



The Antarctic Treaty

Measures adopted at
the Thirty-fifth Consultative Meeting
held at Hobart, 11 – 20 June 2012

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by the Secretary of State for Foreign and Commonwealth Affairs
by Command of Her Majesty
January 2014*

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MEASURES ADOPTED AT THE THIRTY-FIFTH ANTARCTIC TREATY CONSULTATIVE MEETING

Hobart, Australia, 11-20 June 2012

The Measures¹ adopted at the Thirty-fifth Antarctic Treaty Consultative Meeting are reproduced below from the Final Report of the Meeting.

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

The approval procedures set out in Article 6 (1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty² apply to Measures 1 to 10 (2012).

The approval procedures set out in Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty apply to Measure 11 (2012).

¹As defined in Decision 1 (1995), published in Miscellaneous No. 28 (1996) Cm 3483

² Treaty Series No. 15 (2006) Cm 6855

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

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

Measures Adopted at the XXXV Consultative Meeting held at Hobart, 11-20 June 2012

Measure 1 (2012) Antarctic Specially Protected Area No 109 (Moe Island, South Orkney Islands): Revised Management Plan. Pages 5 to 18.

Measure 2 (2012) Antarctic Specially Protected Area No 110 (Lynch Island, South Orkney Islands): Revised Management Plan. Pages 19 to 36.

Measure 3 (2012) Antarctic Specially Protected Area No 111 (Southern Powell Island and adjacent islands, South Orkney Islands): Revised Management Plan. Pages 37 to 50.

Measure 4 (2012) Antarctic Specially Protected Area No 112 (Coppermine Peninsula, Robert Island, South Shetland Islands): Revised Management Plan. Pages 51 to 65.

Measure 5 (2012) Antarctic Specially Protected Area No 115 (Lagotellerie Island, Marguerite Bay, Graham Land): Revised Management Plan. Pages 66 to 84.

Measure 6 (2012) Antarctic Specially Protected Area No 129 (Rothera Point, Adelaide Island): Revised Management Plan. Pages 85 to 96.

Measure 7 (2012) Antarctic Specially Protected Area No 133 (Harmony Point, Nelson Island, South Shetland Islands): Revised Management Plan. Pages 97 to 105.

Measure 8 (2012) Antarctic Specially Protected Area No 140 (Parts of Deception Island): Revised Management Plan. Pages 106 to 133.

Measure 9 (2012) Antarctic Specially Protected Area No 172 (Lower Taylor Glacier and Blood Falls, Taylor Valley, McMurdo Dry Valleys, Victoria Land): Management Plan. Pages 134 to 145.

Measure 10 (2012) Antarctic Specially Managed Area No 4 (Deception Island): Revised Management Plan. Pages 146 to 191.

Measure 11 (2012) Antarctic Historic Sites and Monuments: No 4 Pole of Inaccessibility Station building, No 7 Ivan Khmara's Stone, No 8 Anatoly Shcheglov's Monument, No 9 Buromsky Island Cemetery, No 10 Soviet Oasis Station Observatory, No 11 Vostok Station Tractor, No 37 O'Higgins Historic Site. Pages 192 to 195.

Antarctic Specially Protected Area No 109 (Moe Island, South Orkney Islands): Revised Management Plan

The Representatives,

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

Recalling

- Recommendation IV-13 (1966), which designated Moe Island, South Orkney Islands as Specially Protected Area (“SPA”) No 13 and annexed a map of the Area;
- Recommendation XVI-6 (1991), which annexed a revised description of SPA 13 and a Management Plan for the Area;
- Measure 1 (1995), which annexed a revised description and a revised Management Plan for SPA 13;
- Resolution 9 (1995), which recommended that the structure of the Management Plan for SPA 13 annexed to Measure 1 (1995) be regarded as a model for all new and revised Management Plans for protected areas for the purposes of Annex V;
- Decision 1 (2002), which renamed and renumbered SPA 13 as ASPA 109;
- Measure 1 (2007), which adopted a revised Management Plan for ASPA 109;

Recalling that Recommendation IV-13 (1966) was designated as no longer current by Decision 1 (2011);

Recalling that Recommendation XVI-6 (1991) and Measure 1 (1995) have not become effective;

Recalling that Resolution 9 (1995) was designated as no longer current by Resolution 1 (2008);

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 109;

Desiring to replace the existing Management Plan for ASPA 109 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 109 (Moe Island, South Orkney Islands), which is annexed to this Measure, be approved; and
2. the Management Plan for ASPA 109 annexed to Measure 1 (2007) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area No.109

MOE ISLAND, SOUTH ORKNEY ISLANDS

Introduction

The primary reason for the designation of Moe Island, South Orkney Islands (Latitude 60°44'S, Longitude 045°41'W), as Antarctic Specially Protected Area (ASP) No. 109 is to protect environmental values, and primarily the terrestrial flora and fauna within the Area.

The Area was originally designated in Recommendation IV-13 (1966, SPA No. 13) after a proposal by the United Kingdom on the grounds that the Area provided a representative sample of the maritime Antarctic ecosystem, that intensive experimental research on the neighbouring Signy Island might alter its ecosystem and that Moe Island should be specially protected as a control area for future comparison.

These grounds are still relevant. Whilst there is no evidence that research activities at Signy Island have significantly altered the ecosystems there, a major change has occurred in the low altitude terrestrial system as a result of the rapidly expanding Antarctic fur seal (*Arctocephalus gazella*) population. Plant communities on nearby Signy Island have been physically disrupted by trampling by fur seals and nitrogen enrichment from the seals' excreta has resulted in replacement of bryophytes and lichens by the macro-alga *Prasiola crispa*. Low-lying lakes have been significantly affected by enriched run-off from the surrounding land. So far Moe Island has only been invaded by fur seals to a limited extent and its topography makes it less likely that seals will penetrate to the more sensitive areas inland. Moe Island has been visited on few occasions and has never been the site of occupation for periods of more than a few hours.

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 111 is contained within Environment Domain G (Antarctic Peninsula off-shore islands geologic). The scarcity of Environment Domain G, relative to the other environmental domain areas, means that substantial efforts have been made to conserve the values found within this environment type elsewhere: other protected areas containing Domain G include ASPAs 111, 112, 114, 125, 126, 128, 145, 149, 150, and 152 and ASMAs 1 and 4.

The three other ASPAs present within the South Orkney Islands (ASPAs 110 Lynch Island, ASPA 111 Southern Powell Island and adjacent islands and ASPA 114 Northern Coronation Island) were designated primarily to protect terrestrial vegetation and bird communities. Moe Island complements the local network of ASPAs by protecting a representative sample of the maritime Antarctic ecosystem including cryptogam-dominated terrestrial and coastal communities.

1. Description of values to be protected

Following a visit to the ASPA in February 2011, the values specified in the earlier designation were reaffirmed. These values are set out as follows:

- The Area contains exceptional environmental values associated with the biological composition and diversity of a near-pristine example of the maritime Antarctic terrestrial and littoral marine ecosystems.
- Moe Island contains the greatest continuous expanses of *Chorisodontium-Polytrichum* moss turf found in the Antarctic.

2. Aims and objectives

Management of Moe Island aims to:

- avoid major changes to the structure and composition of the terrestrial vegetation, in particular the moss turf banks;
- prevent unnecessary human disturbance to the Area;
- prevent or minimise the introduction to the Area of non-native plants, animals and microorganisms;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in that Area;
- allow visits for management purposes in support of the aims of the management plan;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;

3. Management activities

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

- Visits shall be made as necessary to assess whether the ASPA continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- The Management Plan shall be reviewed at least every five years and updated as required.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- In accordance with the requirements of Annex III of the Protocol on Environmental Protection to the Antarctic Treaty, abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.

- A copy of this Management Plan shall be made available at Signy Research Station (UK; 60°42'30" S, 045°36'30" W) and Orcadas Station (Argentina; 60°44'15" S, 044°44'20" W).
- Where appropriate, National Antarctic Programmes are encouraged to liaise closely to ensure management activities are implemented. In particular, National Antarctic Programmes are encouraged to consult with one another to prevent excessive sampling of biological material within the Area. Also, National Antarctic Programmes are encouraged to consider joint implementation of guidelines intended to minimize the introduction and dispersal of non-native species within the Area.
- All scientific and management activities undertaken within the Area should be subject to an Environmental Impact Assessment, in accordance with the requirements of Annex I of the Protocol on Environmental Protection to the Antarctic Treaty.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1. The location of Moe Island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 45 °W.

Map 2. Moe Island in greater detail. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 45 °W.

6. Description of the Area

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

BOUNDARIES AND CO-ORDINATES

The boundary co-ordinates of the Area, starting with the most north-westerly position and moving clockwise, are shown in Table 1.

Number	Latitude	Longitude
1	60°43'40" S	045°42'15" W
2	60°43'40" S	045°40'30" W
3	60°43'55" S	045°40'10" W
4	60°44'40" S	045°40'10" W
5	60°44'40" S	045°42'15" W

The Area includes all of Moe Island and unnamed adjacent islands and islets. The Area encompasses all of the ice-free ground, permanent ice and semi-permanent ice found within the boundaries, but excludes the marine environment extending greater than 10 m offshore from the low tide water line (Map 2). Boundary markers have not been installed because the coast itself is a clearly defined and visually obvious boundary.

GENERAL DESCRIPTION OF THE AREA

Moe Island, South Orkney Islands, is a small irregularly-shaped island lying 300 m off the south-western extremity of Signy Island, from which it is separated by Fyr Channel. It is about 1.3 km from the northeast to southwest and 1 km from northwest to southeast. It should be noted that the position of Moe Island on Admiralty Chart No. 1775 (60°44'S, 45°45'W), does not agree closely with the more accurate coordinates in Map 2 (60°44'S, 45°41'W).

The island rises precipitously on the north-eastern and south-eastern sides to Snipe Peak (226 m altitude). There is a subsidiary summit above South Point (102 m altitude) and lower hills on each of three promontories on the western side above Corral Point (92 m), Conroy Point (39 m) and Spaul Point (56 m). Small areas of permanent ice remain on the east- and south-facing slopes with late snow lying on the steeply dipping western slopes. There are no permanent streams or pools.

GEOLOGY

The rocks are metamorphic quartz mica schists, with occasional biotite and quartz-rich beds. There is a thin bed of undifferentiated amphibolite on the northeastern coast. Much of the island is overlain with glacial drift and scree. Soils are predominantly immature deposits of fine to coarse clays and sands intermixed with gravels, stones and boulders. They are frequently sorted by freeze-thaw action in high or exposed locations into small-scale circles, polygons, stripes and lobes. There are deep accumulations of peat (up to 2 m thick on western slopes), considerable expanses of the surface of which are bare and eroded.

TERRESTRIAL BIOLOGICAL COMMUNITIES

The dominant plant communities are *Andreaea-Usnea* fellfield and banks of *Chorisodontium- Polytrichum* moss turf (the largest known example of this community type in the Antarctic). These moss banks constitute a major biological value and a reason for the designation of the Area. The cryptogamic flora is diverse. The majority of these moss banks have received little damage from fur seals, and show few visible signs of degradation. However, the exception to this observation is the northern-most banks located around Spaul Point. Here, although still extensive, the moss turf was estimated to have suffered about 50% damage from Antarctic fur seal (*Arctocephalus gazella*) activity during a survey in January 2006. One sub-adult male Antarctic fur seal was present on this area of moss turf during the survey in January 2006. Almost certainly fur seals gain access to this plant community via the gentle slope leading inland from the small shingle beach located at the north-eastern corner of Landing Cove.

The mites *Gamasellus racovitzai* and *Stereotydeus villosus* and the springtail *Cryptopygus antarcticus* are common under stones.

VERTEBRATE FAUNA

There were five colonies of chinstrap penguins (*Pygoscelis antarctica*) totalling about 11,000 pairs in 1978-79. A visit in February 1994 noted fewer than 100 pairs on the northern side of Landing Cove and more than a thousand on the southern side. A visit in February 2011 noted c.

75 pairs on the northern side of Landing Cove and c. 750 pairs on the southern side. Approximately 100 breeding pairs were observed on Spaul Point during a visit in January 2006. Numerous other birds breed on the island, notably about 2,000 pairs of cape petrels (*Daption capensis*) in 14 colonies (1966) and large numbers of Antarctic prions (*Pachyptila desolata*).

Weddell seals (*Leptonychotes weddellii*), crabeater seals (*Lobodon carcinophaga*) and leopard seals (*Hydrurga leptonyx*) are found in the bays on the west side of the island. Increasing numbers of fur seals (*Arctocephalus gazella*), mostly juvenile males, come ashore on the north side of Landing Cove and have caused some damage to vegetation in that area. However, it is possible that the nature of the terrain will restrict these animals to this small headland where damage may intensify.

6(ii) Access to the Area

- Where possible, access shall be by small boat. There are no restrictions on landing from the sea. Landings are usually most safely made at the northeast corner of Landing Cove (Lat. 60°43'55" S, Long. 045°41'06" W; Map 2). If Landing Cove is inaccessible due to the ice conditions, an alternative landing site is at the western-most point of Spaul Point (Lat. 60°43'54" S, Long. 045°41'15" W), directly opposite an offshore rock of 26 m altitude.
- Under exceptional circumstances, necessary for purposes consistent with the objectives of the Management Plan, helicopters may be permitted to land within the Area.
- Helicopters may land only on the col between hill 89 m and the western slope of Snipe Peak (Lat. 60°44'09" S, Long. 045°41'23" W, Map 2). Landing on vegetation in the col should be avoided to the maximum extent practicable. To avoid overflying bird colonies, approach should preferably be from the south, though an approach from the north is permissible.
- Within the Area the operation of aircraft should be carried out, as a minimum requirement, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). When conditions require aircraft to fly at lower elevations than recommended in the guidelines, aircraft should maintain the maximum elevation possible and minimise the time taken to transit the Area.
- Use of helicopter smoke grenades is prohibited within the Area unless absolutely necessary for safety. If used, all smoke grenades should be retrieved.

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

A marker board is located at the back of the small shingle beach in the northeast corner of Landing Cove, beyond the splash zone on top of a flat rock, to which it is bolted (Lat. 60°43'55" S, Long. 045°41'05" W). During periods of heavy snowfall, the marker board may be buried and difficult to locate.

There is a cairn and the remains of a survey mast, erected in 1965-66, on Spaul Point (Lat. 60°43'49" S, Long. 045°41'05" W). This mast is of interest for lichenometric studies and should not be removed. There are no other structures on Moe Island.

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

ASPA No. 110, Lynch Island, lies about 10 km north-north-east of Moe Island. ASPA No. 114, North Coronation Island, lies about 19 km away on the northern side of Coronation Island. ASPA No. 111, Southern Powell Island and adjacent islands, is about 41 km to the east (Map 1).

6(v) Special zones within the Area

None

7. Permit conditions

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority as designated under Article 7 of Annex V 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 a compelling scientific purpose which cannot be served elsewhere;
or
- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardise the natural ecological system in the Area;
- any management activities are in support of the objectives of this Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or an authorised copy, must be carried within the Area;
- permits shall be issued for a stated period;
- a report or reports are supplied to the authority or authorities named in the Permit;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

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

- Land vehicles are prohibited within the Area.
- Movement within the Area shall be on foot.
- Pilots, helicopter or boat crew, or other people on helicopters or boats, are prohibited from moving on foot beyond the immediate vicinity of their landing site unless specifically authorised by Permit.

- Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects, i.e. all movement should be undertaken carefully so as to minimise disturbance to the soil and vegetated surfaces, walking on rocky terrain if practical.

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

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

7(iv) Installation, modification or removal of structures

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of field camps

Camp in the Area is not normally permitted. If camping is essential for reasons of safety, tents should be erected having regard to causing the least damage to vegetation or disturbance to fauna.

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. Further guidance can be found in the CEP Non-native Species Manual (Edition 2011) and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species. In view of the presence of breeding bird colonies within the Area, no poultry products, including wastes from such products and products containing uncooked dried eggs, shall be released into the Area or into the adjacent sea.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable should be avoided. Fuel or other chemicals shall not be stored in the Area unless specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental 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 should be notified of anything released and not removed that was not included in the authorised Permit.

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

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

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

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

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

7(ix) Disposal of waste

As a minimum standard, all waste shall be disposed of in accordance with Annex III to the Protocol on Environmental Protection to the Antarctic Treaty. In addition, all wastes shall be removed from the Area. Liquid human wastes may be disposed of into the sea. Solid human waste should not be disposed of to the sea, but shall be removed from the Area. No solid or liquid human waste shall be disposed of inland.

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

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

- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Scientific activities shall be performed in accordance with *SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica*.

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 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. Wherever possible, Parties should deposit the original or copies of the 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.

