBCSO), a new high resolution (500 m) gridded bathymetric model. A plea was made by the HCA early 2021 to HCA Members to share their data with the project manager in order to support the compilation phase. This plea applies not only to the Hydrographic Offices representing their nations at the IHO but also to the scientific and research institutes around the world.

HCA and ATCM

HCA has established good links with ATCM, the Secretariat of the Antarctic Treaty and other supporting organizations (IAATO, SCAR, COMNAP, Quantarctica, …) for many years through data collection, information exchange, regular participation in ATCM consultative meetings as observer or running seminar and workshops back-to-back to ATCM Working Groups meetings.

Following up an offer made by the IHO at ATCM XL in Beijing in 2017, the IHO was invited to run an awareness seminar at ATCM XLII in Prague in 2019. Since, the Executive Secretary of the Antarctic Treaty kindly invited the IHO to consider sending experts to the ATCM XLIII in Paris in 2021.

The IHO is pleased to confirm that the 17th Conference of the HCA is planned to be held in Paris on 14-15 June 2021, kindly hosted by Shom, the French Hydrographic and Oceanographic Service. This event will give a good opportunity to HCA Members to attend ATCM XLIII and provide support to their delegation.

From an ATCM perspective, the main outcome of this long standing cooperation between the ATCM and the IHO can be summarized simply by reminding 3 important ATCM Resolutions adopted from 2008 to 2019. They are:

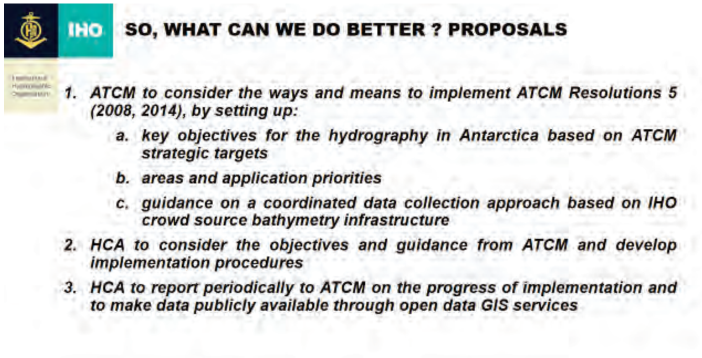
- ATCM Resolution 5 (2008): *Improving Hydrographic Surveying and Charting to Support Safety of Navigation in the Antarctic Region*.
- ATCM Resolution 5 (2014): *Strengthening Cooperation in Hydrographic Surveying and Charting of Antarctic Waters*.
- ATCM Resolution 6 (2019): *Hydrographic Mapping of Antarctic Waters*.

No doubt that recommendations provided in these Resolutions are key enablers for some nations involved in scientific research in Antarctic waters. They are also key drivers for some hydrographic offices of the IHO. They are well identified by stakeholders in the weeks, months, following ATCM annual meetings but then they tend to “sediment” and get forgotten…until the next seminar, workshop, lobbying by the IHO …followed by another ATCM Resolution.

So the question should be: ***what’s next?***

In the IHO Seminar in Prague (ATCM XLII, 2019), the Secretary General of the IHO suggested in his conclusive words:

[1] General Bathymetric Chart of the Oceans, an IHO-IOC programme.



To transform the Resolution into an effective operation plan that can be supported by the IHO, an operational plan meeting ATCM requirements, the 1st step is certainly to identify, collect and prioritize these requirements. This task is under the responsibility of ATCM.

Proposals for consideration by ATCM

In accordance with ATCM Resolutions 5 (2008), 5 (2014) and 6 (2019), the IHO stands ready to support the implementation by the ATCM of step 1a, 1b and 1c (see above) and remains at the disposal of the Secretariat of the Antarctic Treaty to do so.

ATCM is kindly invited to note the work in progress with the compilation of the version 2.0 of the GEBCO IBSCO high resolution bathymetric grid and to share their bathymetric data with the project manager in application of ATCM Resolutions. Technical requirements can be provided on request (adcs@iho.int or boris.dorschel@awi.de)

Finally, for more information on IHO activities in Antarctica: https://lnkd.in/dQEzM2h

WMO Annual Report

The World Meteorological Organization[2] (WMO) is a specialized agency of the United Nations and includes 193 Member States and Territories. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources.

WMO has framed its Polar and High Mountain activities as part of the WMO Strategic Plan 2020-2023 along the following priorities: (i) integration of surface and space observations, (ii) polar prediction and services, including climate services, (iii) the Global Cryosphere Watch pre-operational phase, (iv) high mountain activities, (v) transition from research to operation and services, and (vi) resources and partnership.
The activities of WMO related to Antarctica has been coordinated through the Executive Council Panel on Polar and High Mountains Observations, Research, and Services (EC-PHORS), since 2007. In 2021, EC-PHORS held its 10th session and the report in available online. The meeting recommended revised terms of reference of the Panel including a focus on the evolution of the coordination of those activities on Antarctica where WMO could make contributions to advance specific current and emerging goals, as well as the engagements with other actors in the region, e.g. SCAR, COMNAP, etc.

WMO Observations and Data activities relevant to Antarctica:

WMO continues to play a key role in facilitating programmes of surface and upper-air meteorological observations in the Antarctic by working with relevant scientific organizations, and the standardization of observing, coding, data exchange and data management practices applied to the Antarctic. Following the governance reform of WMO activities, these will receive active support through the structures of the WMO Commission for Observation, Infrastructure and Information Systems (Infrastructure Commission).

The 73rd session of the WMO Executive Council (EC-73), which will take place in June 2021, will consider for approval the pre-operational plan of the Global Cryosphere Watch (GCW). A summary on the GCW Sea Ice objectives was published in the WMO Bulletin Vol 70(1) - 2021[3].

The observing stations operated in Antarctica provide critical input to global prediction models and the availability of their data in real time is critical. To facilitate the registration of available surface stations in the WMO's Observing System Capability and Analysis Tool (OSCAR/Surface) WMO has provided further clarification regarding the allocation of WIGOS Station Identifiers (WSI) for stations operating in Antarctica. Specifically, station operators are invited to connect with their national OSCAR/Surface Focal Points who are authorised to issue WSIs for Antarctica-based stations operated by national institutions. These Focal Points will also provide guidance on the registration process, based on the nationally agreed policies. The list of the OSCAR/Surface national focal points is available from https://community.wmo.int/governance/commission-membership/national-focal-points-oscarsurface.
Additionally, several other programmes, including the Global Cryosphere Watch, has been authorized to issue WSIs, where these are not issued by the National Focal Points. This clarification should further facilitate the engagement of station operators in Antarctica, with the goal of facilitating the real time data exchange from these stations.

[2] www.wmo.int
[3] https://library.wmo.int/doc_num.php?explnum_id=10595

During the current intersessional period, WMO is developing two critical policies, which will be discussed at EC-73. The first is on the Unified Data Policy for the International Exchange of Earth System Data and the second is on establishing the regulatory framework for a Global Basic Observing Network, to which the observing stations in Antarctica are expected to make a critical contribution.
A concept of a WIGOS Data Quality Monitoring System (WDQMS) developed by WMO is relatively mature. A pilot project using the existing monitoring capabilities of the global NWP Centres for the surface component of the Global Observing System is being transitioned to pre-operational status and has already demonstrated the value of such a system. WMO is interested to support the implementation of this concept for the stations operated in Antarctica and collaborate with interested organizations, in this sense.

Winter Antarctic Targeted Observing Periods and Further Plans of the Year of Polar Prediction in the Southern Hemisphere (YOPP-SH)

The Year of Polar Prediction (YOPP) 2017-2019 galvanised extra observation and modelling efforts in both the Arctic and Antarctic. YOPP is part of the World Meteorological Organization's Polar Prediction Project (PPP). From July 2019, the PPP moved into its Consolidation Phase. This final phase of PPP (until end of 2022) is crucial to synthesize the data and research from the Preparation and Core Phases and to determine the long-term success of YOPP. YOPP-SH is currently planning a second Special Observing Period, mid-April to mid-July 2022, coinciding with the rapid expansion of the sea-ice cover (see associated IP 94).

Antarctic Polar Regional Climate Centre (AntRCC) Network: the Ccope and Concept

WMO, with partners, continued with the development of an Antarctic Polar Regional Climate Centre (AntRCC) Network. To facilitate the engagement of countries (including Treaty Parties, WMO Members etc.) interested in climate services for the Antarctic Region, including representatives from operational, research and user communities, WMO in coordination with the Secretariat of Antarctic Treaty and other partners, organized a “Scoping Workshop on Climate Services for Polar Regions: Towards Implementing an Antarctic RCC- Network”. A majority of country representatives expressed a clear indication of interest to contribute to Antarctic RCC-Network activities, and mutually agreed that the RCC implementation for the Antarctic would likely be based on a distributed-function model, similar to that of the WMO Regional Association VI serving Europe, that is countries with strong capabilities in mandatory functions could take the lead responsibility for specific functions and involve other contributors to form a consortium. Further details are provided in the associated IP 95.

Antarctic Science activities of the World Climate Research Programme

Through its co-sponsored World Climate Research Programme[2], WMO carries out a number of research activities and modelling on a variety of scales in which the climate of the Antarctic region is a key aspect. For example, its Climate and Cryosphere Core Project (http://www.climate-cryosphere.org) with an international office at the Bjerknes Centre in Norway, focusses on the cryosphere component of the climate system. This includes coordinating a number of research activities (often in partnership with SCAR) on ice sheet mass balance and sea level, sea ice, permafrost and other cryosphere components. WCRP also coordinates a number of modelling activities of relevance to Treaty Parties, including Antarctic CORDEX[4] (the Coordinated Regional Downscaling Experiment, with an office at the Swedish Meteorological and Hydrological Institute), and the Coupled Model Intercomparison Project

[4] https://cordex.org/domains/region-10-antarctica/

that produces the scenario runs used by the IPCC[5] (now also with a new project office hosted by the European Space Agency in the UK).

As part of the implementation of its Strategic Plan 2019-2028[6] WCRP has started a number of new activities of interest to Parties. Key among these are the new WCRP Lighthouse Activities[7] being developed (see Figure 1, below). We welcome engagement in the development of these activities and intend to provide additional information on the relevance of these to the Antarctic region at a future ATCM.

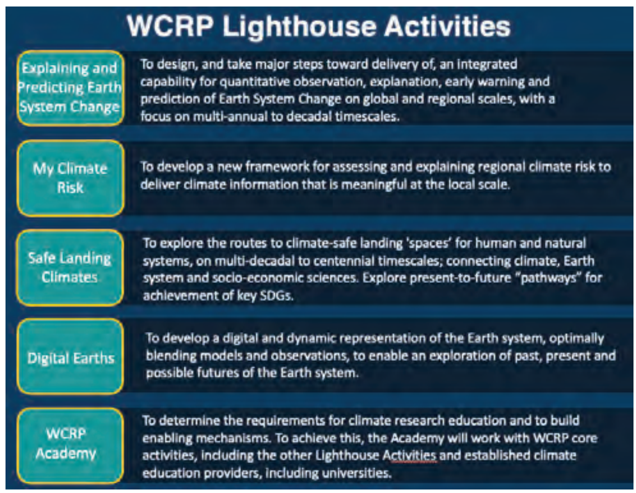


Figure 1: WCRP's new Lighthouse Activities. See: https://www.wcrp-climate.org/wcrp-ip-la for details.

A number of regionally-based Climate Research Forums[8] to exchange ideas, discuss new activities and opportunities are being developed by WCRP, to explore ways that our community of scientists, partner programs, funders and end-users of our climate science can engage. We invite interested Parties and others to take part.

<u>WMO Statement on the State of the Global Climate</u>
Each year WMO produces a high-level "Statement on the State of the Global Climate"[9] with key partners, including SCAR. These statements are presented at the Conference of Parties (COP) meetings and other fora and are available in English, Spanish, Russian, French, Chinese and Arabic. Copies can be downloaded from:
https://library.wmo.int/doc_num.php?explnum_id=10618

WMO continues to look forward to a positive, mutually beneficial engagement with Treaty Parties in Antarctic weather and climate observations, services and research. For further queries please contact Mike Sparrow (msparrow@wmo.int) in the first instance.