8. Supporting documentation

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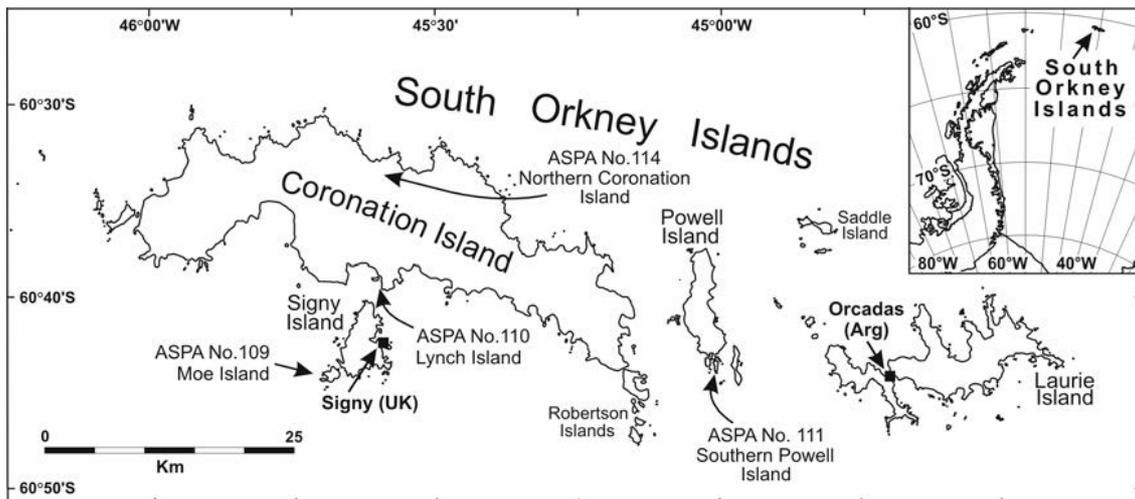
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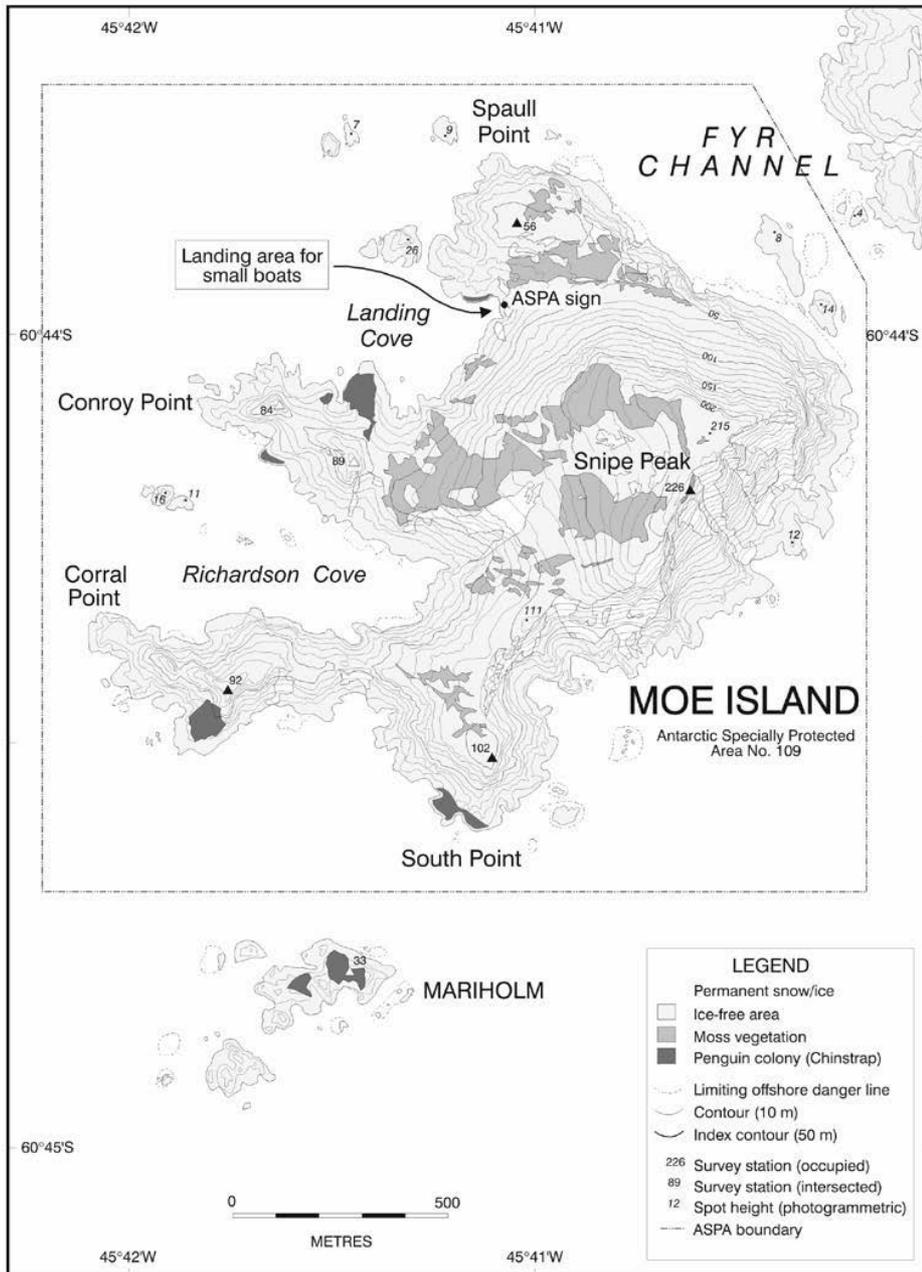
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Map 1. The location of Moe Island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica.



Map 2. Moe Island in greater detail.



**Antarctic Specially Protected Area No 110
(Lynch Island, South Orkney Islands):
Revised Management Plan**

The Representatives,

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

Recalling

- Recommendation IV-14 (1966), which designated Lynch Island, South Orkney Islands as Specially Protected Area (“SPA”) No 14 and annexed a map of the Area;
- Recommendation XVI-6 (1991), which annexed a Management Plan for the Area;
- Resolution 1 (1998), which allocates responsibility among Consultative Parties for the revision of Management Plans for protected areas;
- Measure 1 (2000), which annexed a revised Management Plan for SPA 14;
- Decision 1 (2002), which renamed and renumbered SPA 14 as ASPA 110;

Recalling that Recommendation XVI-6 (1991) and Measure 1 (2000) have not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 110;

Desiring to replace the existing Management Plan for ASPA 110 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 110 (Lynch Island, South Orkney Islands), which is annexed to this Measure, be approved; and
2. the Management Plan for SPA 14 annexed to Measure 1 (2000), which has not become effective, be withdrawn.

Management Plan for Antarctic Specially Protected Area No. 110

LYNCH ISLAND, SOUTH ORKNEY ISLANDS

Introduction

The primary reason for the designation of Lynch Island, South Orkney Islands (Latitude 60°39'10" S, Longitude 045°36'25" W; 0.1 km²), as Antarctic Specially Protected Area (ASP) 110 is to protect environmental values, and primarily the terrestrial flora within the Area.

Lynch Island, Marshal Bay, South Orkney Islands, was originally designated as a Specially Protected Area through Recommendation IV-14 (1966, SPA No. 14) after a proposal by the United Kingdom. It was designated on the grounds that the island "supports one of the most extensive and dense areas of grass (*Deschampsia antarctica*) known in the Treaty Area and that it provides an outstanding example of a rare natural ecological system". These values were amplified and extended by Recommendation XVI-6 (1991) when a management plan for the site was adopted.

Lynch Island is 2.4 km from Signy Island, the location of Signy Research Station (UK), and about 200 m from Coronation Island, the largest of the South Orkney Islands. The Area has been afforded special protection for most of the modern era of scientific activity in the region, with entry permits having been issued only for compelling scientific reasons. Thus, the island has not been subjected to frequent visits, scientific research or sampling. Since 1983, the numbers of Antarctic fur seals in the South Orkney Islands has increased significantly, with consequent destruction of accessible areas of vegetation where the seals come ashore. Some vegetated areas on Lynch Island have been damaged, for example, accessible *Polytrichum* and *Chorisodontium* moss banks and *Deschampsia* on the north-eastern and eastern sides of the island have been extensively damaged in some locations. A visit in February 2011 reported fur seals were present over the eastern side of the island [roughly drawing a line between the boat landing site (Lat. 60°39'05" S, Long. 045°36'12" W; Map 2) and the island's summit (Lat. 60°39'05" S, Long. 045°36'12" W)]. Seals were present to the highest point of the island with about 30 seals on the summit. Despite this, both the Antarctic hair grass; *Deschampsia Antarctica* and *Colobanthus quitensis* appeared to be thriving. The area covered by *Deschampsia*, as reported in February 2011, is more extensive than in the previous report (February 1999). The grass has now increased its abundance and distribution range in an area to the east of the island, extending west to the highest point on the island with good cover to the summit and all over the area around the summit cairn (Map 3). During a visit in February 1999 it was observed that the most luxuriant areas of grass on the northern and north-western slopes had not yet been affected and this observation was confirmed during a visit in February 2011. Notwithstanding some localised destruction, to date the primary values of the island, as noted above, have not been significantly compromised by either human or seal access to the island.

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).

ASPAs 110 is not categorised within Morgan et al.; however, ASPA 111 is likely to be contained within Environment Domain G (Antarctic Peninsula off-shore islands geologic). The scarcity of Environment Domain G, relative to the other environmental domain areas, means that substantial efforts have been made to conserve the values found within this environment type elsewhere: other protected areas containing Domain G include ASPAs 109, 111, 112, 114, 125, 126, 128, 145, 149, 150, and 152 and ASMAs 1 and 4.

The three other ASPAs present within the South Orkney Islands (ASPAs 109 Moe Island, ASPA 111 Southern Powell Island and adjacent islands and ASPA 114 Northern Coronation Island) were designated primarily to protect terrestrial vegetation and bird communities. Lynch Island complements the local network of ASPAs by protecting a representative sample of the maritime Antarctic ecosystem including phanerogam-dominated terrestrial communities.

1. Description of values to be protected

Following a visit to the ASPA in February 2011, the values specified in the earlier designation were reviewed. Values within the Area are set out as follows:

- The Area contains luxuriant swards of Antarctic hair grass *Deschampsia antarctica* and the only other Antarctic flowering plant, Antarctic pearlwort (*Colobanthus quitensis*), is also abundant. It is also one of few sites where the grass *Deschampsia* is known to grow directly on *Polytrichum-Chorisodontium* moss banks.
- The cryptogamic vegetation is typical of the region; however, several species of moss found on the island (*Polytrichastrum alpinum* (= *Polytrichum alpinum*) and *Muelleriella crassifolia*) are unusually fertile for their southerly location. It is also possibly the only known location in Antarctica where *Polytrichastrum alpinum* develops sporophytes in profusion annually. Furthermore, *Polytrichum strictum* (= *Polytrichum alpestre*) occasionally produces male inflorescences in local abundance, which is a rare occurrence in this species in Antarctica and the rare moss *Plagiothecium ovalifolium* occurs in moist shaded rock crevices near the shore.
- The shallow loam-like soil associated with the grass swards contains a rich invertebrate fauna. The population density of the arthropod community associated with *Deschampsia* on Lynch Island appears unusually high, with some measurements suggesting it is one of the highest in the world. The site also shows unusual diversity for an Antarctic site. A rare enchytraeid worm was also found in moist moss in rock crevices on the northern side of the island. One arthropod species (*Globoppia loxolineata*) is near the northernmost limit of its known distribution, and specimens collected from Lynch Island exhibited unusual morphological characteristics compared to specimens collected elsewhere in the South Orkney-Antarctic Peninsula region.
- *Chromobacterium* bacteria, yeasts and fungi are found in higher densities than on Signy Island, thought to be a result of the lower acidity of the soils associated with *Deschampsia* and the more favourable microclimate at Lynch Island.
- The shallow gravelly loam-like soil beneath the dense swards of *Deschampsia* may represent one of the most advanced soil types in the Antarctic.

2. Aims and objectives

Management at Lynch Island aims to:

- avoid major changes to the structure and composition of the terrestrial vegetation;
- prevent unnecessary human disturbance to the Area;
- prevent or minimise the introduction to the Area of non-native plants, animals and microorganisms;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in that Area;
- ensure that the flora and fauna are not adversely affected by excessive sampling within the Area;
- allow visits for management purposes in support of the aims of the management plan;
- minimise the possibility of introduction of pathogens which may cause disease in vertebrate populations within the Area;

3. Management activities

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

- Visits shall be made as necessary to assess whether the ASPA continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- The Management Plan shall be reviewed at least every five years and updated as required.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- In accordance with the requirements of Annex III of the Protocol on Environmental Protection to the Antarctic Treaty, abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.
- A copy of this Management Plan shall be made available at Signy Research Station (UK; 60°42'30" S, 045°36'30" W) and Orcadas Station (Argentina; 60°44'15" S, 044°44'20" W).
- Where appropriate, National Antarctic Programmes are encouraged to liaise closely to ensure management activities are implemented. In particular, National Antarctic Programmes are encouraged to consult with one another to prevent excessive sampling of biological material within the Area. Also, National Antarctic Programmes are encouraged to consider joint implementation of

guidelines intended to minimize the introduction and dispersal of non-native species within the Area.

- All scientific and management activities undertaken within the Area should be subject to an Environmental Impact Assessment, in accordance with the requirements of Annex I of the Protocol on Environmental Protection to the Antarctic Treaty.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1. The location of Lynch Island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 45 °W.

Map 2. ASPA No. 110, Lynch Island, South Orkney Islands, topographic map. Projection: Lambert Conformal Conic. Standard parallels: 1st 60°40'00'' W; 2nd 63°20'00'' S. Central Meridian: 045°26'20'' W. Latitude of Origin: 63°20'00'' S. Spheroid: WGS84. Datum: Mean Sea Level. Horizontal accuracy of control points: ±1 m

Map 3. ASPA No. 110, Lynch Island, South Orkney Islands, vegetation map. Map specifications as for Map 2.

6. Description of the Area

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

BOUNDARIES AND CO-ORDINATES

The Area encompasses all of Lynch Island but excludes all unnamed adjacent islands and islets. The Area encompasses all of the ice-free ground, permanent ice and semi-permanent ice found within Lynch Island, but excludes the marine environment extending greater than 10 m offshore from the low tide water line (Map 2). Boundary markers have not been installed because the coast itself is a clearly defined and visually obvious boundary.

GENERAL DESCRIPTION

Lynch Island (Latitude 60°39'10" S, Longitude 045°36'25" W; area) is a small island situated at the eastern end of Marshall Bay in the South Orkney Islands, about 200 m south of Coronation Island and 2.4 km north of Signy Island (Map 1). The 500 m x 300 m island has low cliffs of up to 20 m in height on the south, east and west sides, dissected by boulder-filled gullies. The northern side has a low cliff below a rock terrace at about 5-8 m altitude, above which moderate slopes rise to a broad plateau at about 40-50 m, with a maximum altitude of 57 m. A beach at the eastern end of the northern coast affords easy access to relatively gentle slopes leading to the central plateau area. The coastal cliffs generally make access to the upper island by other routes difficult, although access is feasible via one or two of the gullies on the eastern and northern

sides. Small temporary melt-streams occur on the slopes in summer, but there are no permanent streams or pools, and only a few small late-lying snow patches occur on the southern side of the island. No meteorological data are available for Lynch Island, but conditions are broadly expected to be similar to those experienced at Signy Research Station. However, anecdotal observations suggest that significant microclimatic differences exist on Lynch Island, as the more profuse growth of plant communities would seem to attest. The island is exposed to the south-west and to katabatic and föhn winds descending from Coronation Island to the north. However, in other respects the island is relatively sheltered from regional northerly, easterly and southerly winds by Coronation Island, Cape Hansen and Signy Island respectively. The föhn effect can briefly raise local air temperatures by as much as 10°C at Signy Island. Lynch Island has often been observed to receive sunshine when the surrounding region is shrouded in low cloud. The angle of solar incidence is also relatively high on the northern side of the island because of its general slope and aspect. The above factors may be important reasons for the abundance of the two flowering plants found on the island.

GEOLOGY

The bedrock of Lynch Island consists of quartzo-feldspathic and micaceous schists of the Scotia metamorphic complex, but is poorly exposed and equivalent rocks are much better displayed in the Cape Hansen area, to the east on Coronation Island.

PEDOLOGY

Three main soil types have been identified on Lynch Island:

(i) An acidic (pH 3.8 – 4.5) moss peat, formed by the tall turf-forming mosses *Chorisodontium aciphyllum* and *Polytrichum strictum* (= *Polytrichum alpestre*), occurs mainly at the north-eastern end of the island. This peat reaches a depth of about 50 cm and is similar to peat on Signy Island where it reaches a depth of 2 m. Where the peat depth exceeds about 30 cm there is permafrost. In a few places where the substratum is moist, shallow peat of 10-15 cm depth (pH 4.8 - 5.5) has accumulated beneath the carpet-forming mosses *Warnstorfia laculosa* (= *Calliergidium austro-stramineum*) and *Sanionia uncinata* (= *Drepanocladus uncinatus*).

(ii) A shallow, gravelly loam-like soil resembling tundra brown soil occurs beneath dense swards of the grass *Deschampsia antarctica*. It is seldom more than about 30 cm in depth (pH 5.0 – 5.8) and probably represents one of the most advanced soil types in the Antarctic.

(iii) A glacial till with material ranging from fine clay (pH 5.2 – 6.0) and sand to gravel and larger stones. This covers the summit plateau and occurs in rock depressions throughout the island, as well as on parts of the rock terrace. On the plateau cryoturbation has in several places sorted the material into patterned features with small stone circles and polygons on level ground and stone stripes on sloping ground. At the north-eastern end of the island, the deposition of limpet shells (*Nacella concinna*) by gulls (*Larus dominicanus*) has resulted in a more calcareous mineral soil in rock depressions with a pH of 6.5 - 6.8.

TERRESTRIAL FLORA

Cryptogamic and phanerogamic vegetation typical of the maritime Antarctic is found over much of the island (Map 3). The most significant aspect of the vegetation is the abundance and reproductive success of the two native Antarctic flowering plants, the Antarctic hair grass (*Deschampsia antarctica*) and Antarctic pearlwort (*Colobanthus quitensis*), found especially on the northern slopes (Map 3). Both species flower in profusion and seed viability appears to be much greater than on Signy Island. Lynch Island possesses the largest stands of *Deschampsia* and the greatest abundance of *Colobanthus* known in the South Orkney Islands and one of the most extensive anywhere in the Antarctica Treaty area.

On the rock terrace and moist slope rising above the northern coast, the grass forms extensive swards of up to 15 × 50 m. These swards range from continuous stands of relatively luxuriant plants on the moister sites and ledges to small, yellowish, more isolated plants on the drier, stonier and more exposed terrain. *Colobanthus* is generally associated with the grass, but here the plants do not coalesce to form closed patches. This is one of very few sites where *Deschampsia* is known to grow directly on *Polytrichum-Chorisodontium* moss banks. Elsewhere on the island, the grass and, to a lesser extent, the pearlwort are frequent associates in other communities, especially stands of denser fellfield vegetation where there is quite high cover afforded by various mosses and lichens (particularly towards the western end of the northern terrace).