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[5] https://www.wcrp-climate.org/wgcm-cmip
[6] https://www.wcrp-climate.org/wcrp-sp
[7] https://www.wcrp-climate.org/wcrp-ip-la
[8] https://www.wcrp-climate.org/climate-research-forums
[9] https://public.wmo.int/en/our-mandate/climate/wmo-statement-state-of-global-climate

PART IV

Additional Documents from ATCM XLIII

1. List of Documents

1. List of Documents

ATIP 2019/2021 (2020)

Working Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
WP001	CEP 9b	Proposal for Inclusion of the San Telmo Wreck in the Antarctic Treaty List of Historic Sites and Monuments	Spain					
WP002	CEP 9a	Review of the Management Plans for Antarctic Specially Protected Areas (ASPAs) No. 113 Litchfield Island, Arthur Harbor, Palmer Archipelago, No. 119 Davis Valley and Forlidas Pond, Dufek Massif, and No. 139 Biscoe Point, Palmer Archipelago.	United States					ASPA 113 Revised Management Plan ASPA 113 Map 1 ASPA 113 Map 2 ASPA 119 Map 1 ASPA 119 Map 2 ASPA 119 Revised Management Plan ASPA 139 Map 1 ASPA 139 Map 2 ASPA 139 Map 3 ASPA 139 Revised Management Plan
WP003	CEP 9a	Revised Management Plan for Antarctic Specially Protected Area No. 121 Cape Royds, Ross Island	United States					ASPA 121 Map 1 ASPA 121 Map 2 ASPA 121 Map 3 ASPA 121 Revised Management Plan
WP004	CEP 9a	Revised Management Plan for Antarctic Specially Protected Area No. 124 Cape Crozier, Ross Island	United States					ASPA 124 Map 1 ASPA 124 Map 2 ASPA 124 Revised Management Plan

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
IP001	ATCM 4	Report by the United Kingdom as Depositary Government for the Convention for the Conservation of Antarctic Seals (CCAS) in Accordance with Recommendation XIII-2, Paragraph 2(D)	United Kingdom					
IP002	CEP 5	Report by the SC-CAMLR Observer to CEP	CCAMLR					
IP003	ATCM 13	Mitigation of erosion of the coastline at the Spanish Antarctic Base Gabriel de Castilla	Spain					

Information Papers									
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
IP004	ATCM 13	Implementation of the IMO Polar Code in Spain. Certification of the Research Vessel (RV) Sarmiento de Gamboa	Spain	⤓	⤓	⤓	⤓	
IP005	CEP 10c	First Evidence for Underwater Hearing in Gentoo Penguins	Germany	⤓				
IP006	ATCM 17 CEP 13	Handling of scientific activities associated with tourism activities	Germany	⤓				
IP007	ATCM 15	Turkish Antarctic Expedition (TAE - IV) 2019 - 2020	Turkey	⤓				
IP008	ATCM 15	Antarctic Publications by Turkish Scientists	Turkey	⤓				
IP009	ATCM 15	Maintenance of Automatic Weather Station (AWS) in Antarctica	Turkey	⤓				
IP010	ATCM 15	Belarus-Turkey Scientific Collaboration in Antarctica	Belarus Turkey	⤓				
IP011	ATCM 15	Bulgaria-Turkey Scientific Collaboration in Antarctica	Bulgaria Turkey	⤓				
IP012	ATCM 13	COVID-19 Precautions during the Turkish Antarctic Expedition (TAE-IV) 2019 – 2020	Turkey	⤓				
IP013	ATCM 11	Education & Outreach Activities during the Turkish Antarctic Expedition - IV (TAE-IV) 2019-2020	Turkey	⤓				
IP014	ATCM 15	Installation of GNSS (Global Navigation Satellite Systems) station at Faure Islands	Turkey	⤓				
IP015	ATCM 6 CEP 13	Harmonizing the Protocol on Environmental Protection to the Antarctic Treaty with Turkish Legislation	Turkey	⤓				
IP016	ATCM 15	Search for Antarctic Meteorites and Micrometeorites in Collaboration with Belgian and Japanese Scientists	Turkey	⤓				
IP017	ATCM 15	Turkish Scientific Project at Henryk Arctowski Polish Antarctic Station, King George Island	Turkey	⤓				
IP018	ATCM 15	Opportunities for Turkish Scientists to participate in scientific projects related to Antarctica	Turkey	⤓				
IP019	ATCM 6	The Foundation of the Polar Research Institute of the Republic	Turkey	⤓				

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
		of Turkey						
IP020	ATCM 13	Hydrographic and Oceanographic Survey Activities of the Turkish Navy Office of Navigation, Hydrography and Oceanography (TN-ONHO) in Antarctic Region	Turkey	⤓				
IP021	ATCM 13	Search and Rescue Cases in the Antarctic Peninsula area year 2019/2020 MRCC Chile	Chile	⤓	⤓			
IP022	CEP 8b	Towards assessment of trends of air quality impact of diesel generator power plants emission in Antarctica	Belarus	⤓			⤓	
IP023	CEP 10a	Horizon scanning exercise to identify likely invasive non-native species in the Antarctic Peninsula region	United Kingdom	⤓				
IP024	ATCM 17 CEP 6	Report on Environmental Remediation	United Kingdom	⤓				
IP025	ATCM 6	Report of Antarctic Parliamentarians Assembly 2-3 December 2019: London	United Kingdom	⤓				Assembly Statement
IP026	ATCM 13	Report on the 22nd edition of the Joint Antarctic Naval Patrol between Chile and Argentina	Argentina Chile	⤓	⤓			
IP027	ATCM 13 CEP 9e	Volcanic surveillance of Deception Island, South Shetland Islands	Spain	⤓	⤓	⤓	⤓	Protocolo de actuación del Comité Polar Español para la vigilancia volcánica de la isla Decepción
IP028	ATCM 4 CEP 5	Annual Report for 2019/20 of the Council of Managers of National Antarctic Programs (COMNAP)	COMNAP	⤓	⤓	⤓	⤓	
IP029	CEP 8b	Information on the initiation of renovations at the Henryk Arctowski Polish Antarctic Station on King George Island, South Shetland Islands	Poland	⤓				
IP030	ATCM 13	Closing of the Arctowski Polish Antarctic Station for tourist traffic due to the ongoing COVID-19 pandemic	Poland	⤓				
IP031	CEP 10a	Non-native species Trichocera maculipennis (Diptera) eradication from Arctowski Polish Antarctic station, Western Shore of Admiralty Bay, King George Island, South Shetland Islands	Poland	⤓				
IP032	CEP 10a	Eradication of a non-native grass Poa annua L. from Western Shore	Poland	⤓				

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
		of Admiralty Bay, King George Island, South Shetland Islands – update 2019/2020						
IP033	ATCM 13	Preliminary COMNAP advice in regards to ATCM process of review of Resolution 1 (2013)	COMNAP	⤓				
IP034	ATCM 15 CEP 11	Time-lapse camera monitoring of species in the Antarctic Treaty area	United Kingdom	⤓				
IP035	ATCM 17	Data Collection and Reporting on Yachting Activity in Antarctica in 2019-20	IAATO Chile Argentina United Kingdom	⤓				
IP036	ATCM 17 ATCM 4	Report of the International Association of Antarctica Tour Operators 2019-20	IAATO	⤓	⤓	⤓	⤓	
IP037	ATCM 17	IAATO Overview of Antarctic Tourism: 2019-20 Season	IAATO	⤓				
IP038	ATCM 17 CEP 9c	Report on IAATO Operator Use of Antarctic Peninsula Landing Sites and ATCM Visitor Site Guidelines, 2019-20 Season	IAATO	⤓				

Secretariat Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
SP001	ATCM 3 CEP 2	ATCM XLIII - CEP XXIII Preliminary Agenda	ATS	⤓	⤓	⤓	⤓	ATCM Multi-year Strategic Work Plan
SP002	ATCM 6	List of measures with status "not yet effective"	ATS	⤓	⤓	⤓	⤓	
SP003	ATCM 7	Secretariat Report 2019/2020	ATS	⤓	⤓	⤓	⤓	Audited Financial Report 2018/19 Contributions Received by the Antarctic Treaty Secretariat 2019/20 Provisional Financial Report 2019/20
SP004	ATCM 7	Secretariat Programme 2020/2021	ATS	⤓	⤓	⤓	⤓	Contribution Scale for the Financial Year 2021/22 Provisional Statement for the

Secretariat Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
								Financial Year 2019/20, Budget for the Financial Year 2020/21, Forecast Budget for the Financial Year 2021/22 Salary Scale
SP005	ATCM 7	Five-Year Forward Budget profile 2021/22 - 2025/26	ATS					Five-Year Forward Budget profile 2021/22 – 2025/26
SP006	ATCM 8	Limits of liability and environmental remediation	ATS					Limits of liability in relevant international instruments Summary of all relevant measures and resolutions and previous advice from the CEP relating to environmental remediation and liability matters
SP007	ATCM 17 CEP 9e	New map and reports of all sites receiving vessel-based visits in Antarctica	ATS					
SP008	ATCM 15	Key Science Priorities of National Antarctic Programmes	ATS					Submission form

Background Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
BP001	ATCM 14 CEP 12	Follow-up on recommendations from the inspection of the Spanish Antarctic Base Gabriel de Castilla	Spain					
BP002	ATCM 14 CEP 12	Follow-up on recommendations from the inspection of the Spanish Antarctic Base Juan Carlos I	Spain					
BP003	CEP 8b	Initial EIA of Three GNSS Stations Assembled by Turkey	Turkey					
BP004	ATCM 11	Turkey Journey to the White Continent: A Book of Turkish Antarctic Expeditions	Turkey					

ATCM XLIII - CEP XXIII (2021)

Working Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
WP001	CEP 9b	Proposal for Inclusion of the San Telmo Wreck in the Antarctic Treaty List of Historic Sites and Monuments	Spain					
WP002 rev. 1	CEP 9a	Review of the Management Plans for Antarctic Specially Protected Areas (ASPAs) No. 113 Litchfield Island, Arthur Harbor, Palmer Archipelago, No. 119 Davis Valley and Forlidas Pond, Dufek Massif, and No. 139 Biscoe Point, Palmer Archipelago.	United States					ASPA 113 Revised Management Plan ASPA 113 Map 1 ASPA 113 Map 2 ASPA 119 Map 1 ASPA 119 Map 2 ASPA 119 Revised Management Plan ASPA 139 Map 1 ASPA 139 Map 2 ASPA 139 Map 3 ASPA 139 Revised Management Plan
WP003	CEP 9a	Revised Management Plan for Antarctic Specially Protected Area No. 121 Cape Royds, Ross Island	United States					ASPA 121 Map 1 ASPA 121 Map 2 ASPA 121 Map 3 ASPA 121 Revised Management Plan
WP004	CEP 9a	Revised Management Plan for Antarctic Specially Protected Area No. 124 Cape Crozier, Ross Island	United States					ASPA 124 Map 1 ASPA 124 Map 2 ASPA 124 Revised Management Plan
WP005	CEP 9e	Suggested guidelines for the de-designation of Antarctic Specially Protected Areas (ASPA)	United States United Kingdom New Zealand China Australia Norway					
WP006	CEP 9a	Revised Management Plan for Antarctic Specially Protected Area No. 106 Cape Hallett, Northern Victoria Land, Ross Sea	United States					ASPA 106 Map 1 ASPA 106 Map 2 ASPA 106 Map 3 ASPA 106 Map 4 ASPA 106 Map 5 ASPA 106 Revised Management Plan
WP007	CEP 9c	Revised Visitor Site Guidelines for Site No. 28 Seabee Hook, Cape Hallett, Northern Victoria Land, Ross Sea	United States					Visitor Site Guide: Seabee Hook, Cape Hallett
WP008	ATCM	Preliminary COMNAP advice in	COMNAP					