Shallow but occasionally extensive (about 50 m²) banks of *Chorisodontium aciphyllum* and *Polytrichum strictum* are frequent at the north-eastern end of the island and, to a lesser extent, on the southern side. These are typical of the moss banks which occur on Signy Island and elsewhere in the northern maritime Antarctic, with several fruticose and crustose lichens growing epiphytically on the moss surface. In small moist depressions, there are carpets of *Warnstorfia laculosa* and *Sanionia uncinata*, with some *Warnstorfia sarmentosum* (= *Calliargon sarmentosum*) and *Cephaloziella varians* (= *C. exiliflora*). On wet soil and rock ledges, *Brachythecium austrosalebrosum* is common. On the drier, more windswept, stonier soils and rock surfaces – notably in the plateau area – a typical open fellfield community of many bryophyte and lichen taxa form a complex mosaic. The dominant species in this locality are the lichens *Usnea antarctica* and *U. aurantiaco-atra* (= *U. fasciata*) and the moss *Andreaea depressinervis*; *Sphaerophorus globosus* and other species of *Alectoria*, *Andreaea*, *Cladonia*, and *Stereocaulon* are also common, while *Himantormia lugubris* and *Umbilicaria antarctica* are infrequent. Crustose lichens are abundant on all rock surfaces. The mosses and macrolichens in this area are loosely attached on thin soils and are easily damaged. Large thalli of *Usnea* spp. and *Umbilicaria antarctica* are found on moist sheltered boulders and rock faces, especially on the southern side of the island.

Communities of crustose lichen occur in the cliffs above the high water mark, especially where the rock is influenced by breeding or roosting birds. The distribution of several species forms distinctive zones in relation to inundation by sea spray and exposure to wind. The best developed communities of brightly coloured ornithocoprophilous taxa occur at the western end of the island where *Caloplaca* spp., *Haematomma erythromma*, *Mastodia tessellata*, *Physcia caesia*, *Xanthoria candelaria*, *X. elegans*, and species of *Buellia* and *Verrucaria* are frequent. The uncommon halophilous moss *Muelleriella crassifolia* also occurs within the spray zone around the island.

The only rare moss recorded on Lynch Island is *Plagiothecium ovalifolium*, found in moist, shaded rock crevices near the shore. However, the island is possibly the only site known in the Maritime Antarctic where the moss *Polytrichastrum alpinum* develops sporophytes in profusion each year; this occurs among *Deschampsia*, *Colobanthus* and cryptogams on the northern side of the island; elsewhere in the Antarctic sporophytes are in some years very rare. Also, *Polytrichum strictum* produces male inflorescences in local abundance, a rare phenomenon in this species in the Antarctic. While the thalloid liverwort *Marchantia berteroana* is locally common on Signy Island, Lynch Island is one of very few other localities where it is known in the South Orkney Islands. Several cryptogamic species of very restricted distribution in the Antarctic, but which are locally common on Signy Island and the mainland of Coronation Island only a few hundred metres away, have not been observed at Lynch Island.

TERRESTRIAL INVERTEBRATES

The microinvertebrate fauna associated with the rich *Deschampsia* swards described thus far comprises 13 taxa: three springtails (*Cryptopygus antarcticus*, *Friesea woyciechowskii* and *Isotoma (Folsomotoma) octooculata* (= *Parisotoma octooculata*), one mesostigmatid mite (*Gamasellus racovitzai*), two cryptostigmatid mites (*Alaskozetes antarcticus* and *Globoppia loxolineata*), and seven prostigmatid mites (*Apotriophyteus* sp., *Ereynetes macquariensis*, *Nanorchestes berryi*, *Stereotydeus villosus*, and three species of *Eupodes*). The number of taxa identified is likely to increase with greater sampling. The community is dominated by the Collembolla, especially *Cryptopygus antarcticus* (84% of all arthropods extracted), with relatively large numbers of *I. octooculata*; the principal mite was an undetermined species of *Eupodes*. *Globoppia loxolineata* is near the northernmost limit of its known distribution. In general, the population density of the arthropod community of grass stands on Lynch Island appears unusually high, with some measurements suggesting it is one of the highest in the world. It also shows considerable diversity for an Antarctic site, although this observation was based on a small number of sample replicates and further sampling would be required to establish densities with greater reliability: this is difficult to achieve on Lynch Island given the very limited extent of communities available for sampling.

Lynch Island was the first site in the Antarctic where a terrestrial enchytraeid was found (in soil beneath a moss *Hennediella antarctica* on a rock ledge above the northern shore); only in a few other sites in the South Orkney Islands have these worms been found – although few samples have been gathered and the species has yet to be identified. Of the tardigrade fauna, most of the 16 individuals isolated from a sample of *Brachythecium* were *Hypsibius alpinus* and *H. pinguis* with some *H. dujardini*, while of 27 isolated from a *Prasiola crispa* sample, almost all were the latter species with a few that were other species of *Hypsibius*.

MICROORGANISMS

The mineral and organic soils of Lynch Island have a slightly higher pH than corresponding soils on nearby Signy Island. This higher base and nutrient status, together with the more favourable microclimate, is reflected in larger numbers of bacteria (including *Chromobacterium*), yeasts and fungi than occur in comparable soils on Signy Island. Bacterial numbers in the *Polytrichum* peat on Lynch Island are about eight times, and in the *Warnstorfia* peat about six times, greater than in corresponding Signy Island peats; yeasts and fungi are similarly much more abundant. Soil associated with the two flowering plants yielded several nematophagous fungi: in

Deschampsia soil *Acrostalagmus goniodes*, *Cephalosporium balanoides* and *Dactylaria gracilis*; in *Colobanthus* soil, *Cephalosporium balanoides*, *Dactylaria gracilis*, *Dactylella stenobrocha* and *Harposporium anguillulae* were found. The basidiomycete fungi *Galerina antarctica* and *G. longinqua* occur on moist moss.

VERTEBRATES

The island has no penguin colonies or substantial breeding colonies of other birds. Groups of chinstrap (*Pygoscelis antarctica*), Adélie (*P. adeliae*) and gentoo (*P. papua*) penguins and, sometimes, blue-eyed cormorants (*Phalacrocorax atriceps*) often congregate at the north-eastern and the western ends of the island. Several pairs of brown skuas (*Catharacta lonnbergii*) and at least two pairs of kelp gulls (*Larus dominicanus*) were observed in the early 1980s to nest at the north-eastern corner. A small colony of Antarctic terns (*Sterna vittata*) may also occur in this vicinity, although in February 1994 breeding was not observed. Cape petrels (*Daption capense*) and snow petrels (*Pagodroma nivea*) breed on the higher cliffs at the eastern end and along the north-western coast of the island. A few pairs of snow petrels and Wilson's storm petrels (*Oceanites oceanicus*) nest on ledges and beneath boulders on the south side of the island.

Weddell seals (*Leptonychotes weddellii*), crabeater seals (*Lobodon carcinophagus*), occasional leopard seals (*Hydrurga leptonyx*), and small groups of southern elephant seals (*Mirounga leonina*) are regularly seen on the coast and on ice floes in the vicinity; none have been known to breed on Lynch Island. Since the early 1980s increasing numbers of Antarctic fur seals (*Arctocephalus gazella*), virtually all being immature non-breeding males, have been observed on Lynch Island, some gaining access up the more gentle north-eastern slopes to vegetated areas, where they have caused local, but severe, damage to *Polytrichum-Chorisodontium* moss banks and other communities.

Seal access to the island is principally from a beach on the northeast coast. Once seals have gained access, there are no further substantial geographical impediments to their more extensive travel over the island. Groups of seals have been observed near the summit. Destruction of swards of *Deschampsia* was first reported in 1988. At the time of the most recent inspection of the island (February 2011), it was observed that the most luxuriant areas of *Deschampsia* and *Colobanthus* on the northern and north-western slopes had not yet been affected. Accessible areas of vegetation in the eastern and north-eastern sides of the island, particularly *Polytrichum* and *Chorisodontium* moss banks, have been severely damaged by Antarctic fur seals. In some eastern and north-eastern areas that have been heavily impacted by fur seals, *Deschampsia* and *Colobanthus* have either been damaged or have died, but at less impacted locations at higher altitudes, these plants continue to grow and may be increasing their abundance and extending their distribution range on the island (see Map 3).

6(ii) Access to the Area

- Where possible, access shall be by small boat. Landings from the sea should be at the beach on the eastern end of the northern coast of the island (Lat. 60°39'05" S, Long. 045°36'12" W; Map 2), unless specifically authorised by Permit to land elsewhere, or when landing at this location is impractical because of adverse conditions.

- Under exceptional circumstances, necessary for purposes consistent with the objectives of the Management Plan, helicopters may be permitted to land within the Area.
- Landing of helicopters within the Area shall be at the designated location on the rock platform (8 m) on the north-western end of the island (Lat. 60°39'04.5" S, Long. 045°36'12" W; Map 2).
- Within the Area the operation of aircraft should be carried out, as a minimum requirement, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). When conditions require aircraft to fly at lower elevations than recommended in the guidelines, aircraft should maintain the maximum elevation possible and minimise the time taken to transit.
- Use of helicopter smoke grenades is prohibited within the Area unless absolutely necessary for safety. If used, all smoke grenades should be retrieved.

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

There are no structures present in the Area apart from several cairns marking sites used for topographical survey. The island's summit cairn is located at Lat. 60°39'05" S, Long. 045°36'12" W. A sign notifying the protected status of Lynch Island was erected on a prominent rock outcrop above the recommended landing beach in February 1994, but this was destroyed by strong winds. Signy Research Station (UK) is 6.4 km south at Factory Cove, Borge Bay, on Signy Island.

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

The nearest protected areas to Lynch Island are North Coronation Island (ASPA No.114) which lies about 5 km to the north, Moe Island (ASPA No. 109) which is about 10 km SSW, and Southern Powell Island and adjacent islands (ASPA No. 111) which is about 35 km to the east (Map 1).

6(v) Special zones within the Area

None

7. Permit conditions

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority as designated under Article 7 of Annex V 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 a compelling scientific purpose which cannot be served elsewhere;
- or

- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardise the natural ecological system in the Area;
- any management activities are in support of the objectives of this Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or an authorised copy, must be carried within the Area;
- Permits shall be issued for a stated period;
- a report or reports are supplied to the authority or authorities named in the Permit;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

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

- Land vehicles are prohibited within the Area.
- Movement within the Area shall be on foot.
- Pilots, helicopter or boat crew, or other people on helicopters or boats, are prohibited from moving on foot beyond the immediate vicinity of their landing site unless specifically authorised by Permit.
- Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects, i.e. all movement should be undertaken carefully so as to minimise disturbance to the soil and vegetated surfaces, walking on rocky terrain if practical.

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

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

7(iv) Installation, modification or removal of structures

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil (see Section 7(vi)), and

be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of field camps

Camping should be avoided within the Area. However, when absolutely necessary for purposes specified in the Permit, camping is allowed at the designated site at the north-western end of the island (Lat. 60°39'04" S, Long. 045°36'37" W; Map 2).

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. Further guidance can be found in the CEP Non-native Species Manual (Edition 2011) and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable should be avoided. Fuel or other chemicals shall not be stored in the Area unless specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental 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 should be notified of anything released and not removed that was not included in the authorised Permit.

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

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

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

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

Permits shall not be granted 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.

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

7(ix) Disposal of waste

As a minimum standard, all waste shall be disposed of in accordance with Annex III to the Protocol on Environmental Protection to the Antarctic Treaty. In addition, all wastes shall be removed from the Area. Liquid human wastes may be disposed of into the sea. Solid human waste should not be disposed of to the sea, but shall be removed from the Area. No solid or liquid human waste shall be disposed of inland.

7(ix) 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 scientific research, monitoring and site inspection activities, which may involve the collection of a small number of samples for analysis, to erect or maintain signboards, or to carry out protective measures.
- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Scientific activities shall be performed in accordance with SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica.

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 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. Wherever possible, Parties should deposit the original or copies of the 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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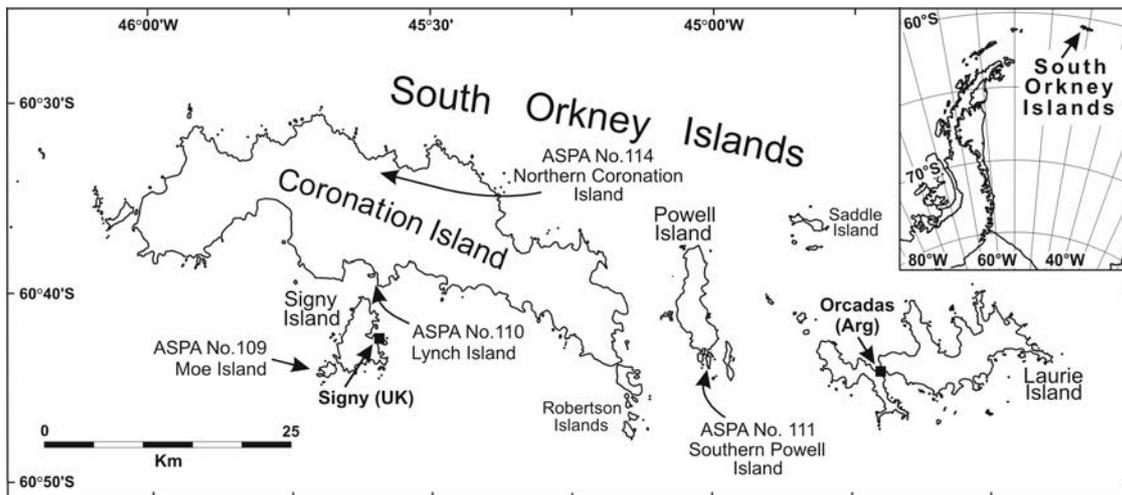
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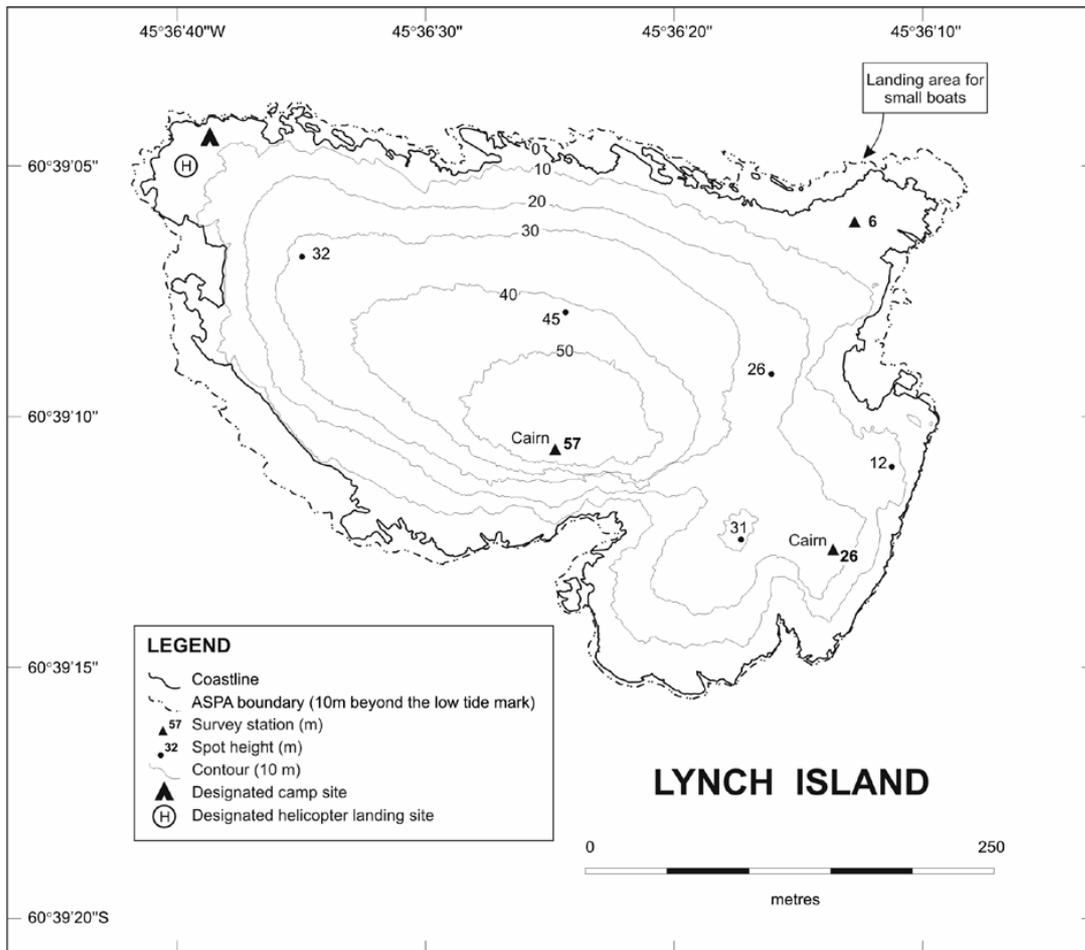
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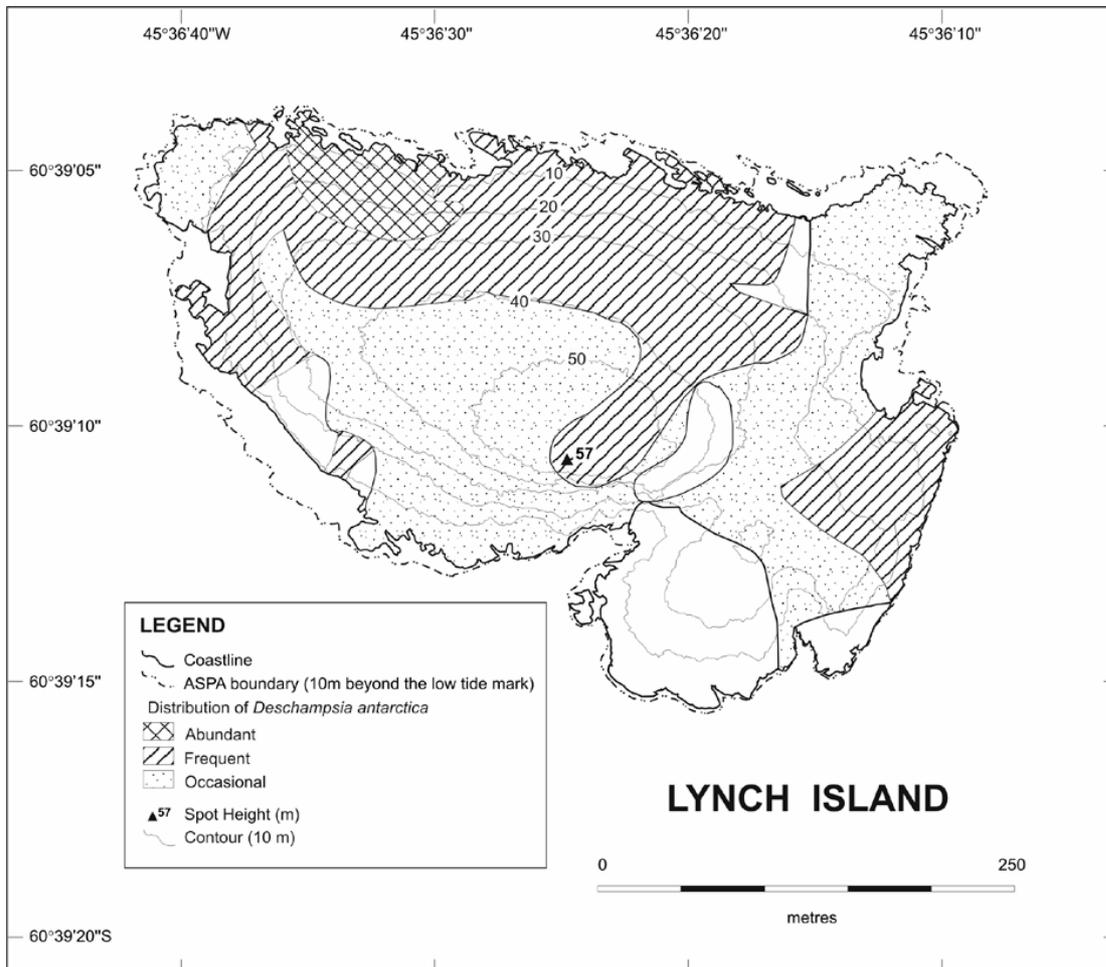
Map 1. The location of Lynch Island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica.