Working Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
	13	regards to ATCM review of Resolution 1 (2013)						
WP009 rev. 1	CEP 9a	Review of Management Plan for Antarctic Specially Protected Area (ASPA) No 163: Dakshin Gangotri Glacier, Dronning Maud Land	India					ASPA 163 Figure 1 ASPA 163 Figure 2 ASPA 163 Map 1 ASPA 163 Map 2 ASPA 163 Map 3 ASPA 163 Map 4 ASPA 163 Map 5 ASPA 163 Revised Management Plan
WP010	CEP 8a	Report of the intersessional open-ended contact group (ICG) to Review the Draft Comprehensive Environmental Evaluation prepared by New Zealand for 'Scott Base Redevelopment'	Spain					
WP011	CEP 9c	Report from the Intersessional Contact Group (ICG) on strengthening the existing guidance for visitors to Antarctica – Proposal to adopt updated General Guidelines for Visitors to the Antarctic	Germany					Updated General Guidelines for Visitors to the Antarctic
WP012	CEP 8a	Report of the intersessional open-ended contact group (ICG) to Review the Draft Comprehensive Environmental Evaluation prepared by Turkey for 'Construction and Operation of Turkish Antarctic Research Station (TARS) at Horseshoe Island, Antarctica'	Australia					
WP013	CEP 9b	Assessment and management of pre-1958 historic remains at Camp Lake, Vestfold Hills, East Antarctica	Australia					
WP014	CEP 7b	Report of the Subsidiary Group on Climate Change Response (SGCCR) 2019-2021	United Kingdom					Attachment A Draft CCRWP Attachment B Draft science needs Attachment C Process for requesting science information Attachment D Current CCRWP presentation Attachment E Updated CCRWP presentation Attachment F SGCCR work plan
WP015	ATCM 11	Fourth report of the Intersessional Contact Group on Education and Outreach	United Kingdom Spain Portugal Chile					

Working Papers								
No.	Ag. Items	Title	Submitted By	E	S	F	R	Attachments
			Brazil Belgium Bulgaria					
WP016	ATCM 9	Antarctic Bioprospecting: SCAR Survey of Member Countries	SCAR					
WP017	ATCM 16 CEP 7a	Antarctic and Southern Ocean Climate Change in a Global Context	SCAR					
WP018	CEP 8a	Draft Comprehensive Environmental Evaluation (CEE) for the Construction and Operation of the Turkish Antarctic Research Station (TARS) at Horseshoe Island, Antarctica	Turkey					Non-technical summary
WP019	CEP 11	Antarctic Environments Portal	SCAR					Portal Content Management Plan
WP020	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) 104: Sabrina Island, Balleny Islands	New Zealand					ASPA 104 Revised Management Plan
WP021	CEP 9d	Report on informal discussions on marine protection measures	New Zealand					
WP022	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area 105: Beaufort Island, McMurdo Sound, Ross Sea	New Zealand					ASPA 105 Map 1 ASPA 105 Map 2 ASPA 105 Map 3 ASPA 105 Revised Management Plan
WP023 rev. 1	CEP 9a	Review of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 155 Cape Evans, Ross Island	New Zealand					ASPA 155 Map 1 ASPA 155 Map 2 ASPA 155 Revised Management Plan
WP024 rev. 1	CEP 9a	Review of the Management Plan for Antarctic Specially Protected Area (ASPA) No.157 Backdoor Bay, Cape Royds, Ross Island	New Zealand					ASPA 157 Map 1 ASPA 157 Map 2 ASPA 157 Map 3 ASPA 157 Revised Management Plan
WP025 rev. 1	CEP 9a	Review of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 158 Hut Point, Ross Island	New Zealand					ASPA 158 Map 1 ASPA 158 Revised Management Plan
WP026 rev. 1	CEP 9a	Review of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 159 Cape Adare, Borchgrevink Coast	New Zealand					ASPA 159 Map 1 ASPA 159 Map 2 ASPA 159 Revised Management Plan

Working Papers								
No.	Ag. Items	Title	Submitted By	E	S	F	R	Attachments
WP027	CEP 7a	Sustainable Antarctic station design: Reducing contributions to climate change	New Zealand United Kingdom					
WP028	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) No.103 Ardery Island and Odbert Island, Budd Coast, Wilkes Land, East Antarctica	Australia					ASPA 103 Map A ASPA 103 Map B ASPA 103 Map C ASPA 103 Map D ASPA 103 Revised Management Plan
WP029	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 102 Rookery Islands, Holme Bay, Mac.Robertson Land	Australia					ASPA 102 Map A ASPA 102 Map B ASPA 102 Map C ASPA 102 Revised Management Plan
WP030	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 167 Hawker Island, Princess Elizabeth Land	Australia					ASPA 167 Map A ASPA 167 Map B ASPA 167 Revised Management Plan
WP031	CEP 9a	Review of the Management Plans for Antarctic Specially Managed Area (ASMA) No. 6 Larsemann Hills and Antarctic Specially Protected Area (ASPA) No. 174 Stornes, East Antarctica	Australia China India Russian Federation					ASMA 6 Map A ASMA 6 Map B ASMA 6 Map C ASMA 6 Map D ASMA 6 Map E ASMA 6 Map F ASMA 6 Revised Management Plan
WP032	ATCM 16	Antarctica in a Changing Climate	United Kingdom Australia Belgium Finland France Germany Netherlands New Zealand Norway Spain Sweden United States					
WP033	CEP 8b	SCAR Environmental Code of Conduct for Geosciences Field Research Activities in Antarctica	SCAR					SCAR Environmental Code of Conduct for Geosciences Field Research Activities in Antarctica
WP034	CEP 9e	Systematic identification of	SCAR					Method for the systematic

Working Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
		globally important geological sites in Antarctica						identification of globally important geological sites in Antarctica
WP035	ATCM 17	Permanent facilities for tourism and other non-governmental activities in Antarctica	Netherlands					
WP036	ATCM 16 CEP 7a	Ocean Acidification in the Southern Ocean	SCAR					
WP037	CEP 10b	Projections of future population decline emphasise the need to designate the emperor penguin as an Antarctic Specially Protected Species	SCAR					
WP038	ATCM 10	Updating requirements for Information Exchange on national expeditions	United States Italy					Proposed Changes to Decision 7 (2019) Annex Information exchange requirements
WP039 rev. 1	CEP 9a	Revised Management Plan for Antarctic Specially Protected Area No. 145 Port Foster, Deception Island, South Shetland Islands	Chile Spain					ASPA 145 Revised Management Plan
WP040	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 148, Mount Flora, Hope Bay, Antarctic Peninsula	United Kingdom Argentina					ASPA 148 Revised Management Plan
WP041	ATCM 17	Report from the Intersessional Contact Group (ICG) on a voluntary on-board observer operational framework for tourist vessels operating within the Antarctic Treaty area	France Argentina					Monitoring Checklist - Voluntary on-board observer framework for tourist vessels Voluntary on-board observer framework for tourist vessels operating within the Antarctic Treaty Area Voluntary on-board Observer operational framework for vessel-based tourism in the Antarctic Treaty area (2021)
WP042	ATCM 13	Eclipse in the Antarctic Peninsula	Argentina Chile					
WP043	CEP 9e	Important Bird Areas and Antarctic Specially Protected Areas: Toward the development of selection criteria	Australia Germany New Zealand Norway Spain United Kingdom United States					

Working Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
WP044	CEP 9c	Antarctic Treaty Visitor Site Guides for important historic sites in the Ross Sea region	New Zealand United States					Visitor Site Guide: Cape Adare Visitor Site Guide: Cape Evans Visitor Site Guide: Cape Royds Visitor Site Guide: Hut Point
WP045	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) 131: Canada Glacier, Lake Fryxell, Taylor Valley, Victoria Land	New Zealand					ASPA 131 Map 1 ASPA 131 Map 2 ASPA 131 Map 3 ASPA 131 Revised Management Plan
WP046	CEP 8a	Draft Comprehensive Environmental Evaluation (CEE) for the Proposed Scott Base Redevelopment	New Zealand					Presentation on the Draft Comprehensive Environmental Evaluation (CEE) for the Proposed Scott Base Redevelopment (Powerpoint presentation 34 Mb)
WP047	CEP 10a	SARS-CoV-2 in Antarctic Species by way of Reverse Zoonosis	COMNAP					
WP048	ATCM 17	Report of the Informal Discussion on the Elaboration of a Manual of Regulations and Guidelines Relevant to Tourism and Non-Governmental Activities in the Antarctic Treaty area	France Argentina United States					Manual of Regulations and Guidelines Relevant to Tourism and NGO Activities (Ready to print format) Manual of Regulations and Guidelines Relevant to Tourism and NGO Activities (Synoptic format) Tourism Operators leaflet
WP049	ATCM 11	Review of information related to Education & Outreach available through the Antarctic Treaty Secretariat webpage	Spain Bulgaria Belgium Brazil Chile Portugal United Kingdom					
WP050	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 101 Taylor Rookery, Mac.Robertson Land	Australia					ASPA 101 Map A ASPA 101 Map B ASPA 101 Map C ASPA 101 Map D ASPA 101 Revised Management Plan
WP051	CEP 9a	Management Plan for ASPA No. 166, Port-Martin, Adélie Land. Proposal to extend the existing plan	France					

Working Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
WP052	CEP 10c	The Retrospective Analysis of Antarctic Tracking Data (RAATD): Areas of Ecological Significance in the Antarctic marine environment	France Australia Belgium Germany United Kingdom United States South Africa					
WP053	CEP 10c	Important Marine Mammals Areas (IMMAs)	France United Kingdom Chile Germany Monaco South Africa					
WP054	CEP 9a	Revision of the Management Plan for Antarctic Specially Protected Area (ASPA) No. 120 – Pointe Géologie	France					ASPA 120 Revised Management Plan
WP055	ATCM 6b	Report of the Informal Discussions on Relevant Issues, Trends and Challenges to the Antarctic Treaty System	Russian Federation					
WP056	CEP 9c	Proposed Visitor Site Guidelines for Argentine Islands, Wilhelm Archipelago	Ukraine					Visitor Site Guide: Argentine Islands
WP057	ATCM 15a CEP 9d	Proposal to Enhance Cooperation in the Research and Monitoring on the Population Dynamics of Penguins in the Ross Sea Region	China					Population Dynamics of Emperor Penguins and Adelie Penguins in the Ross Sea Region
WP058	CEP 9e	Promoting Scientific Research to Inform the Antarctic Decision-Making	China					The Excerpt of 2019 CEP Five-Year Plan
WP059 rev. 1	ATCM 7	Proposal for a disciplinary regime and modifications to ATS Staff Regulations	Argentina					
WP060 rev. 1	CEP 9b	Reformatting of the list of Historic Sites and Monuments in line with Decision 1 (2019)	Argentina Norway United Kingdom					List of Historic Sites and Monuments Revised Guide to the presentation of Working Papers containing proposals for Antarctic Specially Protected Areas, Antarctic Specially Managed Areas or Historic Sites and Monuments
WP061	ATCM 17	Report of the Intersessional Contact Group (ICG) on Post-Visit Reports	Argentina					Post-Visit Report Form Post-Visit Reports Instructions (review)

Working Papers								
No.	Ag. Items	Title	Submitted By	E	S	F	R	Attachments
WP062	CEP 9a	Subsidiary Group on Management Plans Report of activities during the intersessional period 2019-2021	Argentina	⤓	⤓	⤓	⤓	ASPA XXX Inexpressible Island and Seaview Bay Management Plan ASPA XXX Leonie Islands Management Plan ASPA XXX Rosenthal Islands Map 1 ASPA XXX Rosenthal Islands Map 2 ASPA XXX Rosenthal islands Map 3 ASPA XXX Rosenthal Islands, Anvers Island, Palmer Archipelago Management Plan
WP063	ATCM 6b	COVID-19 and Antarctica	New Zealand Argentina Australia Chile Norway United Kingdom SCAR	⤓	⤓	⤓	⤓	
WP064	CEP 9a	Review of the Management Plan for the Antarctic Specially Protected Area (ASPA) No 134, Cierva Point and Offshore Islands, Danco Coast, Antarctic Peninsula	Argentina	⤓	⤓	⤓	⤓	ASPA 134 Revised Management Plan
WP065	ATCM 13	Earthquake Emergency Management System	Chile	⤓	⤓	⤓	⤓	