Map 2. ASPA No. 110, Lynch Island, South Orkney Islands, topographic map.



Map 3. ASPA No. 110, Lynch Island, South Orkney Islands, vegetation map.



Antarctic Specially Protected Area No 111 (Southern Powell Island and adjacent islands, South Orkney Islands): Revised Management Plan

The Representatives,

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

Recalling

- Recommendation IV-15 (1966), which designated Southern Powell Island and adjacent islands, South Orkney Islands as Specially Protected Area (“SPA”) No 15 and annexed a map of the Area;
- Recommendation XVI-6 (1991), which annexed a Management Plan for SPA 15;
- Measure 1 (1995), which annexed a modified description and a revised Management Plan for SPA 15;
- Decision 1 (2002), which renamed and renumbered SPA 15 as ASPA 111;

Recalling that Recommendation XVI-6 (1991) and Measure 1 (1995) have not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 111;

Desiring to replace the existing Management Plan for ASPA 111 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 111 (Southern Powell Island and adjacent islands, South Orkney Islands), which is annexed to this Measure, be approved; and
2. the Management Plans for SPA 15 annexed to Recommendation XVI-6 (1991) and Measure 1 (1995), which have not become effective, be withdrawn.

Management Plan for Antarctic Specially Protected Area No. 111

SOUTHERN POWELL ISLAND AND ADJACENT ISLANDS, SOUTH ORKNEY ISLANDS

Introduction

The primary reason for the designation of Southern Powell Island and Adjacent Islands, South Orkney Islands (Lat. 62°57'S, Long. 60°38'W) as an Antarctic Specially Protected Area (ASPA) is to protect environmental values, predominantly the breeding bird and seal populations, and to a lesser extent, the terrestrial vegetation within the Area.

The Area was originally designated in Recommendation IV-15 (1966, SPA No. 15) after a proposal by the United Kingdom on the grounds that southern Powell Island and the adjacent islands support substantial vegetation and a considerable bird and mammal fauna. The Area was representative of the natural ecology of the South Orkney Islands, and was rendered more important by the nucleus of an expanding colony of Antarctic fur seals (*Arctocephalus gazella*). These grounds are still relevant, though the expansion of the fur seal colony is progressing only slowly.

The Area is also recognised as having scientific value. It is now well established that climate change is affecting the Southern Ocean, and that the region around the Antarctic Peninsula, Scotia Sea and South Orkney Islands is showing some of the most evident impacts of climate change. Air temperatures and ocean temperatures have increased, some ice shelves have collapsed and seasonal sea ice is now much reduced. This has important consequences for biological communities with some of the most obvious consequences of environment change have been reported for pygoscelid penguins. In particular, Adélie penguins, a species of the pack ice, are now thought to be declining at most localities along the Peninsula and at the South Orkney Islands. Chinstrap penguins, a species of the more open ocean, are now also thought to be in decline. Consequently, understanding penguin foraging behaviour in an attempt to relate it to their preferred foraging habitat is particularly important. Understanding how pygoscelid penguins utilise the ocean around them is critical if we are to adequately protect their breeding colonies, including in highly biodiverse protected areas such as southern Powell Island.

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 111 is contained within Environment Domain G (Antarctic Peninsula off-shore islands geologic). The scarcity of Environment Domain G, relative to the other environmental domain areas, means that substantial efforts have been made to conserve the values found within this environment type elsewhere: other protected areas containing Domain G include ASPAs 109, 112, 114, 125, 126, 128, 140, 145, 149, 150, and 152 and ASMA 1 and 4. Environment Domain A is also present (Antarctic Peninsula northern geologic). Other protected areas containing Environment Domain A include ASPAs 128, 151 and ASMA 1.

The three other ASPAs present within the South Orkney Islands (ASPA 109 Moe Island, ASPA 110 Lynch Island and ASPA 114 Northern Coronation Island) were designated primarily to protect terrestrial vegetation. Therefore, Southern Powell Island and Adjacent Islands

complements the local network of ASPAs by protecting primarily breeding bird and seal populations, but also terrestrial vegetation.

1. Description of values to be protected

Following a visit to the ASPA in February 2012, the values specified in the original designation were reaffirmed and expanded. These values are set out as follows:

- The breeding avifauna within the Area is diverse, including up to four species of penguin [chinstrap (*Pygoscelis antarctica*), gentoo (*P. papua*), Adélie (*P. adeliae*) and macaroni penguins (*Eudyptes chrysolophus*)], Wilson's storm petrels (*Oceanites oceanicus*), cape petrels (*Daption capense*), Dominican gulls (*Larus dominicanus*), southern giant petrels (*Macronectes giganteus*), black-bellied storm petrels (*Fregetta tropica*), blue-eyed cormorants (*Phalacrocorax atriceps*), brown skuas (*Catharacta loennbergi*), sheathbills (*Chionis alba*), snow petrels (*Pagodroma nivea*) and possibly Antarctic prions (*Pachyptila desolata*).
- The longest known breeding site of fur seals in the Antarctic, since their near extermination in the nineteenth century, is found within the Area.
- A diverse flora, typical of the region, including moss banks with underlying peat, moss carpet in wet areas, snow algae and the nitrophilous macroalga *Prasiola crispa* associated with the penguin colonies, is found within the Area.
- The Area has scientific value as a location for the collection of telemetry data in order to explore penguin foraging behaviour. This information will contribute to the development of habitat models that will describe the relationship between penguin foraging behaviour and seasonal sea ice extent.

2. Aims and objectives

Management of southern Powell Island and adjacent 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 in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in that Area;
- prevent or minimise the introduction to the Area of non-native plants, animals and microorganisms;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- preserve the natural ecosystem of the Area as a reference area for future comparative studies and for monitoring floristic and ecological change, colonisation processes and community development;

- allow visits for management purposes in support of the aims of the management plan;
- allow for the gathering of data on the population status of the resident penguins and seals on a regular basis and in a sustainable manner

3. Management activities

- Visits shall be made as necessary to assess whether the ASPA continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- The Management Plan shall be reviewed at least every five years and updated as required.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- In accordance with the requirements of Annex III of the Protocol on Environmental Protection to the Antarctic Treaty, abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.
- A copy of this Management Plan shall be made available at Signy Research Station (UK; 60°42'30" S, 045°36'30" W) and Orcadas Station (Argentina; 60°44'15" S, 044°44'20" W).
- Where appropriate, National Antarctic Programmes are encouraged to liaise closely to ensure management activities are implemented. In particular, National Antarctic Programmes are encouraged to consult with one another to prevent excessive sampling of biological material within the Area. Also, National Antarctic Programmes are encouraged to consider joint implementation of guidelines intended to minimize the introduction and dispersal of non-native species within the Area.
- All scientific and management activities undertaken within the Area should be subject to an Environmental Impact Assessment, in accordance with the requirements of Annex I of the Protocol on Environmental Protection to the Antarctic Treaty.

4. Period of designation

ASPA 111 is designated for an indefinite period.

5. Maps

Map 1. The location of southern Powell Island and adjacent island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 45 °W.

Map 2 shows the Area in greater detail.

6. Description of the Area

6(i) Geographical coordinates and natural features

BOUNDARIES AND CO-ORDINATES

The corner co-ordinates of the Area are shown in Table 1.

Corner	Latitude	Longitude
northwest	60°42'35'' S	45°04'00'' W
northeast	60°42'35'' S	44°58'00'' W
southwest	60°45'30'' S	45°04'00'' W
southeast	60°45'30'' S	44°58'00'' W

The Area includes all of Powell Island south of the southern summit of John Peaks (415 m altitude), together with the whole of Fredriksen Island, Michelsen Island (a tidal peninsula at the southern tip of Powell Island), Christoffersen Island, Grey Island and unnamed adjacent islands. The Area encompasses all of the ice-free ground, permanent ice and semi-permanent ice found within the boundaries, but excludes the marine environment extending greater than 10 m offshore from the low tide water line. All but the Crutchley Ice Piedmont of southern Powell Island are ice-free in summer, though there are patches of semi-permanent or late-lying snow in places.

GEOLOGY

The rocks of southern Powell Island, Michelsen Island and Christoffersen Island are conglomerates of Cretaceous-Jurassic age. The two promontories to the west of John Peaks are Carboniferous greywacke-shales. There are boulders containing plant fossils in the glacial deposits around Falkland Harbour. Much of central and southern Fredriksen Island is composed of sandstone and dark phyllitic shales. The north-east and probably most of the north of this island is highly sheared conglomerate with laminated mudstone. The Area has a thick mantle of glacial till, strongly influenced by seabird guano.

BIOLOGICAL COMMUNITIES

Michelsen Island is almost devoid of land vegetation, although on the rocks there are extensive communities of lichens dominated by nitrophilous crustose species. These are also widespread on Fredriksen Island and elsewhere on bird-influenced cliffs and rocks near the shore. The most diverse vegetation on Powell Island occurs on the two promontories and associated scree west of Falkland Harbour. Here, and on Christoffersen Island and the northern part of Fredriksen Island, moss banks with underlying peat occur. Wet areas support stands of moss carpet. There are extensive areas of the nitrophilous macroalga *Prasiola crispa* associated with the penguin colonies in the area. Snow algae are prominent on the ice piedmont and snow patches in late summer.

No information is available on the arthropod fauna, but this is probably very similar to that at Signy Island. The springtails *Cryptopygus antarcticus* and *Parisotoma octoculata* and the mites *Alaskozetes antarcticus*, *Stereotydeus villosus* and *Gamasellus racovitzai* occur in great numbers beneath stones.

There are few observations on marine invertebrates and biota in the Area, but this is likely to be very similar to the well-researched Signy Island area. The relatively enclosed Falkland-Ellefsen Harbour area and the bay on the east side of the peninsula are highly influenced by glacial runoff from the ice piedmont.

Large numbers of penguins and petrels breed throughout the Area. There are many thousand pairs of chinstrap penguins (*Pygoscelis antarctica*), mostly on Fredriksen Island. Similarly large numbers of Adélie penguins (*P. adeliae*) occur principally on the southern Powell-Michelsen Island area. Here there are also several thousand pairs of gentoo penguins (*P. papua*) and a very few scattered pairs of macaroni penguins (*Eudyptes chrysolophus*) breeding among the gentoos.

Other breeding birds include southern giant petrels (*Macronectes giganteus*), cape petrels (*Daption capensis*), snow petrels (*Pagodroma nivea*), Wilson's storm petrels (*Oceanites oceanicus*), blue-eyed shags (*Phalacrocorax atriceps*), Dominican gulls (*Larus dominicanus*), brown skuas (*Catharacia lonnbergi*), sheathbills (*Chionis alba*), and possibly Antarctic prions (*Pachyptila desolata*) and blackbellied storm petrels (*Fregetta tropica*).

Michelsen Island is the longest known breeding site in the Antarctic of fur seals since their near extermination in the nineteenth century. The number of pups born annually has increased slowly but fairly steadily from 11 in 1956 to about 60 in 1989. Thirty-four live pups were recorded in January 1994. Many non-breeding males visit the Area during the summer. Other seals are frequent on the beaches, mainly elephant seals (*Mirounga leonina*) and Weddell seals (*Leptonychotes weddelli*). Leopard seals (*Hydrurga leptonyx*) and crabeater seals (*Lobodon carcinophagus*) are occasionally seen on ice floes.

6(ii) Access to the Area

- Access shall be by small boat.
- There are no special restrictions on boat landings from the sea, or that apply to the sea routes used to move to and from the Area. Due to the large extent of accessible coast around the Area, landing is possible at many locations. Nevertheless, if possible, landing of cargo and scientific equipment should be close to the recommended field camp at 60°43'20''S, 045°01'32''W.
- Under exceptional circumstances necessary for purposes consistent with the objectives of the Management Plan helicopters may be permitted to land at the designated landing site located beside the recommended field camp at 60°43'20''S, 045°01'32''W. Helicopters shall not land elsewhere within the Area.
- To prevent disturbance of breeding avifauna, helicopter landings are prohibited within the Area between the period 1 November to 15 February.
- Within the Area the operation of aircraft should be carried out, as a minimum requirement, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). When conditions require aircraft to fly at lower elevations than recommended in the guidelines, aircraft should maintain the maximum elevation possible and minimise the time taken to transit.

- Overflying helicopters should avoid sites where there are concentrations of birds (e.g. southern Powell-Michelsen Island area or Fredriksen Island).
- Use of helicopter smoke grenades is prohibited within the Area unless absolutely necessary for safety. If used all smoke grenades should be retrieved.

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

Marker boards denoting the Area's protected status are positioned in the following locations:

- Southern Powell Island: on top of a small rock outcrop at the back of the shingle beach on the east side of the southern promontory of the island (60°43'20''S, 045°01'40''W).
- Michelsen Island: on a low-lying rock about 50 m from the shoreline at the back of a high shingle beach at the southern tip of the island (60°44'06''S, 045°01'25''W).
- Christoffersen Island: on a small promontory on the north-eastern shore of the island at the entrance to Falkland Harbour. The board is located at the back of the beach just below a small Adélie penguin rookery (60°43'36''S, 045°02'08''W).
- Fredriksen Island: at the northern end of the pebble boulder beach on the western side of the island, below a small chinstrap penguin rookery. The board is at the back of the beach on top of a small rock outcrop (60°44'06''S, 044°59'25''W).

There are no other structures within the Area, but various mooring chains and rings associated with the use of Ellefsen and Falkland Harbours by floating whale factories in the 1920s are to be found on the shore.

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

ASPANo. 109, Moe Island, and ASPANo. 110, Lynch Island, are located approximately 35 km west of the Area. ASPANo. 114, North Coronation Island, is located around 35 km west-north-west of the Area on the northern side of Coronation Island (see Map 1).

6(v) Restricted zones within the Area

None.

7. Permit Conditions

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority as designated under Article 7 of Annex V of the Protocol on Environmental Protection to the Antarctic Treaty.

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Conditions for issuing a Permit to enter the Area are that:

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

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

- Land vehicles are prohibited in the Area.
- No pedestrian routes are designated within the Area, but persons on foot should avoid walking on vegetated areas or disturbing wildlife wherever possible.
- To reduce disturbance of bird species, anchoring within Falkland Harbour and Ellefsen Harbour is strongly discouraged, except in an emergency.
- Pilots, air and boat crew, or other people on aircraft or boats, are prohibited from moving on foot beyond the immediate vicinity of their landing site unless specifically authorised by Permit.

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

Activities include:

- compelling scientific research which cannot be undertaken elsewhere;
- essential management activities, including monitoring.

7(iv) Installation, modification or removal of structures

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a

permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil (see Section 7(vi)), and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of field camps

In order to minimise the area of ground within the ASPA impacted by camping activities, tents should be erected at the designated field campsite, located at 60°43'20''S, 045°01'32''W. When necessary for purposes specified in the Permit, temporary camping beyond the designated field campsite is allowed within the Area. Camps should be located on non-vegetated sites, such as on the drier parts of the raised beaches, or on thick (>0.5 m) snow-cover when practicable, and should avoid concentrations of breeding birds or mammals.

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. Further guidance can be found in the CEP Non-native Species Manual (Edition 2011) and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species. In view of the presence of breeding bird colonies within the Area, no poultry products, including wastes from such products and products containing uncooked dried eggs, shall be released into the Area or into the adjacent sea.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable should be avoided. Fuel or other chemicals shall not be stored in the Area unless specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental 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 should be notified of anything released and not removed that was not included in the authorised Permit.

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

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

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

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

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

7(ix) Disposal of waste

As a minimum standard, all waste shall be disposed of in accordance with Annex III to the Protocol on Environmental Protection to the Antarctic Treaty. In addition, all wastes shall be removed from the Area. Liquid human wastes may be disposed of into the sea. Solid human waste should not be disposed of to the sea, but shall be removed from the Area. No solid or liquid human waste shall be disposed of inland.