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
IP001	ATCM 14 CEP 12	United States Report of Inspection, February 2020	United States	⤓				2020 United States Antarctic Inspection
IP002	ATCM 4	Report of the Depositary Government of the Antarctic Treaty and its Protocol in accordance with Recommendation XIII-2	United States	⤓	⤓	⤓	⤓	1. Antarctic Treaty Status Table 2. Environmental Protocol Status Table 3. Annex V Status Table 4. Annex VI Status Table 5. List of Recommendations / Measures and their approvals
IP003	ATCM 4	Report by the CCAMLR Observer to the Forty Third Antarctic Treaty Consultative Meeting	CCAMLR	⤓	⤓	⤓	⤓	
IP004	ATCM 13 ATCM 4	Report by the International Hydrographic Organization (IHO)	IHO	⤓	⤓	⤓	⤓	
IP005	ATCM 6a	On the issue of consideration of the application of the Republic of Belarus for obtaining the status of a Consultative Party	Belarus	⤓	⤓	⤓	⤓	
IP006	CEP 10a	Horizon scanning exercise to identify likely invasive non-native species in the Antarctic Peninsula region	United Kingdom	⤓				
IP007	ATCM 17 CEP 6	Report on Environmental Remediation	United Kingdom	⤓				
IP008	ATCM 6b	Report of Antarctic Parliamentarians Assembly 2-3 December 2019: London	United Kingdom	⤓				Assembly Statement
IP009	ATCM 15a CEP 11	Time-lapse camera monitoring of species in the Antarctic Treaty area	United Kingdom	⤓				
IP010 rev. 1	ATCM 4	Report by the United Kingdom as Depositary Government for the Convention for the Conservation of Antarctic Seals (CCAS) in Accordance with Recommendation XIII-2, Paragraph 2(d) 2018/19 and 2019/20	United Kingdom	⤓	⤓	⤓	⤓	
IP011	ATCM 4 CEP 5	Annual Report for 2020/21 of the Council of Managers of National Antarctic Programs (COMNAP)	COMNAP	⤓	⤓	⤓	⤓	

Information Papers								
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IP012	ATCM 9	Antarctic Bioprospecting: SCAR Survey of Member Countries	SCAR	⤓				
IP013	ATCM 17	A case of fruitful cooperation between Chile and Ukraine National Competent Authorities regarding yacht's activity in Antarctica	Chile Ukraine	⤓				
IP014	CEP 13	Antarctic wilderness and inviolate areas	Australia Netherlands New Zealand	⤓				
IP015	ATCM 14 CEP 12	Australian Antarctic Treaty and Environmental Protocol inspections: January/February 2020	Australia	⤓				Inspection Report
IP016	CEP 7a	A custom Green Star Antarctic Tool: A sustainable design standard	New Zealand	⤓				
IP017	CEP 12	On the activities of the Republic of Belarus to implement the environmental principles of the Madrid Protocol of 1991 in 2019-2021	Belarus	⤓	⤓	⤓	⤓	
IP018	CEP 10c	Operationalizing the use of Unmanned Aerial Vehicles (UAV) for assessing Antarctic wildlife populations	Germany	⤓				
IP019	CEP 10c	Managing the Effects of Anthropogenic Noise in the Antarctic – Steps towards the development of an underwater noise protection concept for 'Antarctica'	Germany	⤓				
IP020 rev. 1	CEP 10c	Assessment of communication masking in Antarctic marine mammals by airgun sound	Germany	⤓				
IP021	CEP 11	A step towards a structured sample and data collection of environmental contamination in the Antarctic	Germany Italy	⤓				
IP022 rev. 1	CEP 10b	Projections of future population decline indicate the need to designate the emperor penguin as an Antarctic Specially Protected Species	SCAR	⤓				
IP023	CEP 9e	Important Bird Areas and Antarctic Specially Protected Areas: Toward the development of selection criteria	Australia Germany New Zealand Norway Spain United	⤓				

Information Papers								
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			Kingdom United States					
IP024	CEP 10c	Important Marine Mammal Areas (IMMAS) within the Antarctic Treaty area: An international collaboration to inform habitat-related conservation decision-making and conservation planning for marine mammal species	IUCN SCAR	✓				
IP025	ATCM 15a	Report of the Asian Forum for Polar Sciences (AFoPS) 2019–2021	Japan	✓				
IP026	ATCM 15a	Actividades del Programa Nacional Antártico de Perú Período 2020 - 2021	Peru		✓			
IP027	ATCM 15a	Expedición Científica del Perú a la Antártida	Peru		✓			
IP028	ATCM 18 CEP 15	Proposal of Finland to host the 45. ATCM in Helsinki in 2023	Finland	✓				
IP029 rev. 1	ATCM 4 CEP 5	The Scientific Committee on Antarctic Research Annual Report 2021 to the Antarctic Treaty Consultative Meeting XLIII	SCAR	✓	✓	✓	✓	SCAR Annual Report Infographic
IP030	CEP 8b	Information provision of quantitative assessment of cumulative air impacts in the framework of environmental impact assessment in Antarctica	Belarus	✓			✓	
IP031	ATCM 15a CEP 11	Breeding of seabirds insensitive to shifting ocean temperatures	Portugal Canada New Zealand South Africa United Kingdom	✓				
IP032	ATCM 11 CEP 13	Education and outreach by the Antarctic Treaty Parties under ATCM framework: a review	Portugal Belgium Bulgaria United Kingdom	✓				
IP033	ATCM 11 CEP 13	Celebrating Magellan and Elcano	Portugal Spain	✓	✓			

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
IP034	CEP 11	Using treated wastewater for hydroponic cultivation of vegetables in the Antarctic	Portugal Bulgaria	⤓				
IP035	CEP 10a	Progress and plan towards eradication of the Non-native flies in King George Island, South Shetland Islands	Chile Korea (ROK) Russian Federation Uruguay	⤓				Genetic variability analyses of Non-native files
IP036	ATCM 13	The response of the Italian National Antarctic Program to COVID-19 pandemic in the 2020-2021 expedition	Italy	⤓				
IP037	ATCM 15a CEP 10a	Seeds for Future. Global Wild Plant Seed Vault	Italy	⤓				
IP038	ATCM 13	Report on the 23rd edition of the Joint Antarctic Naval Patrol between Argentina and Chile - 2020/2021	Chile Argentina	⤓	⤓			
IP039	ATCM 13	Report on the tasks completed by the Naval Hydrographic Service in Antarctica 2020/21	Argentina	⤓	⤓			
IP040	ATCM 15a	Malaysia's activities and achievements in Antarctic research and diplomacy	Malaysia	⤓				
IP041	ATCM 6b	A review of the activities conducted by Italy in support of the established CCAMLR Ross Sea Region Marine Protected Area (RSRMPA)	Italy	⤓				
IP042	ATCM 13	Chile's experience in the implementation of the COVID-19 protocol for control and monitoring	Chile	⤓	⤓			
IP043	ATCM 15a	Gender Agenda of the Chilean Scientific Program	Chile	⤓	⤓			
IP044	ATCM 11	Antarctic Communication and Education in a Pandemic Year	Chile	⤓	⤓			
IP045	ATCM 15a	Diversity in Polar Science Initiative: Polar Horizons	United Kingdom	⤓				Polar Horizons - How-to Guide
IP046	ATCM 16	Latitudinal network of multiparametric stations in Antarctica and Climate Change Observatory	Chile	⤓	⤓			Brochure Climate Change Observatory
IP047	CEP 10a	Potential for zoonotic transmission of SARS-CoV-2 from humans to Antarctic wildlife	Chile	⤓	⤓			
IP048	CEP 10c	Second Edition of the Wildlife Awareness Manual	United Kingdom	⤓				

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
			Germany IAATO					
IP049 rev. 1	CEP 10c	The Retrospective Analysis of Antarctic Tracking Data identifies Areas of Ecological Significance in the Southern Ocean	SCAR					
IP050	ATCM 15a	Chilean Antarctic Science Program (PROCIEN) and challenges of the 2020-2025 Five-Year Plan	Chile					
IP051	ATCM 15a CEP 8b	Current glaciological research activities at the Dome Fuji station and its vicinity	Japan					
IP052	ATCM 15a	Australian Antarctic Science Program 2019-20 and 2020-21	Australia					
IP053	CEP 9a	Initiation of the review of the Management Plan for Antarctic Specially Protected Area No. 126 Byers Peninsula, Livingston Island, South Shetland Islands	United Kingdom Chile Spain					
IP054	ATCM 17	Data Collection and Reporting on Yachting Activity in Antarctica in 2019-20 and 2020-21	United Kingdom Argentina Chile IAATO					
IP055	CEP 10a	Risks of COVID-19 to Antarctic Wildlife	SCAR					
IP056	ATCM 13	Mitigation of erosion of the coastline at the Spanish Antarctic Base Gabriel de Castilla	Spain					
IP057	ATCM 13	Implementation of the IMO Polar Code in Spain. Certification of the Research Vessel (RV) Sarmiento de Gamboa	Spain					
IP058	ATCM 17	Competent Authorities discussion forum on tourism regulatory activities: report by the convener	Australia					
IP059	ATCM 13	COMNAP Antarctic Aviation Project: Update	COMNAP					
IP060 rev. 1	CEP 10c	State of Antarctic Penguins 2020 Report	SCAR					
IP061	ATCM 13	Concept study for Troll station	Norway					
IP062	ATCM 17	Norwegian supervision scheme for Antarctic cruise operators	Norway					

Information Papers									
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
IP063	ATCM 11	Education & Outreach Activities of Turkey in 2020-2021	Turkey	⤓				
IP064	ATCM 11	Polar Research Projects Contest for High School Students in Turkey	Turkey	⤓				
IP065	ATCM 15a	The Letter of Endorsement between the Association of Polar Early Career Scientists (APECS) and APECS National Committee of Turkey	Turkey	⤓				
IP066	ATCM 15a	The Fifth Turkish Antarctic Expedition (TAE-V)	Turkey	⤓				
IP067	ATCM 6b	New Legislation for Turkish Polar Scientific Expeditions	Turkey	⤓				
IP068	ATCM 15a	Turkey's Membership to the European Polar Board	Turkey	⤓				
IP069	ATCM 15a	Turkey's Full Membership to the SCAR	Turkey	⤓				
IP070	ATCM 15a	The Turkish Academy of Sciences Young Scientists Award Programme Polar Studies Prize	Turkey	⤓				
IP071	ATCM 15a	A Letter of Intent between the Scientific and Technological Research Council of Turkey, Marmara Research Center, Polar Research Institute and the Korea Polar Research Institute	Turkey Korea (ROK)	⤓				
IP072	ATCM 15a	A Memorandum of Understanding between the Scientific and Technological Research Council of Turkey, Marmara Research Center, Polar Research Institute and the Bulgarian Antarctic Institute	Turkey Bulgaria	⤓				
IP073	ATCM 15a	A Memorandum of Understanding between the Scientific and Technological Research Council of Turkey, Marmara Research Center, Polar Research Institute and the State Institution National Antarctic Scientific Centre of Ukraine	Turkey Ukraine	⤓				
IP074	ATCM 15a	Antarctic Publications by Turkish Scientists (2020/2021 Update)	Turkey	⤓				
IP075	ATCM 11	Training Book for the Turkish Scientific Polar Expeditions	Turkey	⤓				

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
IP076	ATCM 15a	Project Calls and Evaluation Processes in Turkish Antarctic Expeditions	Turkey	⤓				
IP077	ATCM 15a CEP 9d	Observing the Changing Southern Ocean and its Global Connections	United States	⤓				
IP078	ATCM 15a	Delivering the Promise of Antarctic Science through Inclusiveness and Diversity	United States United Kingdom	⤓				
IP079	ATCM 15a	High-precision Map of Antarctic Ice Sheet Bed Topography	United States	⤓				
IP080	ATCM 4	ASOC Report to the ATCM	ASOC	⤓	⤓	⤓	⤓	
IP081	ATCM 6b CEP 13	The Madrid Protocol at Thirty: Where Do We Go From Here?	ASOC	⤓				
IP082	ATCM 15a ATCM 6b	National Antarctic Programs' operations during an unprecedented Antarctic season	COMNAP	⤓				
IP083	ATCM 4	Report of the Depositary Government for the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)	Australia	⤓	⤓	⤓	⤓	
IP084	ATCM 4	Report of the Depositary Government for the Agreement on the Conservation of Albatrosses and Petrels (ACAP)	Australia	⤓	⤓	⤓	⤓	
IP085	ATCM 15a	Japan's Antarctic Research Highlights 2020–21	Japan	⤓				
IP086	ATCM 17	Closing of the Arctowski Polish Antarctic Station for tourist traffic due to the COVID-19 pandemic and the ongoing renovation of station facilities	Poland	⤓				
IP087	ATCM 15a	Polish-Russian Collaboration in East Antarctica	Poland Russian Federation	⤓				
IP088	CEP 10a	Non-native species Trichocera maculipennis (Diptera) eradication from Arctowski Polish Antarctic Station, Western Shore of Admiralty Bay, King George Island, South Shetland Islands – update 2020/2021	Poland	⤓				

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
IP089	CEP 10a	Eradication of a non-native grass Poa annua L. from the Western Shore of Admiralty Bay, King George Island, South Shetland Islands – update 2020/2021	Poland	⤓				
IP090	ATCM 6b	Adoption of the Polish Polar Policy. From Past Expeditions to Future Challenges	Poland	⤓				
IP091	CEP 8a	The Initial Responses to the Comments on the Draft CEE for the Construction and Operation of the Turkish Antarctic Research Station (TARS) at Horseshoe Island, Antarctica	Turkey	⤓				
IP092	ATCM 13	Autonomous Science Operations at Halley Research Station	United Kingdom	⤓				
IP093	ATCM 4 CEP 5	WMO Annual Report	WMO	⤓	⤓	⤓	⤓	
IP094	ATCM 15a	Winter Targeted Observing Periods and Further Plans of the Year of Polar Prediction in the Southern Hemisphere (YOPP-SH)	WMO	⤓				
IP095	ATCM 15a CEP 5	Antarctic Regional Climate Centre Network: the scope and concept	WMO	⤓				WMO AntRCC Appendix
IP096	ATCM 17 CEP 8b	Framework for assessing 'New, Novel or Particularly Concerning Activities'	United Kingdom	⤓				
IP097	CEP 8b	Update and CEE Compliance Report: Rothera Wharf Reconstruction and Coastal Stabilisation Project	United Kingdom	⤓				
IP098	CEP 10a	Detection and eradication of a non-native Lepidoptera incursion in a food deposit at Carlini Station	Argentina Germany	⤓				
IP099	CEP 9c	Tourism Management Policy for Esperanza Antarctic Station	Argentina	⤓	⤓			Visitor guideline for Esperanza Station
IP100	CEP 9e	Deception Island Antarctic Specially Managed Area (ASMA No. 4) – 2019/2021 Management report	Argentina Chile Norway Spain United Kingdom United States ASOC IAATO	⤓				

Information Papers

No.	Ag. Items	Title	Submitted By	E	S	F	R	Attachments
IP101	CEP 9e	Evaluation of Ecosystem Services and preliminary identification of their trade-offs	Spain	⤓	⤓			
IP102	CEP 8a	Preparation of a Comprehensive Environmental Evaluation for the proposed construction and operation of an aerodrome near Australia's Davis research station (the Davis Aerodrome Project)	Australia	⤓				
IP103	ATCM 13	Modernisation of Australia's Antarctic Program	Australia	⤓				Davis Aerodrome Project Fact Sheet
IP104	ATCM 17 CEP 9e	Guidance on Short Overnight Stays: Consistency and Coordination through Knowledge Sharing	United States Canada	⤓				Attachment A: Questionnaire
IP105	ATCM 6b	Notification of the Intention of Canada to request recognition of Consultative Party status	Canada	⤓		⤓		
IP106	CEP 13	The Ice Memory Programme	France Italy	⤓				
IP107	ATCM 15a	Report about 2020-2021 Antarctic Summer Campaign Uruguayan National Antarctic Program	Uruguay	⤓				
IP108	ATCM 13	Protocolo sanitario aplicable a ciudadanos nacionales y extranjeros que participaron de actividades en la Campaña Antártica 2020-2021	Uruguay		⤓			
IP109	ATCM 17 ATCM 4	Report of the International Association of Antarctica Tour Operators 2020-21	IAATO	⤓	⤓	⤓	⤓	
IP110	ATCM 17	IAATO Overview of Antarctic Tourism: A Historical Review of Growth, the 2020-21 Season, and Preliminary Estimates for 2021-22	IAATO	⤓				
IP111	ATCM 17 CEP 9c	A Five-Year Overview and 2020–21 Season Report on IAATO Operator Use of Antarctic Peninsula Landing Sites and ATCM Visitor Site Guidelines	IAATO	⤓				
IP112	ATCM 15a	Avances en la participación de Colombia en el SCAR	Colombia		⤓			
IP113	ATCM 15a CEP 13	Adhesión de Colombia al Protocolo del Tratado Antártico sobre Protección del Medio	Colombia		⤓			

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
		Ambiente: Retos y Oportunidades						
IP114	ATCM 11	Primer Congreso Internacional "Colombia y su proyección en la Antártida"	Colombia		⤓			
IP115	ATCM 15a	VII Expedición Científica de Colombia a la Antártica, verano austral 2020-2021	Colombia		⤓			
IP116	ATCM 15a	Determinación del aporte de la presión Atmosférica sobre las variaciones del nivel del mar en la Antártica, verano austral 2020-2021	Colombia Ecuador		⤓			
IP117	ATCM 6b	Colombia, Miembro Observador del Consejo de Administradores de los Programas Antárticos Nacionales (COMNAP)	Colombia		⤓			
IP118	ATCM 13	Implementación de una Turbina Eólica en la Antártica	Colombia		⤓			
IP119	ATCM 15a	Cooperación de Colombia con la Comisión para la Conservación de los Recursos Vivos Marinos Antárticos (CCRVMA): Implementación Voluntaria de la Medida de Conservación 10-05 (2018)	Colombia		⤓			
IP120	ATCM 15a	Cooperación Internacional para el Estudio de Mamíferos Marinos en el Pacífico Sudeste y la Antártica	Colombia		⤓			
IP121	ATCM 6b	Fortalecimiento del Programa Antártico Colombiano (PAC)	Colombia		⤓			
IP122	ATCM 11	Resultados XIX Encuentro de Historiadores Antárticos Latinoamericanos y I Feria de Historia Antártica Latinoamericana	Colombia		⤓			
IP123	ATCM 15a	Cooperación entre Colombia y Argentina sobre análisis magnetoeléctrico en tectónica: Instalación de una Estación Geofísica Permanente en la Base Antártica Isla Marambio	Colombia		⤓			
IP124	CEP 8b	Procedimiento implementado en el marco del Programa Antártico Colombiano para la evaluación de impacto ambiental de las actividades desarrolladas en el	Colombia		⤓			

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
		área del Tratado Antártico						
IP125	ATCM 13	Gestión y eliminación de residuos a bordo del buque ARC "20 de Julio", en el marco de las expediciones científicas de Colombia a la Antártica	Colombia		↓			
IP126	ATCM 15a	Aportes de Colombia a la Investigación Antártica: Publicaciones Científicas	Colombia		↓			
IP127	ATCM 13	Comunicaciones Satelitales de la Fuerza Área Colombiana (FAC) en la Antártica	Colombia		↓			
IP128	ATCM 13	Brazilian Antarctic Operation (OPERANTAR) - OPERANTAR XXXIX (2020/2021) and OPERANTAR XL (2021/2022)	Brazil	↓				
IP129	ATCM 11	New Ferraz Station book and stamp	Brazil	↓				
IP130	ATCM 13	Comandante Ferraz Antarctic Station	Brazil	↓				
IP131	ATCM 11	PROANTAR Education & Outreach Activities	Brazil	↓				
IP132	ATCM 13	Brazilian Hydrographic Surveying of Antarctic Waters	Brazil	↓				
IP133	CEP 9a	Progress in the revision process of the Management Plan for Antarctic Specially Managed Area Nº 1, Admiralty Bay	Brazil Ecuador Peru Poland United States	↓				
IP134	ATCM 13 CEP 9e	Vigilancia volcánica de la isla Decepción durante la campaña antártica española 2020-2021	Spain		↓			
IP135	CEP 9b	Development of draft Antarctic Terrestrial and Underwater Archaeology Best Practice guidelines	SCAR	↓	↓	↓	↓	
IP136	ATCM 15a	The Southern Ocean contribution to the United Nations Decade of Ocean Science for Sustainable Development	SCAR	↓				
IP137	CEP 11	Persistent Organic Chemicals in Antarctica: A horizon scan of priority challenges	SCAR	↓				
IP138	ATCM 13	On the work of the Russian Antarctic Expedition during the	Russian Federation	↓			↓	

Information Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
		COVID-19 pandemic: lessons from the 2020–2021 season						
IP139	ATCM 14	Response to Australia's 2019/2020 Inspection Observations	Russian Federation	⤓			⤓	
IP140	ATCM 17	Participation of a Russian scientist in Heritage Expeditions voyage	Russian Federation	⤓			⤓	
IP141	ATCM 11	Celebrating the bicentennial of the discovery of Antarctica	Russian Federation ASOC	⤓			⤓	
IP142	ATCM 15a	Report on the scientific activity of the Argentine Antarctic Institute – 2020	Argentina	⤓	⤓			
IP143	CEP 4	Committee for Environmental Protection (CEP): summary of activities during the 2019/21 intersessional period	Norway	⤓				
IP144	ATCM 14 CEP 12	Summary of the intersessional discussion on inspection reports under Article VII of the Antarctic Treaty and Article 14 of the Environment Protocol	Norway Spain	⤓	⤓			
IP145	ATCM 18	Preparation of the 44 th Meeting - Berlin, 2022	Germany	⤓				

Secretariat Papers									
No.	Ag. Items	Title	Submitted By	E	S	F	R	Attachments
SP001 rev. 6	ATCM 3	ATCM XLIII - CEP XXIII Agenda and Daily Schedule	ATS					Ad hoc guidelines for ATCM XLIII - CEP XXIII virtual meeting ATCM Multi-year Strategic Work Plan
SP002	CEP 2	CEP XXIII Preliminary Agenda and Five-Year Work Plan (5YWP)	ATS					Ad hoc guidelines for ATCM XLIII - CEP XXIII virtual meeting
SP003	ATCM 6b	List of Measures with status "not yet effective"	ATS					
SP004	ATCM 7	Secretariat Report 2020/2021	ATS					Audited financial Report for 2019/2020 Contributions Received by the Antarctic Secretariat 2020/21 Provisional Financial Report 2020/21
SP005	ATCM 7	Secretariat Programme 2021/2022	ATS					Contribution Scale for the Financial Year 2022/23 Provisional Statement for the Financial Year 2020/21, Budget for the Financial Year 2021/22, Forecast Budget for the Financial Year 2022/23 Salary Scale Secretariat Programme 2021/2022
SP006	ATCM 7	Five-Year Forward Budget profile 2022/23 - 2026/27	ATS					Five-Year Forward Budget profile 2022/23 – 2026/27
SP007	ATCM 17 CEP 9e	New map and reports of all sites receiving vessel-based visits in Antarctica	ATS					
SP008	ATCM 15a	Key Science Priorities of National Antarctic Programmes	ATS					submission form
SP009	ATCM 10	Redesign of the Electronic Information Exchange System (EIES)	ATS					
SP010	ATCM 10	Analysis of the use of the Electronic Information Exchange System: uploading of Annual Reports and other additional considerations	ATS					
SP011	ATCM 7	Status of the Secretariat Archive of Final Reports	ATS					
SP012	CEP 8b	Annual list of Initial Environmental Evaluations (IEE) and Comprehensive Environmental	ATS					