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

- Permits may be granted to enter the Area to carry out scientific research, monitoring and site inspection activities, which may involve the collection of a small number of samples for analysis, to erect or maintain signboards, or to carry out protective measures.
- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Scientific activities shall be performed in accordance with SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica.

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 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. Wherever possible, Parties should deposit the original or copies of the 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.

8. Supporting documentation

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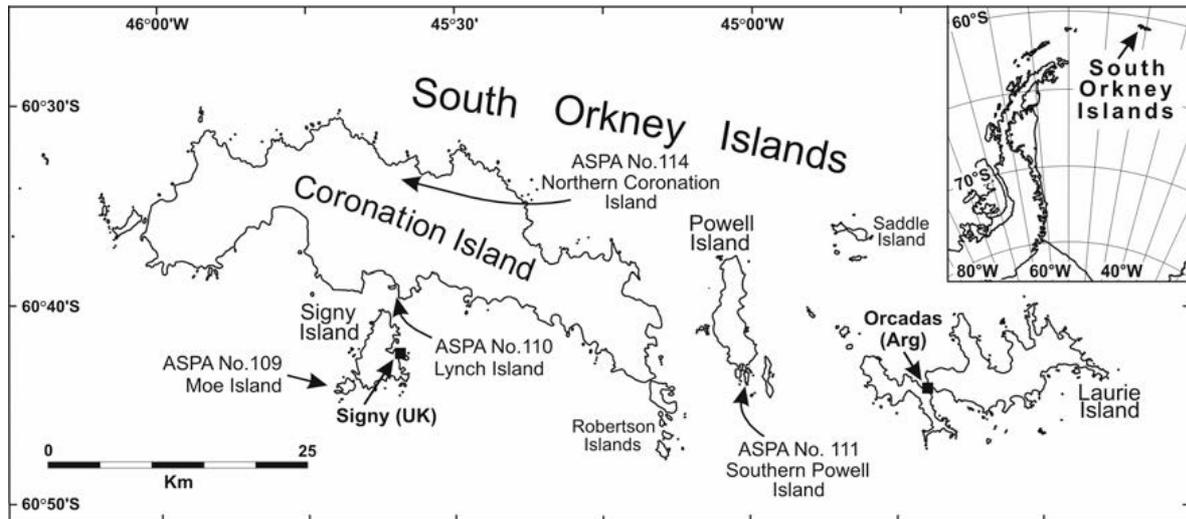
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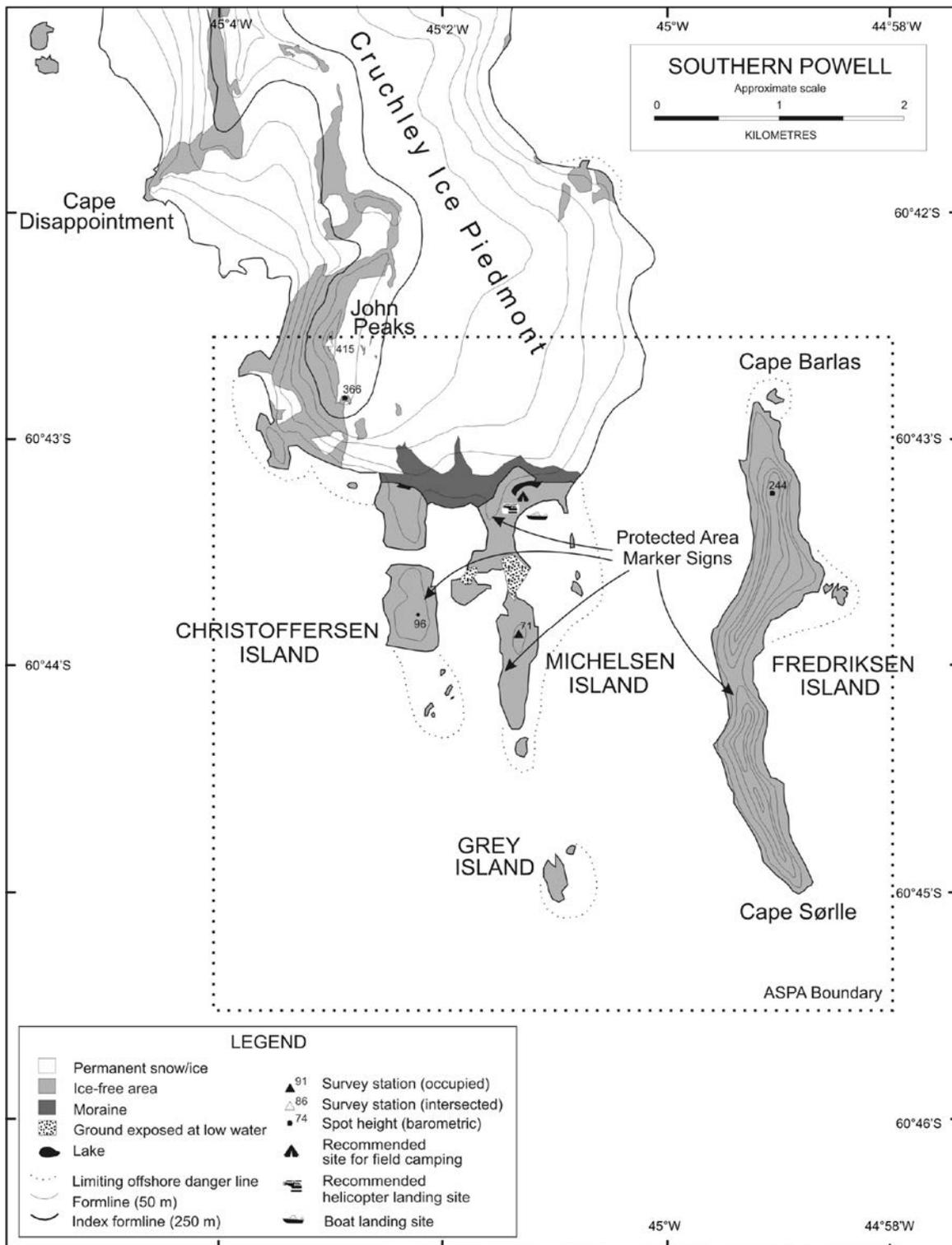
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Map 1. The location of Southern Powell Island and adjacent island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica.



Map 2. Southern Powell Island and adjacent islands Antarctic Specially Protected Area No. 111.



**Antarctic Specially Protected Area No 112
(Coppermine Peninsula, Robert Island, South Shetland Islands):
Revised Management Plan**

The Representatives,

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

Recalling

- Recommendation VI-10 (1970), which designated Coppermine Peninsula, Robert Island, South Shetland Islands as Specially Protected Area (“SPA”) No 16 and annexed a map of the Area;
- Resolution XVI-6 (1991), which adopted a Management Plan for SPA 16;
- Resolution 1 (1998), which allocates responsibility among Consultative Parties for the revision of Management Plans for protected areas;
- Decision 1 (2002), which renamed and renumbered SPA 16 as ASPA 112;

Recalling that Resolution XVI-6 (1991) has not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 112;

Desiring to replace the existing Management Plan for ASPA 112 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 112 (Coppermine Peninsula, Robert Point, South Shetland Islands), which is annexed to this Measure, be approved; and
2. the Management Plan for SPA 16 annexed to Resolution XVI-6 (1991), which has not become effective, be withdrawn.

Management Plan for Antarctic Specially Protected Area No. 112

COPPERMINE PENINSULA, ROBERT ISLAND, SOUTH SHETLAND ISLANDS

Introduction

Coppermine Peninsula (62°24'S; 59°30'W) is located in the north western coast of Robert Island, South Shetland Islands, in front of the English Strait. The Area was designated as Specially Protected Area SPA No. 16 through Recommendation VI-10 (1970). The first Management Plan was approved by Recommendation XVI-6 (1991). In accordance with Decision 1 (2002), the Area came to be called Antarctic Specially Protected Area No. 112.

The Area is mainly protected due to its significant terrestrial ecosystem, with the presence of large Antarctic flora and fauna colonies, which are of special interest for scientific research.

1. Description of values to be protected

Coppermine Peninsula is a biologically rich area with a diverse biota typical of the South Shetland Islands. It supports a wide range of plant communities with associated invertebrate fauna; the vertebrate fauna is also particularly well represented.

Much of the higher ground is permanently ice-covered. There are numerous small streams and pools in summer.

The principal value of the Area is the vegetation, which is characterised by a vast moss carpet, together with hepatic, lichen and algae species. One of the Antarctic vascular plant species is also present in the Area. The Area is also renowned for the presence of bird colonies nesting here, mainly the giant petrel, *Macronectes giganteus*.

Scientific studies have been developed in the Area in order to know the composition of its biological communities, and identify the impacts that may affect them.

2. Aims and objectives

Management at Coppermine Peninsula aims to:

- Protect the terrestrial ecosystem and the community of birds that breed in the Area;
- Avoid degradation or substantial risk to the values of the Area by preventing unnecessary human disturbance;
- Avoid major changes in the structure and composition of the flora and fauna communities;

- Allow scientific research in the terrestrial environment, while ensuring protection from over-sampling;
- Allow for the development of other scientific research in the Area, provided they do no compromise the values for which the Area has been protected; and
- Allow visits for management purposes in support of the aims of this Management Plan.

3. Management Activities

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

- The staff authorised to access the Area shall be specifically instructed on the conditions of this Management Plan.
- Approach distances to fauna must be respected, except when the scientific projects may require otherwise and this is specified in the relevant permits.
- Collection of samples will be limited to the minimum required for the development of authorised scientific research plans.
- Wherever possible, cloths, shoes and equipment shall be sanitised before visiting the Area, in order to avoid the introduction of microorganisms.
- Signs may be placed (markers, boards or other information structures) in places that do not disturb the values protected or the development of research, either for scientific, management or dissemination purposes, which shall be maintained in good condition.
- The signs or structures to be installed in the Area for scientific or management purposes shall be maintained in good condition.
- The equipment and materials to be installed in the Area shall be removed when no longer required.
- The entry of any type of vehicles to the Area is strictly prohibited.
- 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 measures are adequate.

4. Period of designation.

The Area is designated for an indefinite period.

5. Maps

Map 1: Part of South Shetland Islands, showing the location of Nelson, Robert and Greenwich Islands, as well as the Antarctic Specially Protected Areas located there, including ASPA No.112, Coppermine Peninsula.

Map 2: Coppermine Peninsula, Robert Island. ASPA No. 112 is marked in grey. Based on the Chart of the Hydrographical Institute of the Chilean Army (Instituto Hidrográfico de la Armada de Chile), English Strait and Lautaro Channel, scale 1:40,000.

6. Description of the Area

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

GENERAL DESCRIPTION

Coppermine Peninsula (62°24'S; 59°30'W) is located at the northwestern end of Robert Island. It covers an elongated strip (2 km long by 500 m wide), from the isthmus connecting Robert Island to Cape Fort Williams. It has an irregular relief, with average heights of 30 to 40 masl, and many protrusions reaching over 80 masl, such as the basaltic columns of Neptune's Cathedral and the snout near the facilities at Luis Risopatrón Base (Chile).

The peninsula features Late Cretaceous volcanic rocks, mainly formed by basaltic lavas and olivine, of a prominent cindery red colour at interfaces. The articulated columns at Fort Williams and Neptune's Cathedral are intrusions from the Pliocene or recent periods.

Soil formation through plant decomposition and humus deposit is slow and scarce, but the accumulation of organic matter can reach 85 cm locally. Low-ground soils resemble moss carpets, usually 3 to 10 cm deep.

The topography and weather conditions of the Area favour various types of habitats for plant communities, which are strongly influenced by the marine aerosols.

BOUNDARIES

The Coppermine Peninsula extends from Cape Morris to Triplet Hill, separating Carlota and Coppermine Coves. This peninsula is the westernmost area of Robert Island and ends in the western tip in Fort Williams, a cape with striking features, such as Morris Rock, located in the coastal area. This peninsula represents one of the earlier stages of the Late Cenozoic volcanism of the region.

The peninsula is connected to Robert Island through a terrace-shaped isthmus featuring marine gravel, about 10 m above sea level, and 250 m wide. The isthmus is interrupted to the east by a small horseshoe-shaped hill. At the south-eastern end of Coppermine Cape, the Triplet Hill emerges, with a height of 140 m.

FLORA

The main value of the Area is its vegetation, which is characterised by a vast moss carpet covering around 1.5 ha, representing one of the most important bryophyte communities in Antarctica. The moistest areas of the peninsula are dominated by *Calliergidium austrostramineum* and *Calliergon sarmentosum*, which is merged in the interior of *Drepanocladus uncinatus*, where drainage is higher. In the dryer marginal areas, *Polytrichum alpinum*, *Bryum algens*, *Psoroma cinnamomeum*, *Sphaerophorus globosus*, *Ceratodon* sp., and *Usnea* sp., together with other lichens, are associated with *Drepanocladus*. In moist slopes near the summit, moss peats have developed with moist peats of about 85 cm wide. Areas with moist ash soils in valley soils and troughs represent vast communities of foliose lichens. Coastal rocks are frequently covered in lichens, mainly *Caloplaca* sp., *Haematomma erythromma*, *Physcia caesia*, *Ramalia tenebrata* and *Usnea* sp., which are occasionally associated with moss.

The *Prasiola crispa* alga is present in areas influenced by bird colonies, and the bluish green alga *Nostoc commune* can also be found in some areas. The *Clammydomonas nivalis* and *Scottiella Antarctica* algae can be found in the areas covered by snow, and give a characteristic reddish colour to the ice.

Deschampsia antarctica is frequently located in the sheltered slopes of the peninsula.

Table 1 shows plant species identified in the Area:

Table 1. Plant species present in Coppermine Peninsula, Robert Island.

Vascular plants		
<i>Deschampsia antarctica</i>		
Mosses		
<i>Andreaea depressinervis</i>	<i>Caratodon</i> cf. <i>grossiretis</i>	<i>Polytrichum piliferum</i>
<i>Andreaea gainii</i>	<i>Caratodon</i> cf. <i>purpureus</i>	<i>Pottia austro-georgica</i>
<i>Andreaea regularis</i>	<i>Chorisodontium aciphyllum</i>	<i>Schistidium</i> (= <i>Grimmia</i>) <i>antarcticum</i>

<i>Bartramia patens</i>	<i>Dicranoweisia grimmiceae</i>	<i>Tortula cf. conferta</i>
<i>Brachythecium austro-salebrosum</i>	<i>Drepanocladus uncinatus</i>	<i>Tortula excelsa</i>
<i>Bryum algens</i>	<i>Pohlia cruda</i> var. <i>imbricata</i>	<i>Tortula fusco-viridis</i>
<i>Calliergidium austro-stramineum</i>	<i>Pohlia nutans</i>	<i>Tortula grossiretis</i>
<i>Calliergon sarmentosum</i>	<i>Polytrichum alpinum</i>	
Hepatic		
Algae		
<i>Barbilophozia hatcheri</i>	<i>Nostoc commune</i>	
<i>Cephaloziella varians</i>	<i>Prasiola crispa</i>	
Lichens		
<i>Buellia</i> sp.	<i>Haematomma erythromma</i>	<i>Ramalia terebrata</i>
<i>Caloplaca regalis</i>	<i>Lecania brialmontii</i>	<i>Rinodina</i> sp.
<i>Caloplaca</i> sp.	<i>Lecanora</i> sp.	<i>Sphaerophorus globosus</i>
<i>Candelariella vitellina</i>	<i>Leptogium puberulum</i>	<i>Stereocaulon glabrum</i>
<i>Cladonia balfourii</i>	<i>Mastodia tessellata</i>	<i>Umbilicaria antarctica</i>
<i>Cladonia</i> cf. <i>carneola</i>	<i>Ochrolechia frigida</i>	<i>Usnea aurantiaco-atra</i> (forma postrada)
<i>Cladonia furcata</i>	<i>Physcia caesia</i>	<i>Usnea fasciata</i>
<i>Cladonia</i> sp.	<i>Psoroma hypnorum</i>	<i>Xanthoria candelaria</i>
<i>Cornicularia epiphorella</i>	<i>Psoroma</i> cf. <i>cinnamomea</i>	<i>Xanthoria elegans</i>

FAUNA

Vegetation present in the Area favours habitats for terrestrial invertebrate communities. Coppermine Peninsula habitats include Collembola, mites, nematodes, rotifers, tardigrades and a variety of protozoa. The main specimen in this group is the Collembola *Cryptopygus antarcticus*, usually associated with moss carpets.

The Coppermine Peninsula hosts various seabird colonies, either breeding or resting. Breeding colonies include giant petrels *Macronectes giganteus*, Wilson's storm petrels, *Oceanites oceanicus*, Antarctic terns, *Sterna vittata*, kelp gulls, *Larus dominicanus*, and brown skuas, *Stercorarius (Catharacta) lonnbergi*.

The Area is also visited by seals and fur seals, which rest on the beaches.

Table 2. Fauna present in Coppermine Peninsula, Robert Island.

Vertebrates
Flying birds

Scientific name	Common name
<i>Macronectes giganteus</i>	Giant petrel
<i>Daption capense</i>	Cape petrel
<i>Oceanites oceanicus</i>	Wilson's storm-petrel
<i>Phalacrocorax bransfieldensis</i>	Antarctic shag
<i>Larus dominicanus</i>	Dominican gull
<i>Sterna vittata</i>	Antarctic tern
<i>Stercorarius (Catharacta) antarcticus</i>	Antarctic skua
<i>Chionis albus</i>	Seathbill
Swimming birds	
Scientific name	Common name
<i>Pygoscelis antarctica</i>	Antarctic or chinstrap penguins
<i>Pygoscelis papua</i>	Gentoo penguins
<i>Pygoscelis adeliae</i>	Adélie penguin
Pinnipeds	
Scientific name	Common name
<i>Mirounga leonina</i>	Southern elephant seal
<i>Leptonychotes weddelli</i>	Weddell seals
<i>Hydrurga leptonyx</i>	Leopard seals
<i>Arctocephalus gazella</i>	Antarctic fur seal

6(ii) Access to the Area

The Area can only be accessed by sea, landing on the Carlota Cove or Coppermine Cove beaches, only in front of the facilities at Luis Risopatrón scientific station (Chile).