Secretariat Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
		Evaluations (CEE) prepared between 1 April 2019 and 31 March 2021						
SP013	ATCM 10 ATCM 11 ATCM 12 ATCM 6b ATCM 7 ATCM 8 ATCM 9	ATCM Working Group 1 Schedule, Annotated Agenda and Summary of Papers	ATS					
SP014 rev. 1	CEP 2	CEP XXIII Schedule, Annotated Agenda and Summary of Papers	ATS					
SP015 rev. 1	ATCM 13 ATCM 14 ATCM 15a ATCM 16 ATCM 17	ATCM Working Group 2 Schedule, Annotated Agenda and Summary of Papers	ATS					
SP016 rev. 1	ATCM 1 ATCM 18 ATCM 19 ATCM 2 ATCM 20 ATCM 21 ATCM 3 ATCM 4 ATCM 5 ATCM 6a	ATCM Plenary - Schedule, Annotated Agenda and Summary of Papers	ATS					

Background Papers

No.	Ag. Items	Title	Submitted By	E	S	F	R	Attachments
BP001	CEP 10c	Unoccupied Aerial System (UAS) Surveys Minimize Predator Response relative to Ground Surveys	United States	⤓				
BP002	ATCM 6b	On the publication of the "Chilean Antarctic Statute"	Chile	⤓	⤓			Estatuto Chileno Antártico - Ley 21255
BP003	ATCM 17	On the Chilean Antarctic Tourism Policy	Chile	⤓	⤓			Política Nacional de Turismo Antártico
BP004	ATCM 6b	Recent amendments in Antarctica legislation of the Kingdom of the Netherlands	Netherlands	⤓				
BP005	CEP 6	Characterising Antarctic Fuels to Inform the Clean Up of Fuel Spill Sites	Argentina Australia	⤓				
BP006	CEP 10c	The Animal Audiogram Database	Germany	⤓				
BP007	ATCM 14	Follow-up on Recommendations from the Inspection at the Antarctic Jang Bogo Station during 2019-2020 Antarctic Summer Season	Korea (ROK)	⤓				
BP008	ATCM 15a	Scientific and Science-related Cooperation with the Consultative Parties and the Wider Antarctic Community and COVID-19 Responses	Korea (ROK)	⤓				
BP009 rev. 1	ATCM 11	Italian activities in Antarctica before the institution of the Italian National Research Program in Antarctica (PNRA)	Italy	⤓				
BP010	ATCM 16	The 19th Council of Managers of National Antarctic Programs (COMNAP) Symposium (2020)	COMNAP	⤓				
BP011	ATCM 11	Documentaries of the Turkish Antarctic Expedition (TAE - IV) 2019 - 2020	Turkey	⤓				
BP012	ATCM 11	Turkish Polar Encyclopedia Project	Turkey	⤓				
BP013	CEP 8b	Information on the Progress of the Renovation of the Henryk Arctowski Polish Antarctic Station on King George Island, South Shetland Islands	Poland	⤓				
BP014	ATCM 13	Fire at the Russian Antarctic station Mirny	Russian Federation	⤓			⤓	
BP015	ATCM 13	On the postponement of the first stage of assembly of a new wintering building at Vostok station for the season 2021/2022	Russian Federation	⤓			⤓	

Background Papers								
No.	**Ag. Items**	**Title**	**Submitted By**	**E**	**S**	**F**	**R**	**Attachments**
BP016	ATCM 13	Informe de ejecución de la XXIV Expedición Antártica Ecuatoriana (2019-2020)	Ecuador		⤓			
BP017	ATCM 15a	Cooperación Científica entre Programas Antárticos Nacionales ECUANTAR XXIV (2019-2020)	Ecuador		⤓			
BP018	ATCM 13	Informe de ejecución de la XXV Expedición Antártica Ecuatoriana (2020-2021)	Ecuador		⤓			
BP019	ATCM 15a	Cooperación Científica entre Programas Antárticos Nacionales ECUANTAR XXV (2020-2021)	Ecuador		⤓			
BP020	ATCM 15a	Estudios toxicológicos de metales pesados, microplásticos y ecología microbiana con potencial biotecnológico en la Península Antártica	Ecuador		⤓			
BP021	ATCM 13	Informe de actividades y resultados REFUGIO ANTÁRTICO ECUATORIANO Expediciones XXIV y XXV	Ecuador		⤓			
BP022	ATCM 15a	Informe de avance sobre el proyecto "Estructura microalgal y su relación con la variabilidad físico-químicas en el ecosistema marino de las islas Shetland del Sur	Ecuador		⤓			
BP023	ATCM 15a	South Africa’s first Antarctic and Southern Ocean Strategy gazetted	South Africa	⤓				Gazetted South Africa’s Antarctic and Southern Ocean Strategy

2. List of Participants

2. List of Participants

Consultative Parties			
Party	**Title**	**Name**	**Position**
Argentina	Msc.	Abas, Marina	Advisor
Argentina	Lic	Abbeduto, María Luz	Advisor
Argentina	Cnl	Acosta, Oscar Alfredo	Advisor
Argentina	Dr	Ansaldo, Martin	Advisor
Argentina	Cnl	Ballerini, Enrique Marcelo	Advisor
Argentina	Mrs	Balsalobre, Silvina	Advisor
Argentina	Gral.	Calandin, Edgar Fernando	Delegate
Argentina	Lic.	Casela, Paula	Delegate
Argentina	Consejero	Conde Garrido, Rodrigo	Alternate
Argentina	Dr	Curtosi, Antonio	Advisor
Argentina	Dr	Diaz, Martin Andres	Delegate
Argentina	Dr	Fontana, Pablo	Advisor
Argentina	Min.	Gowland, Máximo	Head of Delegation
Argentina	Dr	Libertelli, Marcela	Advisor
Argentina	Dr	Lirio, Juan Manuel	Advisor
Argentina	Min	Lopez Crozet, Fausto	Alternate
Argentina	Cnl	López Meyer, Lorenzo Matías	Advisor
Argentina	Dr	Mac Cormack, Walter	Alternate
Argentina	Dr	Martinez Alvarez, Lucas	Advisor
Argentina	Cnl	Mingorance, Ruben Alejandro	Advisor
Argentina	Consejera	Mulville, Cynthia	Delegate
Argentina	Dr	Negrete, Javier	Advisor
Argentina	Lic.	Ortúzar, Patricia	CEP Representative
Argentina	Sec	Pesaresi, Andrea Paula	Delegate
Argentina	Dr	Reguero, Marcelo	Advisor
Argentina	Capitán De Corbeta	Rivas, Julio Cesar	Advisor
Argentina	Dr	Ruberto, Lucas	Advisor
Argentina	Sec.	Santiago, Facundo	Delegate
Argentina	Lic.	Santillana, Sergio	Advisor
Argentina	Dr	Schloss, Irene	Advisor
Argentina	Lic.	Vereda, Marisol	Advisor
Argentina	Consejero	Violini, Patricio	Delegate
Australia	Mr	Ellis, Kim	Alternate
Australia	Ms	Kingston, Melissa	Delegate
Australia	Mr	LaMacchia, Frank	Delegate
Australia	Ms	Mccourt, Suzanne	Alternate
Australia	Mr	Mcgee, Jeffrey	Advisor
Australia	Mr	Mcivor, Ewan	CEP Representative
Australia	Mr	Newnham, Simon	Head of Delegation
Australia	Mr	Playle, Ben	Delegate

Consultative Parties			
Party	**Title**	**Name**	**Position**
Australia	Mr	Quinn, Todd	Delegate
Australia	Dr	Tracey, Phillip	Delegate
Australia	Professor	Webster, Nicole	Delegate
Australia	Dr	Wooding, Rob	Alternate
Belgium	Ambassadeur	de Lannoy, Christian	Head of Delegation
Belgium	Ms	Langerock, Stephanie	CEP Representative
Belgium	Mr	Mayence, Jean-François	Advisor
Belgium	Dr	Van de Putte, Anton	Advisor
Belgium	Ms	Vancauwenberghe, Maaike	Alternate
Belgium	Mr	Vanstappen, Nils	Advisor
Belgium	Mr	Verheyen, Koen	Advisor
Belgium	Ms	Wilmotte, Annick	Advisor
Brazil	Mr	Diniz Guedes, Thomaz	Alternate
Brazil	Mr	Suarez Sampaio, Carlos Hugo	Advisor
Brazil	Mr	Belli , Guilherme	Advisor
Brazil	Mr	Carvalho Raposo, Philippe	Alternate
Brazil	Ms	Cruz, Andrea	Delegate
Brazil	Rear Admiral	Da Rocha Martins, Antonio Cesar	Alternate
Brazil	Ms	Hemetrio Valadares, Luciana	CEP Representative
Brazil	Ms	Messias E Silva, Julie	Advisor
Brazil	Mr	Obino, Rodrigo	Delegate
Brazil	Mr	Peruch Viana, Benhur	Head of Delegation
Brazil	Ms	Trad Souza, Haynnée	Delegate
Bulgaria	Mrs	Damyanova, Milena	Delegate
Bulgaria	Mrs	Dramova, Dimana	Head of Delegation
Bulgaria	Mr	Mateev, Dragomir	CEP Representative
Bulgaria	Prof. D.Sc.	Pimpirev, Christo	Alternate
Bulgaria	Ms	Raycheva, Sasha	Delegate
Chile	Ms	Asencio, Geraldine	Delegate
Chile	Mr	Barticevic, Elias	Delegate
Chile	Nr	Benitez, Cristobal	Advisor
Chile	Mr	Canales, Reiner	Delegate
Chile	Mr	Cariceo, Yanko	CEP Representative
Chile	Mrs	Carvallo, Maria Luisa	Advisor
Chile	Mr	Castillo, Rafael	Advisor
Chile	Cdr	Christiansen, Lars	Advisor
Chile	Mr	Ferrada, Luis Valentín	Advisor
Chile	Cdr	Figueroa, Miguel	Advisor
Chile	Mr	Gamboa, Cesar	Advisor
Chile	Mrs	Gonzalez, Paula	Delegate
Chile	Mr	González, Marcelo	Delegate
Chile	Mr	Hawa, Samy	Advisor
Chile	Mr	Jarpa, Victor	Advisor
Chile	Ms	Lazen, Chantal	Advisor

Consultative Parties			
Party	**Title**	**Name**	**Position**
Chile	Dr	Leppe, Marcelo	Alternate
Chile	Mr	Lertora, Francisco	Advisor
Chile	Mrs	Molina, Alejandra	Delegate
Chile	Ms	Movillo, Macarena	Advisor
Chile	Nr	Piña, Carlos	Advisor
Chile	Dr	Ranson García, John	Advisor
Chile	Mr	Salazar, Miguel	Advisor
Chile	Ms	Salinas, Carla	Delegate
Chile	Mr	Santibañez, Miguel	Advisor
Chile	Ms	Stockins, Christine	Advisor
Chile	Ms	Vallejos, Verónica	CEP Representative
Chile	Mr	Waghorn, Rodrigo	Head of Delegation
China	Ms	Bai, Jiayu	Advisor
China	Mr	Gou, Haibo	Head of Delegation
China	Ms	Li, Xueping	Advisor
China	Mr	Li, Linlin	Delegate
China	Mr	Long, Wei	CEP Representative
China	Ms	Qiu, Yutong	Delegate
China	Mr	Su, Wenlu	Delegate
China	Professor	Tang, Jianye	Advisor
China	Mr	Yang, Lei	Alternate
China	Ms	Yu, Xinwei	Delegate
China	Prof.	Zhang, Yanyun	Advisor
China	Mr	Zhang, Yang	Alternate
China	Ms	Zheng, Yingqin	Advisor
Czechia	Mr	Beranek, Milan	Delegate
Czechia	Mr	Caban, Pavel	Delegate
Czechia	Ms	Filippiova, Martina	Alternate
Czechia	Dr	Kapler, Pavel	Delegate
Czechia	Mrs	Krizova, Barbora	Delegate
Czechia	Dr	Nyvlt, Daniel	Delegate
Czechia	Dr	Štepánek, Premysl	Delegate
Czechia	Dr	Válek, Petr	Head of Delegation
Czechia	Mr	Venera, Zdenek	CEP Representative
Ecuador	Minister	Carranza, José Antonio	Delegate
Ecuador	Cpnv-Em	Correa Aguayo, Johny	Delegate
Ecuador	Mr	Mendoza, Javier	Delegate
Ecuador	Cpfg-Em	Morales Auz, Luis	CEP Representative
Ecuador	Cpfg-Emt	Pinto, Edwin	Delegate
Ecuador	Emb.	Troya, Maria Gabriela	Head of Delegation
Ecuador	Ing.	Vera Hidalgo, Andrea	Alternate
Finland	Ms	Haukka, Jenny	Alternate
Finland	Mr	Kalakoski, Mika	Advisor
Finland	Ms	Kangas, Aino	Alternate
Finland	Mr	Koivurova, Timo	Advisor

Consultative Parties			
Party	**Title**	**Name**	**Position**
Finland	Ms	Mähönen, Outi	CEP Representative
Finland	Ms	Tölö, Elina	Alternate
Finland	Mr	Vuorimäki, Petteri	Head of Delegation
Finland	Ms	Yletyinen, Anna	Alternate
France	Dr	Chappellaz, Jérôme	CEP Representative
France	Dr	Choquet, Anne	Advisor
France	M.	Cottarel, Guillaume	Delegate
France	Mme	Jolly, Maude	CEP Representative
France	Mr	Le Lan, Julien	Alternate
France	Mr	Ortolland, Didier	Head of Delegation
France	Ambassador	Poivre D'arvor, Olivier	ATCM Chairman
France	Mr	Raharinaivo, Jacques	Advisor
France	Mr	Ropert-Coudert, Yan	Delegate
Germany	Dr	Boetius, Antje	Delegate
Germany	Dr	Diedrich, Erhard	Delegate
Germany	Dr	Duennwald, Sonja	Delegate
Germany	Ms	Fabris, Rita	Delegate
Germany	Prof. Dr	Gaedicke, Christoph	Delegate
Germany	Dr	Hain, Stefan	Delegate
Germany	Dr	Herata, Heike	Delegate
Germany	Ms	Hilbert, Jacqueline	Delegate
Germany	Mr	Hochmüller, Tilman	Head of Delegation
Germany	Dr	Krakau, Manuela	Delegate
Germany	Dr	Küster, Anette	Delegate
Germany	Dr	Läufer, Andreas	Delegate
Germany	Mr	Liebschner, Alexander	Delegate
Germany	Mr	Lindemann, Christian	Delegate
Germany	Mrs	Marker, Benita	Delegate
Germany	Mr	Mengedoht, Dirk	Delegate
Germany	Dr	Nixdorf, Uwe	Delegate
Germany	Dr	Reinke, Manfred	Delegate
Germany	Mr	Schulz, Christian	Delegate
Germany	Dr	Vöneky, Silja	Advisor
Germany	Dr	Wesche, Christine	Delegate
Germany	Mr	Wilckens, Julian	Delegate
Germany	Ms	Wolter, Miriam	Delegate
India	Dr	Chaturvedi, Sanjay	Delegate
India	Dr	Gupta, G.V.M.	Delegate
India	Dr	Kumar, Vijay	Delegate
India	Dr	Rangreji, Luther	Delegate
India	Dr	Ravichandran, Muthalagu	Head of Delegation
India	Dr	Tiwari, Anoop Kumar	CEP Representative
Italy	Prof.	Andreone, Gemma	Delegate
Italy	Dr	Azzaro, Maurizio	Delegate
Italy	Prof.	Calizza, Edoardo	Advisor

Consultative Parties			
Party	**Title**	**Name**	**Position**
Italy	Dr	Ghigliotti, Laura	Advisor
Italy	Mr	Guanciale, Orazio	Head of Delegation
Italy	Ing.	Mecozzi, Roberta	CEP Representative
Italy	Prof.	Onofri, Silvano	Delegate
Italy	Dott.	Ubaldi, Carla	Delegate
Italy	Dr	Vacchi, Marino	Delegate
Japan	Mr	Baba, Kentaro	Advisor
Japan	Prof.	Hashida, Gen	Advisor
Japan	Ms	Ichitsuka, Yuka	CEP Representative
Japan	Prof.	Imura, Satoshi	Advisor
Japan	Mr	Iwasaki, Atsushi	Head of Delegation
Japan	Mr	Kayashima, Takuro	Alternate
Japan	Prof.	Nakamura, Takuji	Advisor
Japan	Mr	Okumura, Kouki	Advisor
Japan	Ms	Sato, Moeka	Advisor
Japan	Ms	Shirai, Hikaru	Alternate
Korea (ROK)	Mr	Ahn, Kukhyun	Head of Delegation
Korea (ROK)	Mr	Choi, Seonung	Delegate
Korea (ROK)	Dr	Chung, Hosung	Delegate
Korea (ROK)	Mr	Han, Seung Woo	Delegate
Korea (ROK)	Ms	Han, Juhee	Delegate
Korea (ROK)	Ms	Jung, Chaerin	Delegate
Korea (ROK)	Ms	Kim, Min Ji	Delegate
Korea (ROK)	Ms	Kim, Ji Hyun	Delegate
Korea (ROK)	Dr	Kim, Ji Hee	Delegate
Korea (ROK)	Mr	Seo, Joonwoo	Delegate
Korea (ROK)	Dr	Shin, Hyoung Chul	Delegate
Korea (ROK)	Ms	Suh, Hyein	Delegate
Netherlands	Dr	Badhe, Renuka	Advisor
Netherlands	Prof. Dr	Bastmeijer, Kees	Delegate
Netherlands	Drs.	Eijs, Arthur	CEP Representative
Netherlands	Mrs	Elstgeest, Marlynda	Advisor
Netherlands	Ms	Eshuis, Nikki	Delegate
Netherlands	Drs	Kroef, Van Der, Dick A.	Delegate
Netherlands	Ms	Kuile, Ter, Liz	Delegate
Netherlands	Mr	Peijs, Martijn	Delegate
Netherlands	Mr	Pistecky, Michael	Head of Delegation
Netherlands	Ms	Wijmenga, Hannah	Delegate
New Zealand	Mr	Jain, Arun	Alternate
New Zealand	Mr	Kirk, Hamish	Delegate
New Zealand	Ms	Newman, Jana	Head of Delegation
New Zealand	Ms	Poirot, Ceisha	CEP Representative
New Zealand	Ms	Sitter, Pauline	Delegate
Norway	Ms	Galli, Aasta Louise Thorbjørnsrud	Delegate

Consultative Parties			
Party	**Title**	**Name**	**Position**
Norway	Mr	Guldahl, John Erik	Delegate
Norway	Ms	Høgestøl, Astrid Charlotte	Delegate
Norway	Ms	Jørem, Ane	Alternate
Norway	Dr	Misund, Ole Arve	Delegate
Norway	Ms	Nicolaisen, Kristine Oftedal	Delegate
Norway	Ms	Njåstad, Birgit	Delegate
Norway	Ms	Øseth, Ellen	CEP Representative
Norway	Ms	Stoltenberg, Anne Elisabeth	Delegate
Norway	Ms	Strengehagen, Mette	Head of Delegation
Norway	Mr	Theisen, Fredrik Juell	Delegate
Norway	Ms	Von Quillfeldt, Cecilie	Delegate
Peru	Ms	Bello Chirinos, Cinthya	CEP Representative
Peru	Mr	Franco Moreno, Enrique	Delegate
Peru	Mr	Londoñe Bailon, Pablo	Delegate
Peru	Min.	Soarez Documet, Manuel	Head of Delegation
Poland	Dr Hab.	Bialik, Robert	Alternate
Poland	Mr	Jalukowicz, Tomasz	Delegate
Poland	Ms	Krawczyk-Grzesiowska, Joanna	Delegate
Poland	Ms	Kruszewska, Agnieszka	CEP Representative
Poland	Prof.	Lewandowski, Marek	Delegate
Poland	Dr	Marciniak, Konrad	Head of Delegation
Poland	Mrs	Tolkacz, Katarzyna	CEP Representative
Russian Federation	Mrs	Bystramovich, Anna	Alternate
Russian Federation	Mr	Kalinin, Andrey	Head of Delegation
Russian Federation	Mr	Klepikov, Alexander	CEP Representative
Russian Federation	Mr	Pomelov, Victor	Advisor
Russian Federation	Mr	Tarasenko, Sergey	Advisor
Russian Federation	Ms	Zhuzhginova, Yulia	Delegate
South Africa	Ms	Brammer, Romi	Advisor
South Africa	Mr	Devanunthan, Nishendra	Delegate
South Africa	Mr	Dopolo, Mbulelo Tomie	Head of Delegation
South Africa	Ms	Madlokazi, Ntombovuyo	Advisor
South Africa	Ms	Malherbe, Carina	Advisor
South Africa	Dr	Siko, Gilbert	Advisor
Spain	Mr	Aguilera Aranda, Francisco	Head of Delegation
Spain	Mr	Díaz De La Guardia, Ignacio	Delegate
Spain	Mr	Ojeda Cardenes, Miguel Ángel	Delegate
Spain	Dr	Quesada Del Corral, Antonio	CEP Representative

Consultative Parties			
Party	**Title**	**Name**	**Position**
Spain	Mrs	Ramos García, Sonia	Delegate
Spain	Prof. Dra. Mrs	Sobrido Prieto, Marta	Delegate
Sweden	Dr	Dahl, Justiina	CEP Representative
Sweden	Prof	Gardfeldt, Katarina	Delegate
Sweden	Deputy Director	Nilsson, Pernilla	Head of Delegation
Sweden	Dr	Norling, Pia	Delegate
Sweden	Desk Officer, Dr	Ratcovich Leopardi, Martin	Advisor
Ukraine	Mr	Fedchuk, Andrii	Alternate
United Kingdom	Mr	Chance, Thomas	Delegate
United Kingdom	Ms	Clarke, Rachel	Delegate
United Kingdom	Mr	Clarkson, George	CEP Representative
United Kingdom	Dr	Crosbie, Kim	Delegate
United Kingdom	Mr	Downie, Rod	Delegate
United Kingdom	Mr	Eager, John	Delegate
United Kingdom	Prof Dame	Francis, Jane	Delegate
United Kingdom	Mr	Garrod, Simon	Delegate
United Kingdom	Dr	Hughes, Kevin	Delegate
United Kingdom	Mrs	Purdasy, Margaret	Delegate
United Kingdom	Ms	Rumble, Jane	Head of Delegation
United States	Ms	Arvis, Constance	Head of Delegation
United States	Mr	Edwards, David	Advisor
United States	Dr	Falkner, Kelly	Advisor
United States	Mr	Gilanshah, Bijan	Advisor
United States	Professor	Karentz, Deneb	Advisor
United States	Mr	Kill, Theodore P.	Advisor
United States	Dr	McGinn, Nature	Advisor
United States	Mr	Muntean, William	Alternate
United States	Ms	Ohnemus, Kimberly	Advisor
United States	Dr	O'Reilly, Jessica	Advisor
United States	Dr	Penhale, Polly A.	CEP Representative
United States	Ms	Roemele, Julie	Advisor
United States	Ms	Scott, Lela	Advisor
United States	Mr	Sheppard, Paul	Advisor
United States	Mr	Shobert, William	Advisor
United States	Ms	Short, Stephanie	Advisor
United States	Dr	Sung, Nancy	Advisor
United States	Ms	Taylor, Heidi	Advisor
United States	Dr	Watters, George	Advisor
United States	Ms	Wheatley, Victoria	Advisor
Uruguay	Director	Danzov, Ernesto	Advisor
Uruguay	R.A. (Ret.)	Burgos, Manuel	Alternate
Uruguay	Mr	Corbo, Richard	Advisor
Uruguay	Lic.	Da Costa, Pamela	Advisor
Uruguay	Mr	Fraga, Rafael	Staff
Uruguay	Mr	Juri, Eduardo	CEP Representative