Access by air is only permitted by helicopter and in cases of emergency, landing to the east of the isthmus, on Robert Island, outside the Area.

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

The Luis Risopatrón scientific station (Chile) is located about 100 m west of the Area, in Coppermine Peninsula. The scientific station stands 40 m above sea level, on solid rock surface, located 150 m from the coastal line. It has 5 modules used for accommodation,

laboratories and storage areas. The station operates in the austral summer and can currently host 5 people.

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

The following Protected Areas are located in the vicinity of the Coppermine Peninsula:

- ASPA No. 133, Point Harmony, Nelson Island, 30 km northwest.
- ASPA No. 144, Chile Bay (Discover Bay), Greenwich Island, about 12 km to the south.

6(v) Special zones within the Area

None.

7. Permit conditions

7(i) General conditions

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

- The permit is issued for essential scientific or management purposes, consistent with the objectives of the plan, such as inspections, maintenance or review tasks, which cannot be served elsewhere;
- The actions permitted will not jeopardise the ecological and scientific values of the Area;
- Any management activity are in support of the objectives of the Management Plan;
- Actions permitted are in accordance with this Management Plan;
- Scientific staff present in the Area carries the Permit or an authorised copy thereof during the specified period; and
- At the end of the period, a report is submitted before the relevant national authority mentioned in the Permit, making reference to any undertaken activity not expressly mentioned in the Permit.

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

The Area can only be accessed by sea, landing on the Carlota Cove or Coppermine Cove beaches, in front of the Luis Risopatrón scientific station (Chile). Movement within the Area shall be on foot.

Vehicle access

Access to the Area by any type of vehicles is prohibited.

Overflights

Due to the presence of seabirds breeding on the island, the landing of aircrafts within the Area is prohibited. Access by air is permitted by helicopter and in case of emergency, landing outside Area, to the east of the isthmus. In addition, any overflight operations shall comply with the guidelines established in Resolution 2 (2004), Guidelines for the Operation of Aircraft near Concentrations of Birds.

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

- Scientific research that will not jeopardise the ecosystem or scientific values of the Area, or affect in any way the value of the Area as a reference site.
- Essential management activities, including monitoring.

7(iv) Installation, modification or removal of structures

- No structures are to be erected within the Area except as specified in a Permit. Permanent structures or installations are prohibited.
- All structures, scientific equipment or markers installed in the Area must be authorised by a permit for a definite period 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 to the Area.
- The installation (including site selection), maintenance, modification or removal of structures must be performed in a way that produces minimal disturbance to the flora and fauna present.
- The authority issuing the original permit shall be in charge of removing the specific equipment which permit is overdue, this being a condition for the permit to be granted.

7(v) Location of field camps

Camping in the Area is prohibited. The Luis Risopatrón scientific station offers accommodation to researchers, subject to prior arrangement with the Chilean Antarctic Program.

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Tents will be allowed for the sole purpose of storing scientific instruments or equipment, or to be used as an observation post, and shall be removed upon conclusion of the activity.

If camping in the Coppermine Peninsula is absolutely necessary, the tents shall be located near Risopatrón Station. No other locations shall be used for this purpose, in order to restrict the human impact.

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

- No alien living animals, plants or microbes may be deliberately introduced into the Area, and precautions shall be taken to avoid their accidental introduction. Whenever possible, all clothes, shoes and equipment must be thoroughly inspected and cleaned before entering the Area.
- To ensure that the fauna, flora and ecological values of the Area are preserved, special precautions shall be taken by visitors against accidentally introducing microorganisms or invertebrates from other Antarctic sites or from regions outside Antarctica. All sampling equipment and markers brought into the Area shall be cleaned or sterilised before use in the Area, to the extent possible.
- In order to protect the avifauna of the island, no poultry meat or derived products may be introduced into the Area for consumption by researchers.
- 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.
- All materials introduced into the Area shall remain there only for the period stated in the Permit, shall be removed at or before the conclusion of the stated period, and shall be handled so that the risk of introduction into the environment is minimised.
- If release occurs which may affect the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.

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

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

Where taking of or harmful interference with animals is involved, the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica should be used as a minimum standard.

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 reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, sediment, flora or fauna that their distribution or abundance within the Area would be significantly affected.
- 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 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 shall be removed from the Area. However, organic human waste can be released into the sea in accordance with article 5, Annex III of the Protocol on Environmental Protection to the Antarctic Treaty.

Waste generated as a consequence of the activities performed in the Area must be temporarily stored near the scientific station, so as to avoid accidental releases. Such waste shall be adequately labelled as litter. Upon conclusion of the activity, it shall be removed from the Area and from the Antarctic Treaty Area.

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

Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, which may involve the collection of limited samples for analysis or review, or to adopt protective measures.

Whenever possible, all sites where long-term monitoring activities are carried out, which are vulnerable to involuntary disturbance, shall be duly marked on the site and Area maps.

7(xi) Requirements for reports

Parties should ensure that the principal holder for each permit issued submits to the appropriate authority a report of the activities undertaken, no later than six months after the visit. Such reports should include, as appropriate, the information identified in the Visit Report form contained in Appendix 2 of Resolution 2 (2011).

Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should offer sufficient detail to allow for the 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 be used both for review of the management plan and in organizing the scientific use of the Area.

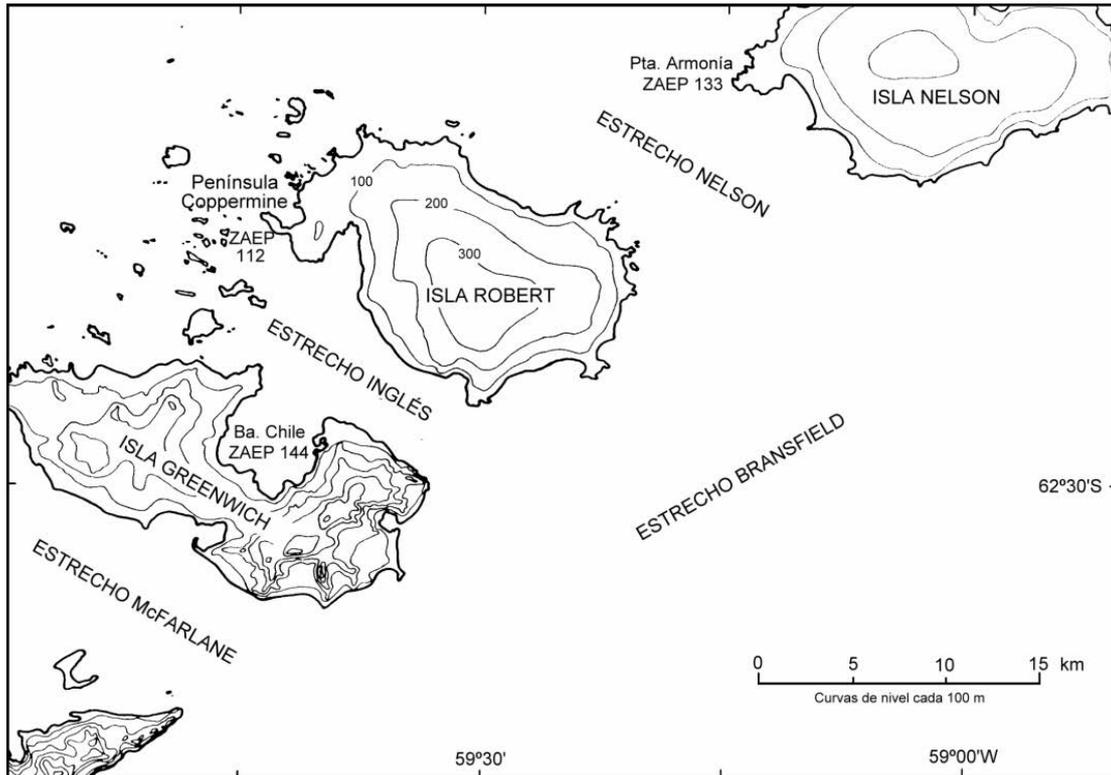
The relevant authority shall be informed of any activity undertaken, any measure taken or material released and not removed which are not covered by a permit.

8. Supporting documentation

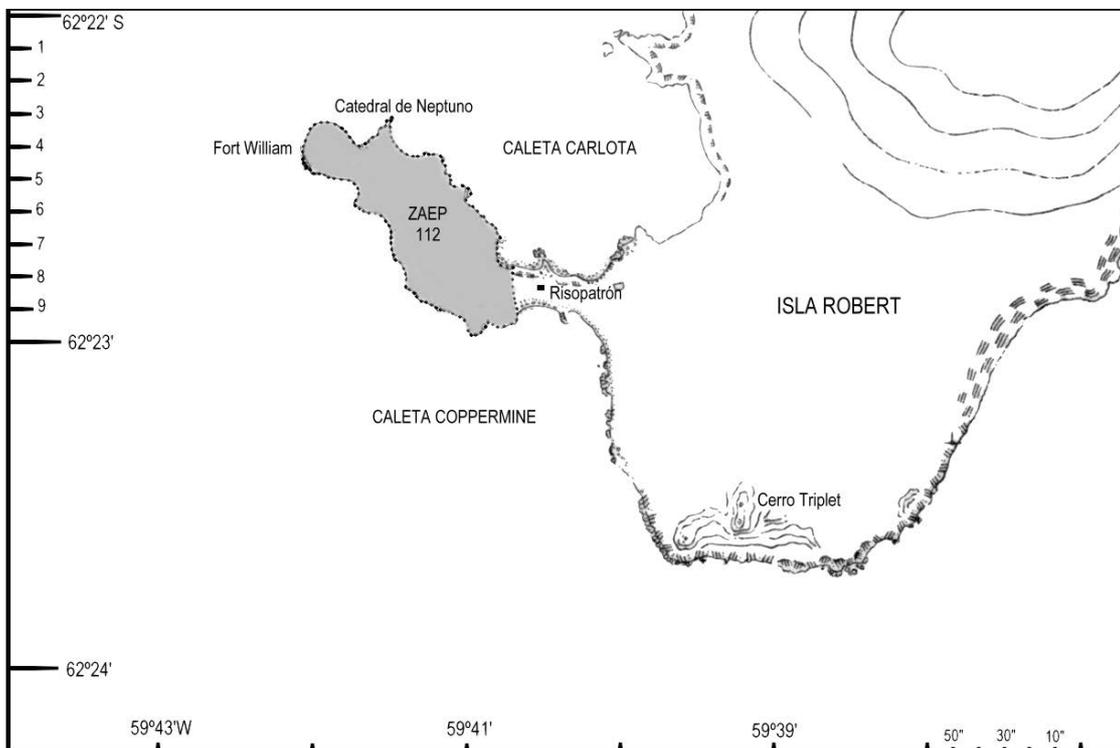
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Map 1: Part of the South Shetland Islands, showing the location of Nelson, Robert and Greenwich Islands, as well as the Antarctic Specially Protected Areas located there, including ASPA No. 112, Coppermine Peninsula.



Map 2: Coppermine Peninsula, Robert Island ASPA No. 112 is shown in grey. Based on the Chart of the Hydrographical Institute of the Chilean Army. English Strait and Lautaro Channel, scale 1:40,000.

Map 1. Part of South Shetland Islands, showing the location of Nelson, Robert and Greenwich Islands, as well as the Antarctic Specially Protected Areas located there, including ASPA No.112, Coppermine Peninsula.

Español	English	Français	Русский
Isla Nelson	Nelson Island	Île Nelson	Остров Нельсон
Punta Armonía, ZAEP 133	Harmony Point,	Pointe Harmony,	Мыс гармония,
Estrecho Nelson	Nelson Strait	Détroit Nelson	Пролив Нельсон
Isla Robert	Robert Island	Île Robert	Остров Роберт
Península Coppermine, ZAEP 112	Coppermine Peninsula, ASPA 112	Péninsule Coppermine, ZSPA 112	Полуостров Коппермайн, ООРА
Estrecho Inglés	English Strait	Détroit anglais	Английский пролив
Bahía Chile, ZAEP 144	Chile Bay, ASPA 144	Baie Chile, ZSPA 144	Залив Чили, ООРА 144
Isla Greenwich	Greenwich Island	Île Greenwich	Остров Гринвич
Estrecho McFarlane	McFarlane Strait	Détroit McFarlane	Пролив МакФарлейн
Estrecho Bransfield	Bransfield Strait	Détroit Bransfield	Пролив Брансфилд
Curvas de nivel cada 100 m	Level contours each 100 m	Courbes de niveau tous les 100 m	Горизонталы проведены через

Map 2: Coppermine Peninsula, Robert Island ASPA No. 112 is shown in grey. Based on the Chart of the Hydrographical Institute of the Chilean Army. English Strait and Lautaro Channel, scale 1:40,000.

Español	English	Français	Русский
Isla Robert	Robert Island	Île Robert	Остров Роберт
Caleta Carlota	Carlota Cove	Anse Carlota	Бухта Карлота
Caleta Coppermine	Coppermine Cove	Anse Coppermine	Бухта Коппермайн
Catedral de Neptuno	Neptune's Cathedral	Cathédrale de	Храм Нептуна
Fort William	Fort William	Fort William	Мыс Форт-Вильям
ZAEP 112	ASPА 112	ZSPA 112	ООРА 112
Risopatrón	Risopatron	Risopatron	Станция
Cerro Triplet	Triplet Hill	Colline Triplet	Тройной холм

**Antarctic Specially Protected Area No 115
(Lagotellerie Island, Marguerite Bay, Graham Land):
Revised Management Plan**

The Representatives,

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

Recalling

- Recommendation XIII-11 (1985), which designated Lagotellerie Island, Marguerite Bay, Graham Land as Specially Protected Area (“SPA”) No 19 and annexed a map of the Area;
- Recommendation XVI-6 (1991), which annexed a Management Plan for the Area;
- Resolution 1 (1998), which allocates responsibility among Consultative Parties for the revision of Management Plans for protected areas;
- Measure 1 (2000), which annexed a revised Management Plan for SPA 19;
- Decision 1 (2002), which renamed and renumbered SPA 19 as ASPA 115;

Recalling that Recommendation XVI-6 (1991) and Measure 1 (2000) have not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 115;

Desiring to replace the existing Management Plan for ASPA 115 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 115 (Lagotellerie Island, Marguerite Bay, Graham Land), which is annexed to this Measure, be approved; and

2. the Management Plan for SPA 19 annexed to Measure 1 (2000), which has not become effective, be withdrawn.

Management Plan for Antarctic Specially Protected Area No. 115

LAGOTELLERIE ISLAND, MARGUERITE BAY, GRAHAM LAND

Introduction

The primary reason for the designation of Lagotellerie Island, Marguerite Bay, Graham Land (Latitude 67°53'20" S, Longitude 67°25'30" W; area 1.58 km²) as an Antarctic Specially Protected Area (ASP) is to protect environmental values, and primarily the terrestrial flora and fauna but also the avifauna within the Area.

Lagotellerie Island is approximately 2 km by 1.3 km, oriented generally in an east-west direction. The Area is 11 km south of Porquois Pas Island and 3.25 km west of the south end of Horseshoe Island. Lagotellerie Island was first mapped by Jean-Baptiste Charcot during the *Deuxième Expédition Antarctique Française* in 1908-10. There are no records of further visits until the 1940s, when the island was visited occasionally by American, Argentine and British field parties from nearby scientific stations. The island has not been the subject of any major scientific investigations and is thus largely undisturbed by human activities.

Lagotellerie Island was originally designated as a Specially Protected Area through Recommendation XIII-II (1985, SPA No. 19) after a proposal by the United Kingdom. It was designated on the grounds that the island contains a rich and diverse flora and fauna typical of the southern Antarctic Peninsula region. These values were reiterated in Recommendation XVI-6 (1991) when a management plan for the site was adopted, and are largely reaffirmed again in the present management plan.

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 115 is contained within Environment Domain B (Antarctic Peninsula mid-northern latitudes geologic). Other protected areas containing Domain B include ASPAs 108, 134, 140 and 153 and ASMAs 4.

The three other ASPAs are present within the Marguerite Bay area (ASPAs 107 Emperor Island, Dion Islands, ASPA 117 Avian Island and ASPA 129 Rothera Point). ASPA 107 Emperor Island and ASPA 117 Avian Island were designated to protect predominantly the avifauna of the area, while ASPA 129 Rothera Point was designated to monitor the impact of the nearby station on an Antarctic fellfield ecosystem. Therefore, Lagotellerie Island complements the local network of ASPAs by primarily protecting terrestrial biological communities.

1. Description of values to be protected

Following a visit to the ASPA in February 2011, the values specified in the earlier designation were reaffirmed. These values are set out as follows:

- Lagotellerie Island contains a relatively diverse flora typical of the southern Antarctic Peninsula region. Of particular interest is the abundance of the only two Antarctic flowering plants *Deschampsia antarctica* and *Colobanthus quitensis* which form stands up to 10 m². These are amongst the largest stands known south of the South Shetland Islands, being only 90 km north of their southern limit. Both species flower profusely and the seeds have a greater viability than those produced in the South Orkney or South Shetland Islands.
- Numerous mosses and lichens form well-developed communities on the island. A few of the mosses are fertile, which is a rare phenomenon in most Antarctic localities.
- The island is notable for the occurrence of *Deschampsia antarctica* at the highest recorded altitude south of 56° S, with scattered small plants observed at heights of up to 275 m. The island therefore has a particular future scientific value for study of the influence of altitudinal gradient on biological viability for plant species represented at this site.
- The invertebrate fauna is rich and the island is one of the southernmost sites for the apterous midge *Belgica Antarctica*.
- The shallow loamy soil developed beneath the vegetation and its associated invertebrate fauna and microbiota are probably unique at this latitude.
- There is a colony of c. 1850 Adélie penguins (*Pygoscelis adeliae*) and one of the farthest south colonies of a few dozen blue-eyed cormorants (*Phalacrocorax atriceps*) at the south-east corner of the island. Numerous pairs of brown and south polar skuas (*Catharacta lonnbergii* and *C. maccormicki*) breed on the island.
- The values associated with the penguin and skua colonies are now considered to be their ecological interrelationship with the other biological features of exceptional value noted above.
- Fossiliferous strata present at the eastern end of the island are of particular geological value, as such formations are not commonly exposed in the Antarctic Peninsula Volcanic Group.
- The island has not been subject to frequent visits, scientific research or sampling and therefore may be regarded as one of the most pristine highly vegetated areas in the region.

2. Aims and objectives

Management at Lagotellerie Island aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere which will not jeopardise the natural ecological system in that Area;
- allow visits for management purposes in support of the aims of the management plan;
- prevent or minimise the introduction to the Area of non-native plants, animals and microorganisms;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- preserve the natural ecosystem of the Area as a reference area for future studies.

3. Management activities

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

- Visits shall be made as necessary to assess whether the ASPA continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- The Management Plan shall be reviewed at least every five years and updated as required.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- In accordance with the requirements of Annex III of the Protocol on Environmental Protection to the Antarctic Treaty, abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.
- A copy of this Management Plan shall be made available at Rothera Research Station (UK; Latitude 67°34' S, Longitude 68°07' W) and General San Martín Station (Argentina; Latitude 68°08' S, Longitude 67°06' W).

- All scientific and management activities undertaken within the Area should be subject to an Environmental Impact Assessment, in accordance with the requirements of Annex I of the Protocol on Environmental Protection to the Antarctic Treaty.

4. Period of designation

The ASPA is designated for an indefinite period.

5. Maps

Map 1. Lagotellerie Island Antarctic Specially Protected Area No. 115, Marguerite Bay, location map, showing the location of General San Martín Station (Arg.), the station Teniente Luis Carvajal (Chile), Adelaide Island, Rothera Research Station (UK) and nearby ASPA 129 at Rothera Point, also on Adelaide Island, and the location of the other protected areas in the region [Emperor Island, Dion Islands (ASPAs 107) and Avian Island (ASPAs 117)]. 'Base Y' (UK) (Historic Monument No. 63) on Horseshoe Island is shown. Inset: the location of Lagotellerie Island along the Antarctic Peninsula.

Map 2. Lagotellerie Island (ASPAs 115) topographic map. Map specifications: Projection: Lambert Conformal Conic. Standard parallels: 1st 63° 20' 00" S; 2nd 76° 40' 00" S. Central Meridian: 65° 00' 00" W. Latitude of Origin: 70° 00' 00" S. Spheroid: WGS84. Datum: Mean Sea Level. Vertical contour interval 20 m. Horizontal and vertical accuracy expected to be better than ±5 m.

Map 3. Lagotellerie Island (ASPAs 115) geological sketch map.

6. Description of the Area

6(i) Geographical coordinates and natural features

BOUNDARIES AND CO-ORDINATES

The corner co-ordinates of the Area are shown in Table 1.

Corner	Latitude	Longitude
northwest	67°52'30" S	67°27'00" W
northeast	67°52'30" S	67°22'00" W
southwest	67°54'00" S	67°27'00" W
southeast	67°54'00" S	67°22'00" W

The Area includes all of Lagotellerie Island and unnamed adjacent islands and islets. The Area encompasses all of the ice-free ground, permanent ice and semi-permanent ice found within the boundaries, but excludes the marine environment extending greater than 10 m offshore from the low tide water line (Map 2). Boundary markers have not been installed because the coast itself is a clearly defined and visually obvious boundary.

Lagotellerie Island is steep-sided and rocky, with about 13% permanent ice cover, most of which is on the southern slopes. The island rises to twin peaks of 268 m and 288 m separated by a broad saddle at around 200 m, with precipitous cliffs up to this height on the south, west and east sides. The upper northern slopes also have steep cliffs, intersected by gullies, screes and traversed by broad rock terraces. The lower northern slopes are more gentle, particularly on the eastern half of the island, with a broad rocky terrace at an elevation of about 15 m which is formed of frost-shattered raised beach debris.

GEOLOGY

The bulk of Lagotellerie Island is formed of quartz diorite of unknown age, cut by pink, coarse-grained granodiorite and numerous basic and felsic dykes (Map 3). At the eastern end of the island the plutonic rocks are in fault contact with folded, mildly hornfelsed volcanic rocks of Jurassic–Cretaceous age. These consist of agglomerates, andesitic lavas and tuffs of the Antarctic Peninsula Volcanic Group, with plant remains – probably Jurassic – present in shaly beds interbedded with tuff. Such fossiliferous strata are not commonly exposed in the Antarctic Peninsula Volcanic Group, and are therefore of particular geological importance.

Locally extensive areas of coarse sand and gravel derived from weathered quartz-diorite occur on slopes, ledges, gullies and depressions; the most extensive accumulations are on the saddle between the two summits where the soil is sorted into well-developed stone polygons, circles and stripes. On the broad rock terraces closed stands of moss and grass have developed a relatively rich loamy earth up to 25 cm in depth. Glacial erratics are common on the island.

TERRESTRIAL BIOLOGICAL COMMUNITIES

The island has a relatively diverse flora and luxuriant development of plant communities, representative of the southern maritime Antarctic region. The rich terrestrial biology of Lagotellerie Island was first noted by Herwil Bryant, biologist at East Base (US, on Stonington Island; now Historic Monument No. 55), during a visit in 1940-41 when he observed growths of moss, the Antarctic hair grass *Deschampsia antarctica*, and "a small flowering plant" (almost certainly the Antarctic pearlwort *Colobanthus quitensis*), in a small gully – believed to be that found at the north-eastern end of the island – which he considered of such unusual richness for the region that he unofficially referred to it as "Shangri-la Valley". He did not describe the less luxuriant but more extensive communities of *Deschampsia antarctica* and *Colobanthus quitensis* found on the higher north-facing slopes of the island. These slopes and terraces also provide favourable microclimatic conditions for growth, with a relatively long snow-free growing season, and support an abundance of *Deschampsia antarctica* and *Colobanthus quitensis*, the grass forming closed swards of up to 10 m² on some of the terraces. These are among the largest stands of these plants known south of the South Shetland Islands. Both species flower abundantly and the seeds have a greater viability than those produced in the South Orkney or South Shetland Islands, yet they are close to the southern limit of their range. Lagotellerie Island, however, is notable for the growth of *Deschampsia antarctica* at the highest altitude recorded south of 56° S,

with scattered small plants observed at heights of up to 275 m. *Colobanthus quitensis* has been observed growing up to 120 m on the island.

Lagotellerie Island also has a rich cryptogamic flora, with small stands of well-developed communities containing several mosses and lichens which are rare at this latitude (notably the mosses *Platydictya jungermannioides* and *Polytrichastrum alpinum*, and lichens *Caloplaca isidioclada*, *Fuscoparmelia gerlachei* and *Usnea trachycarpa*). The number of bryophyte species thus far identified include 20 mosses and two liverworts (*Barbilophozia hatcheri* and *Cephaloziella varians*), and there are at least 60 lichen species. A comprehensive floristic survey of the island has not yet been undertaken, and numerous species, especially of crustose lichens, remain to be accurately determined.

Vegetation is best developed on a series of rock terraces at around 30-50 m a.s.l. on the northern side of the island. Here, both *Deschampsia* and *Colobanthus* are abundant, and closed grass swards form stands of several square metres. Associated with these, especially on the moister terraces, are usually the mosses *Brachythecium austrosalebrosum*, *Bryum* spp., *Pohlia nutans*, *Polytrichastrum alpinum* and *Sanionia uncinata*, and liverworts *Barbilophozia hatcheri* and *Cephaloziella varians*. Many of these grass swards are used as nest sites by skuas.

In drier habitats, especially on scree and rock faces, there are locally dense stands dominated by the macrolichens *Usnea sphacelata* and *U. subantarctica*, with *Pseudephebe minuscula*, *Umbilicaria decussata*, and a large number of crustose taxa. Several lichens are associated with the grass and moss communities (e.g. *Cladonia* spp., *Leptoloma* spp., *Leptogium puberulum*, *Ochrolechia frigida*, *Psoroma* spp.). Near the penguin and cormorant colonies several colourful nitrophilous lichens are abundant (e.g. *Buellia* spp., *Caloplaca* spp., *Fuscoparmelia gerlachei*, *Xanthoria* spp.).

Numerous lichens (notably *Caloplaca isidioclada*, *Pseudephebe minuscula*, *Usnea sphacelata*, *Umbilicaria decussata* and many crustose taxa) and a few mosses (notably *Grimmia reflexidens*) occur close to the summit of the island, as do scattered individual plants of *Deschampsia*. Few bryophytes produce sporophytes at far southern latitudes, but several mosses are fertile on Lagotellerie Island (e.g. *Andreaea regularis*, *Bartramia patens*, *Bryum amblyodon*, *B. pseudotriquetrum*, *Grimmia reflexidens*, *Hennediella heimii*, *Pohlia nutans*, *Schistidium antarctici*, *Syntrichia princeps*).

Specific studies of the invertebrate fauna have not been conducted on Lagotellerie Island. However, at least six species of arthropod have been recorded: *Alaskozetes antarcticus*, *Gamasellus racovitzai*, *Globoppia loxolineata* (Acari), *Cryptopygus antarcticus*, *Friesea grisea* (Collembola), and *Belgica antarctica* (Diptera, Chironomidae). Several species of nematophagous fungi have been isolated from the soils associated with mosses and *Deschampsia* on Lagotellerie Island (*Cephalosporium balanoides*, *Dactylaria gracilis*, *Dactylella ellipsozona*), species widely distributed in similar habitats throughout the Antarctic and also commonly found in temperate soils.

Bryant reported several small pools present on the island in the early 1940s, which presumably are the same as, or close to, those observed more recently on the extensive

flat low-lying ground on the northern side of the island. He recorded the pools contained many phyllopod crustaceans identified as *Branchinecta granulosa*. Rocks in one of the pools were coated in a bright green filamentous alga, on which the mites *Alaskozetes antarcticus* were observed. *A. antarcticus* was also common under pebbles on the pool floor. Other microorganisms of the trochelminth type were observed living in the algae, with a pink rotifer identified as *Philodina gregaria* being especially numerous. Small tufts of a grey-green alga were observed on large pebbles close to the pool bottom. The algae have not been described in more detail, although the presence of *Prasiola crispa* has been noted. More recent observations in the early 1980s suggested there were no permanent freshwater bodies on the island, but temporary runnels in summer were found, with some brackish pools in rock depressions near the northern coast. Inspection visit January 1989 and February 2011 noted the presence of several small melt pools of around 5-10 m², some with fringing wet moss carpets, and suggested these were probably the habitat of *Belgica antarctica*.

VERTEBRATE FAUNA

A small Adélie penguin (*Pygoscelis adeliae*) colony occupies the eastern promontory of the island (Map 2). Numbers have varied from a low of perhaps 350-400 pairs based on an estimate made in December 1936 to a high of 2402 pairs recorded in an accurate nest count in November 1955. A count of the colony made on 19 February 2011 noted approximately 1850 adult and juvenile birds (accurate to within 10%). The colony was regularly used as a source of eggs for personnel stationed at the nearby British Base Y on Horseshoe Island between 1955-60. It was reported that some 800 eggs were taken during 1955. The number of breeding pairs dropped to around 1000 in 1959 and 1960. Adélie penguin colonies are known to exhibit high interannual change in numbers as a result of a variety of natural factors, and in March 1981 it was observed that all of the approximately 1000 chicks in the colony had died. A chick count made in February 1983 suggested the colony consisted of approximately 1700 pairs, which is considered accurate to within 15-25%.

A small colony of blue-eyed cormorants (*Phalacrocorax atriceps*) has been observed on the eastern promontory of the island, which is one of the most southerly breeding sites reported for the species. Some 200 immature birds were observed close to the island, within view of the colony, on 16 January 1956. The colony was reported to consist of 10 nests on 17 February 1983. The colony was not seen in the January 1989 inspection on Lagotellerie Island; however, in February 2011, c. 250 adults and chicks were observed and with many nest containing two large chicks.

Brown and south polar skuas (*Catharacta loenbergi* and *C. maccormicki*) are also present, with 12 nests reported in 1956, when it was noted that many of the chicks were definitely south polar skua (*C. maccormicki*). It was estimated in 1958 that five pairs nested around the penguin colony and that both species occurred. A group of 59 non-breeding birds of both species was recorded on 12 January 1989 mid-way along the northern side of the island. Two Wilson's storm petrel (*Oceanites oceanicus*) nests were recorded on 14 January 1956. A kelp gull (*Larus dominicanus*) nest, with eggs, was recorded in the 'Shangri-La Valley' by Bryant in December 1940.

The inspection visit in January 1989 reported 12 Weddell seals (*Leptonychotes*

weddellii) hauled out on a small shingle beach at the base of a rocky spit on the north coast, but no other seals were seen. In contrast, the inspection visit of February 2011 noted c. 200 fur seals on northern side of the island and within the Adélie penguins colony (particular to the south of the colony above the pebble beaches). Twenty Weddell seals were also observed.

HUMAN IMPACT

The most significant environmental impact at Lagotellerie Island appears to have been from the practice of egg harvesting to feed personnel at bases operating nearby in the period 1955-60. The inspection visit of February 2011 reported there was no evidence of any recent physical or biological change on the island and it was concluded that the Area was continuing to serve the purpose for which it was designated.

6(ii) Access to the Area

- Access to the Area shall be by boat. Access from the sea should be to the northern coast of the island (Map 2), unless specifically authorised by Permit to land elsewhere or when landing along this coast is impractical because of adverse conditions. The coastline is generally rocky and recommended landing sites are located on the north coast at Lat. 67°52'57'' Long. 067°24'03'' and Lat. 67°53'04'' Long. 067°23'30'' (see Map 2).
- Access to the Area is not permitted 100 m either side of the gully on the northeast coast at Lat. 67°53'10'' Long. 067°23'13'' (i.e. the coast below the valley unofficially referred to as "Shangri-la Valley" by Bryant; see Map 2). The valley inland of this coastline contains the richest vegetation growth on the island, and to reduce trampling impacts, non-essential activity within this area is discouraged (Map 2). These restrictions apply equally to persons wishing to access the Area via sea ice in the winter.
- Under exceptional circumstances necessary for purposes consistent with the objectives of the Management Plan helicopters may be permitted to land at the designated landing site located beside the recommended field camp on the broad rock/permanent snow platform about half-way along the northwest coast at about 15 m altitude, and 200 m inland from the sea (Lat. 67°53'04'' Long. 067°23'43''). Helicopters shall not land elsewhere within the Area unless specifically authorized by Permit.
- Within the Area the operation of aircraft should be carried out, as a minimum requirement, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). When conditions require aircraft to fly at lower elevations than recommended in the guidelines, aircraft should maintain the maximum elevation possible and minimise the time taken to transit.
- Overflight of the eastern end of the island over the penguin/cormorant colony is prohibited below 610 m (2000 feet) (Map 2).

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- Use of helicopter smoke grenades is prohibited within the Area unless absolutely necessary for safety. If used all smoke grenades should be retrieved.

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

A cairn and the remains of a mast erected for survey purposes in the 1960s are present on the summit of the island. During the inspection visit in February 2011, some of the cabling and the remains of black survey flag associated with the mast were removed. The five 8-10 m long bamboo posts, from which the original mast was constructed, were collected together and secured along with six metal stakes near the eastern summit of the island (288 m).

A cairn (c. 1 m high) is present on the north coast of the island (Lat. 67°53'16'' Long. 067°22'51'') and a 30 cm high pile of stones containing a short wooden post with a 2.5 cm diameter metal disc at one end inscribed with the number '10' is present on cliffs west of the penguin colony (Lat. 67°53'17'' Long. 067°22'46''). No other structures are known to exist on the island.

Two year-round scientific research stations operate in the vicinity: General San Martín (Argentina; Lat. 68°08' S, Long. 67°06' W) which is 29.5 km south-southeast, and Rothera Research Station (UK; Lat. 67°34' S, Long. 68°07' W) which is 46 km to the northwest. A summer-only station, Teniente Luis Carvajal (Lat. 67°46' S, Long. 68°55' W), has been operated by Chile at the southern end of Adelaide Island since 1985.

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

The nearest protected areas to Lagotellerie Island are Emperor Island, Dion Islands (ASPA 107) about 55 km west, Avian Island (ASPA 117) 65 km west and Rothera Point (ASPA 129) 46 km to the northwest (Map 1). Several Historic Sites and Monuments are located in the vicinity: 'Base Y' (UK) on Horseshoe Island (HSM No. 63); 'Base E' (UK) (HSM No. 64) and buildings and artefacts at and near East Base (US) (HSM No. 55), both on Stonington Island; and installations of San Martín Station (Argentina) at Barry Island (HSM No. 26).

6(v) Special zone within the Area

None.

7. Permit conditions

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority as designated under Article 7 of Annex V 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 a compelling scientific purpose which cannot be served elsewhere;
- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardise the natural ecological system in the Area;
- any management activities are in support of the objectives of this Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit must be carried within the Area;
- permits shall be issued for a stated period;
- a report or reports are supplied to the authority or authorities named in the Permit;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

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

- Vehicles are prohibited within the Area.
- Movement within the Area shall be on foot.
- Pilots, helicopter or boat crew, or other people on helicopters or boats, are prohibited from moving on foot beyond the immediate vicinity of their landing site unless specifically authorised by Permit.
- Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects, i.e. all movement should be undertaken carefully so as to minimise disturbance to the soil and vegetated surfaces, walking on rocky terrain if practical.

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

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

7(iv) Installation, modification or removal of structures

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area (see Section 7(vi)). Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of field camps

When necessary for purposes specified in the Permit, temporary camping is allowed at the designated site on the broad rock/permanent snow platform about half-way along the northwest coast at about 15 m altitude, and 200 m inland from the sea (Lat. 67°53'04'' Long. 067°23'43''; Map 2).