Consultative Parties			
Party	**Title**	**Name**	**Position**
Uruguay	Lic.	Machado , Ana Laura	Advisor
Uruguay	Mr	Pache Soto, Jaime	Delegate
Uruguay	Mr	Pereyra, Álvaro	Advisor
Uruguay	Lic.	Quartarolo, Angela	Delegate
Uruguay	Dra	Rivero, Florencia	Advisor
Uruguay	Dr	Vanerio Balbela, Gustavo	Head of Delegation

Non-Consultative Parties			
Party	**Title**	**Name**	**Position**
Belarus	Ms	Kaminskaya, Alena	Delegate
Belarus	Dr	Haidashou, Aliaksei	Alternate
Belarus	Dr	Kakareka, Sergey	CEP Representative
Belarus	Ms	Kharashun, Tamara	Delegate
Belarus	Prof.	Loginov, Vladimir	Head of Delegation
Belarus	Mr	Ryzhikov, Vladimir	Delegate
Belarus	Mr	Shpakovsky, Alexander	Delegate
Belarus	Ms	Velichko, Irina	Delegate
Canada	Mr	Dupuis, Frederick	Delegate
Canada	Mrs	Murji, Alyssa	Advisor
Canada	Mr	Paul, Amrita	Delegate
Canada	Mrs	Rumbolt, Sara	Delegate
Canada	Mrs	Song, Gloria	Alternate
Canada	Mr	Taillefer, David	Head of Delegation
Canada	Mrs	Thompson, Jacqueline	Delegate
Canada	Ms	Wark, Jutta	Alternate
Colombia	Capitán	Arias Isaza, Francisco Armando	Alternate
Colombia	Mr	Barreto , Luis Reinaldo	Delegate
Colombia	Mr	Bula Bohórquez, Alberto	Advisor
Colombia	Capitán De Corbeta	Burgos Uribe , Natalia	CEP Representative
Colombia	Embajador	Cadena Montenegro, Diego Felipe	Delegate
Colombia	Mr	Ceballos , Jorge Luis	Delegate
Colombia	Capitán De Navío	Forero Hauzeur, Juan Camilo	Delegate
Colombia	Mrs	Franco Torrente, Catalina	Delegate
Colombia	Mrs	González , Ana María	Delegate
Colombia	Mayor	Jaimes Parada, Gerson Ricardo	Delegate
Colombia	Capitán	Jiménez Lozano, César	Delegate
Colombia	Teniente Coronel	Jiménez Sánchez , Jorge Giovanni	Delegate
Colombia	Mr	Marmolejo Egred , Andrés Felipe	Delegate
Colombia	Embajadora	Molina De La Villa, Olga Cielo	Delegate
Colombia	Mr	Montenegro Coral, Ricardo	Head of Delegation
Colombia	Mrs	Moreno , Kelly Joletii	Delegate
Colombia	Mr	Navarro Hernández , Jesús Gabriel	Delegate
Colombia	Mrs	Ricaurte , Constanza	Delegate
Colombia	Mayor	Rincón Urbina, Sonia Ruth	Delegate
Colombia	Teniente De Fragata	Rodríguez Saldaña, Danna María	Delegate
Colombia	Mrs	Rubio Tamayo, Laura	Delegate

Non-Consultative Parties			
Party	**Title**	**Name**	**Position**
Colombia	Mrs	Sierra Correa , Paula Cristina	Delegate
Colombia	Mrs	Suárez Triviño , Natalia Del Pilar	Delegate
Malaysia	Mr	Abd Rahman, Mohd Nasaruddin	Delegate
Malaysia	Mr	Abu Bakar, Jamalulail	Head of Delegation
Malaysia	Prof. Dr	Abu Samah, Azizan	Delegate
Malaysia	Mr	Baharuddin, Rosmahyuddin	Delegate
Malaysia	Ms	Mogan, Deepa	Delegate
Malaysia	Dr	Mohd Nor, Salleh	Delegate
Monaco	Docteur	Le Bohec, Céline	Alternate
Monaco	Docteur	Planas, Victor	Advisor
Monaco	Del.	Van Klaveren-Impagliazzo, Céline	CEP Representative
Portugal	Prof	Caetano Xavier, José Carlos	Head of Delegation
Portugal	Dr	Grafino, Carla Fonseca	Delegate
Portugal	Dr	Mendes, Maria Luís	Delegate
Portugal	Dr	Motta, Gonçalo	Delegate
Portugal	Ms	Santos, Maria Germana	Delegate
Slovakia	Mrs	Erdelská, ?ubica	Alternate
Slovakia	Mrs	Pánisová Ležáková, Michaela	Alternate
Slovakia	H.E.	Slobodník, Igor	Head of Delegation
Slovakia	Mrs	Sykorova, Michaela	Delegate
Slovenia	Ms	Del Fabro, Elena	Delegate
Switzerland	Mr	Andrin, Studer	CEP Representative
Switzerland	Ms	Carola, Göhlich	Delegate
Switzerland	Ms	Danièle, Rod	Advisor
Switzerland	Mr	Hauser, Grégoire	Delegate
Switzerland	Dr	Margrit, Schwikowski	Advisor
Switzerland	Ambassadeur	Roberto, Balzaretti	Head of Delegation
Turkey	Ms	Bayar, Eda	CEP Representative
Turkey	Dr	Erguven, N. Sarp	Delegate
Turkey	Cpt.	Oktar, Özgün	Alternate
Turkey	Mr	Özigci, Yunus Emre	Delegate
Turkey	Prof.	Özsoy, Burcu	Head of Delegation
Turkey	Mr	Ünlü, Bartu	Delegate
Turkey	Dr	Yilmaz, Atilla	Alternate
Turkey	Mr	Yüksel, Subutay	Delegate
Venezuela	Mr	Castillo, Marco	Alternate
Venezuela	Ms	Handt, Helga	CEP Representative
Venezuela	Ms	Requena, Ailing	Delegate

Observers, Experts and Guests			
Party	**Title**	**Name**	**Position**
CCAMLR	Dr	Agnew, David	Head of Delegation
CCAMLR	Dr	Granit, Jakob	Alternate
CCAMLR	Dr	Welsford, Dirk	CEP Representative
COMNAP	Dr	Colombo, Andrea	Delegate
COMNAP	Ms	Rogan-Finnemore, Michelle	Head of Delegation
SCAR	Dr	Grant, Susie	CEP Representative
SCAR	Dr	Kennicutt, Mahlon C.	Delegate
SCAR	Dr	Kim, Yeadong	Head of Delegation
SCAR	Dr	Nath, Chandrika	Delegate
ASOC	Ms	Aiken, Kimberly	Advisor
ASOC	Ms	Andrews, Olive	Advisor
ASOC	Mr	Chen, Jiliang	Advisor
ASOC	Ms	Christian, Claire	Head of Delegation
ASOC	Ms	Grilly, Emily	Advisor
ASOC	Mr	Helten, Randy	Advisor
ASOC	Ms	Kavanagh, Andrea	Advisor
ASOC	Dr	Kim, Eunhee	Advisor
ASOC	Mr	Markowitz, David	Advisor
ASOC	Dr	Prior, Sian	Advisor
ASOC	Dr	Roura, Ricardo	CEP Representative
ASOC	Ms	Schuetzek, Meike	Advisor
ASOC	Mr	Sonntag, Ralf	Advisor
ASOC	Mr	Walker, Mike	Advisor
ASOC	Mr	Wang, Charlie Sen	Advisor
ASOC	Mr	Werner Kinkelin, Rodolfo	Advisor
ASOC	Ms	Zharkova, Elena	Advisor
ASOC	Ms	Zhou, Wei	Advisor
IAATO	Ms	Greer, Gina Marie	Delegate
IAATO	Mrs	Kelley, Lisa	Head of Delegation
IAATO	Mrs	Lynnes, Amanda	CEP Representative
IHO	Mr	Guillam, Yves	Advisor
IHO	Dr	Jonas, Mathias	Head of Delegation
IOPC Funds	Mr	Maura, José	Head of Delegation
IOPC Funds	Mr	Okugawa, Yuji	Advisor
IUCN	Mrs	Epps, Minna	Head of Delegation
IUCN	Dr	Francis, Elizabeth	Delegate
IUCN	Dr	Leung, Yu-Fai	Alternate
IUCN	Dr	Spadone, Aurélie	Delegate
WMO	Dr	Hovsepyan, Anahit	Delegate
WMO	Dr	Nitu, Rodica	Delegate
WMO	Dr	Sparrow, Mike	Head of Delegation

Host Country Secretariat			
Party	**Title**	**Name**	**Position**
HCS	Mr	Binachon, Martin	Staff
HCS	Ms	Gourbeau, Alexana	Staff
HCS	Ms	Krajka, Caroline	Head of Delegation
HCS	Ms	Lakhyali , Amelle	Staff
HCS	Mr	Mousnier-Lompre, Patrick	Staff

Antarctic Treaty Secretariat			
Party	**Title**	**Name**	**Position**
ATS	Mr	Agraz, José Luis	Staff
ATS	Ms	Balok, Anna	Staff
ATS	Ms	Choudhry, Iqra Asghar	Staff
ATS	Ms	Erceg, Diane	Staff
ATS	Mr	González Vaillant, Joaquín	Staff
ATS	Mrs	Hodgson-Johnston, Indiah	Staff
ATS	Mr	Lluberas, Albert	Head of Delegation
ATS	Dr	Nielsen, Hanne Fonss	Staff
ATS	Mr	Papaserge, Walter	Staff
ATS	Mr	Phillips, Andrew	Staff
ATS	Dr	Portella Sampaio, Daniela	Staff
ATS	Mr	Sabev, Atanas	Staff
ATS	Mg	Sánchez, Rodolfo Andrés	Staff
ATS	Ms	Van Der Watt, Lize-Marié	Staff
ATS	Mr	Wainschenker, Pablo	Staff
ATS	Mr	Wydler, Diego	Alternate
Translation & Interpretation	Mr	Arias, Iván	Staff
Translation & Interpretation	Mrs	Bocharova, Elena	Staff
Translation & Interpretation	Ms	Buergo, Matilde	Staff
Translation & Interpretation	Ms	Correa, Olivia	Staff
Translation & Interpretation	Mr	Fleming, Jack	Staff
Translation & Interpretation	Mr	Hoffman, Justin	Staff
Translation & Interpretation	Ms	Kryzhanovska, Ekaterina	Staff
Translation & Interpretation	Ms	Lantsuta-Davis, Ludmila	Staff
Translation & Interpretation	Mr	Lorente, Adriá	Staff
Translation & Interpretation	Ms	Malyshenko, Alexandra	Staff
Translation & Interpretation	Ms	Mateos, Maria Cristina	Staff
Translation & Interpretation	Ms	Moroz, Victoria	Staff
Translation & Interpretation	Mr	Mossop, David	Staff
Translation & Interpretation	Ms	Palà, Silvia	Staff
Translation & Interpretation	Ms	Poupin, Anna	Staff
Translation & Interpretation	Mr	Sandin, José Manuel	Staff
Translation & Interpretation	Mr	Seizilles De Mazancourt, Stephen	Staff

Antarctic Treaty Secretariat			
Party	**Title**	**Name**	**Position**
Translation & Interpretation	Mr	Skinner, Michael	Staff
Translation & Interpretation	Mr	Tazara, Spafford	Staff
Translation & Interpretation	Mrs	Vallvé, Caroline	Staff
Translation & Interpretation	Ms	Vinarskaja, Valeria	Staff
Translation & Interpretation	Mrs	Zelenina, Acielle	Staff