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. Further guidance can be found in the CEP Non-native Species Manual (Edition 2011) and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species. In view of the presence of breeding bird colonies within the Area, no poultry products, including wastes from such products and products containing uncooked dried eggs, shall be released into the Area or into the adjacent sea.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable should be avoided. Fuel or other chemicals shall not be stored in the Area unless specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental 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 should be notified of anything released and not removed that was not included in the authorised Permit.

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

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

To prevent human disturbance of the breeding cormorant colony and in particular the premature fledging of juvenile cormorants, visitors shall not approach within 10 m of the cormorant colony on the eastern tip of the island between 15 October and 28 February, unless authorised by Permit for specific scientific or management purposes.

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

Collection or removal of anything not brought into the Area by the Permit holder shall only be in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted in instances where it is proposed to take, remove or damage such quantities of soil, native flora or fauna that their distribution or abundance on Lagotellerie Island would be significantly affected. Anything of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise 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(ix) Disposal of waste

As a minimum standard, all waste shall be disposed of in accordance with Annex III to the Protocol on Environmental Protection to the Antarctic Treaty. In addition, all wastes shall be removed from the Area. Liquid human wastes may be disposed of into the sea. Solid human waste should not be disposed of to the sea, but shall be removed from the Area. No solid or liquid human waste shall be disposed of inland.

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

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

- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Scientific activities shall be performed in accordance with *SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica*.

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 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. Wherever possible, Parties should deposit the original or copies of the 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.

8. Supporting documentation

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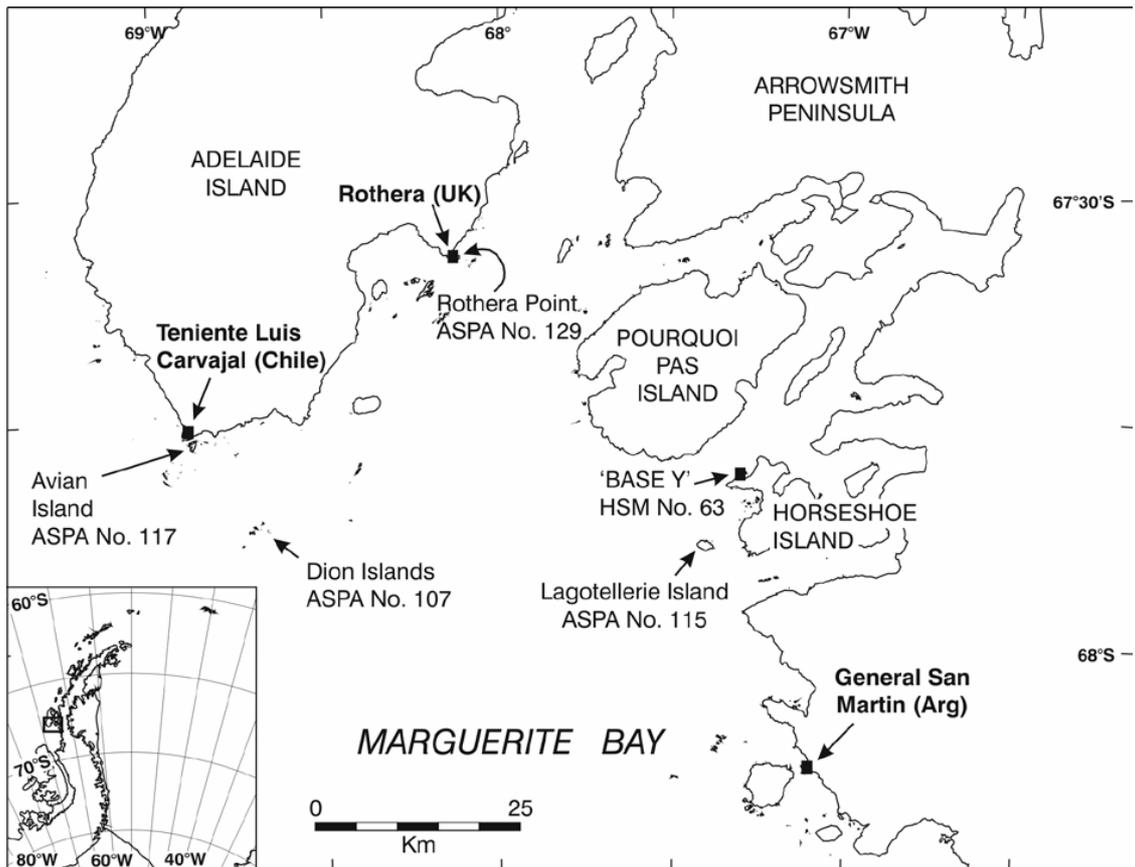
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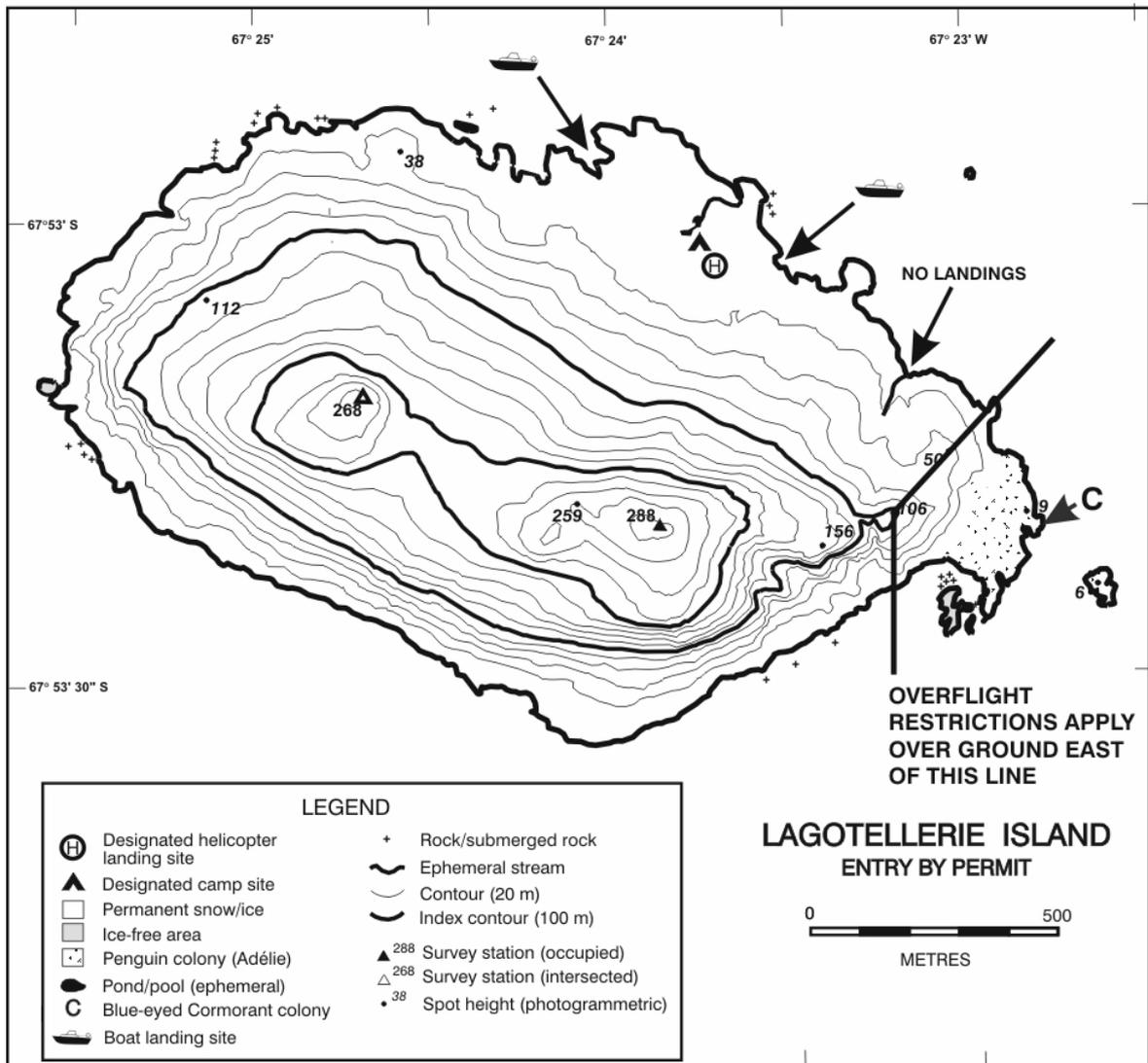
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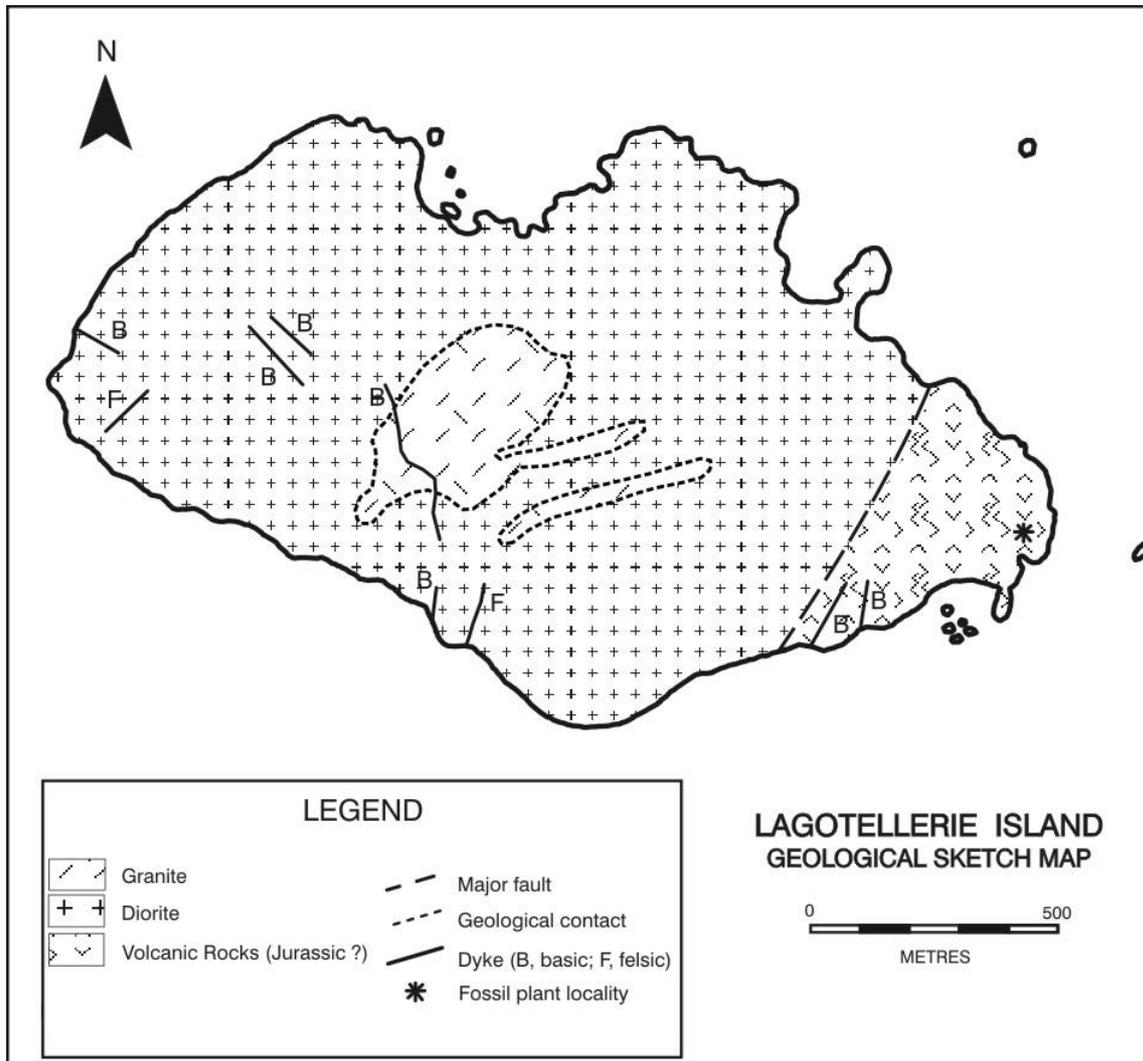
Map 1. Lagotellerie Island Antarctic Specially Protected Area No. 115, Marguerite Bay, location map, showing the location of General San Martín Station (Arg.), the station Teniente Luis Carvajal (Chile), Adelaide Island, Rothera Research Station (UK) and nearby ASPA 129 at Rothera Point, also on Adelaide Island, and the location of the other protected areas in the region [Emperor Island, Dion Islands (ASPA 107) and Avian Island (ASPA 117)]. 'Base Y' (UK) (Historic Monument No. 63) on Horseshoe Island is shown. Inset: the location of Lagotellerie Island along the Antarctic Peninsula.



Map 2. Lagotellerie Island (ASPA 115) topographic map.



Map 3. Lagotellerie Island (ASPA 115) geological sketch map.



**Antarctic Specially Protected Area No 129
(Rothera Point, Adelaide Island): Revised
Management Plan**

The Representatives,

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

Recalling

- Recommendation XIII-8 (1985), which designated Rothera Point, Adelaide Island as Site of Special Scientific Interest (“SSSI”) No 9 and annexed a Management Plan for the site;
- Resolution 7 (1995), which extended the expiry date of SSSI 9;
- Measure 1 (1996), which annexed a revised description and a revised Management Plan for SSSI 9;
- Decision 1 (2002), which renamed and renumbered SSSI 9 as ASPA 129;
- Measure 1 (2007), which adopted a revised Management Plan for ASPA 129 and revised its boundaries;

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

Recalling that Measure 1 (1996) has not become effective and was withdrawn by Measure 10 (2008);

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 129;

Desiring to replace the existing Management Plan for ASPA 129 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 129 (Rothera Point, Adelaide Island), which is annexed to this Measure, be approved; and
2. the Management Plan for ASPA 129 annexed to Measure 1 (2007) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area (ASPAs) No. 129

ROTHERA POINT, ADELAIDE ISLAND

Introduction

The primary reason for the designation of Rothera Point, Adelaide Island (Lat. 68°07'S, Long. 67°34'W), South Shetland Islands, as an Antarctic Specially Protected Area (ASPAs) is to protect scientific values, primarily that the Area would serve as a control area, against which the effects of human impact associated with the adjacent Rothera Research Station (UK) could be monitored in an Antarctic fellfield ecosystem. Rothera Point was originally designated in Recommendation XIII-8 (1985, SSSI No. 9) after a proposal by the United Kingdom. The Area itself has little intrinsic nature conservation value.

The Area is unique in Antarctica as it is the only protected area currently designated solely for its value in the monitoring of human impact. The objective is to use the Area as a control area which has been relatively unaffected by direct human impact, in assessing the impact of activities undertaken at Rothera Research Station on the Antarctic environment. Monitoring studies undertaken by the British Antarctic Survey (BAS) began at Rothera Point in 1976, before the establishment of the station later that year. On-going environmental monitoring activities within the Area and Rothera Point include: (i) assessment of heavy metal concentrations in lichens; (ii) measurement of hydrocarbon and heavy metal concentrations in gravel and soils and (iii) survey of the breeding bird populations.

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, Rothera Point is predominantly Environment Domain E (Antarctic Peninsula and Alexander Island main ice fields) which is also found in ASPAs 113, 114, 117, 126, 128, 129, 133, 134, 139, 147, 149, 152 and ASMA 1 and 4. However, given that Rothera Point is predominantly ice-free this domain may not be full representative of the environment encompassed within the Area. Although not specifically described as such, Rothera Point may also contain Environment Domain B (Antarctic Peninsula mid-northern latitudes geologic). Other protected areas containing Environment Domain B include ASPAs 108, 115, 134, 140 and 153 and ASMA 4.

1. Description of values to be protected

- The Area itself has little intrinsic nature conservation value. However, it has scientific value as a control area, against which the effects of human impact associated with the adjacent Rothera Research Station (UK) could be monitored in an Antarctic fellfield ecosystem.
- The Area also has value as a biological research site, particularly for scientists working in the Bonner Laboratory (Rothera Research Station).

2. Aims and objectives

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- 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, and (ii) limiting human access to the Area to maintain its value as a control area for environmental monitoring studies;
- allow scientific research and monitoring studies in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in that Area;
- minimize to the maximum extent practicable, the introduction of non-native species, which could compromise the scientific values of the Area;
- preserve the natural ecosystem of the Area as a reference area for future comparative studies;
- allow regular visits for management purposes in support of the objectives of the management plan.

3. Management activities

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

- Signboards illustrating the location and boundary of the Area and stating entry restrictions shall be erected at the major access points and serviced on a regular basis;
- A map showing the location and boundaries of the Area and stating entry requirements shall be displayed in a prominent position at Rothera Research Station;
- 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.
- Abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1. ASPA No. 129 Rothera Point, location map.

Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.

Map 2. ASPA No. 129 Rothera Point, topographic map.

Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.

6. Description of the Area

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

BOUNDARIES AND CO-ORDINATES

Rothera Point (67° 34'S, 68° 08'W) is situated in Ryder Bay, at the south-east corner of Wright Peninsula on the east side of Adelaide Island, south-west Antarctic Peninsula (Map 1). The Area is the north-eastern one-third of Rothera Point (Map 2), and is representative of the area as a whole. It extends about 280 m from west to east and 230 m from north to south, and rises to a maximum altitude of 36 m. At the coast, the Area boundary is the 5 m contour. No upper shore, littoral or sublittoral areas of Rothera Point are therefore included within the ASPA. The southern boundary of the Area, running across Rothera Point, is partially marked by rock filled gabions, in which are placed ASPA boundary signs. The remaining boundary is unmarked. There are two signboards just outside the perimeter of the Area located at the starting points of the pedestrian access route around Rothera Point (see Map 2). The boundary is broadly represented by the following co-ordinates, listed in a clockwise direction, starting with the most northerly point:

Area	Number	Latitude	Longitude
ASPA 129 Rothera Point	1	67°33'59" S	068°06'47" W
	2	67°34'06" S	068°06'48" W
	3	67°34'06" S	068°07'00" W
	4	67°34'02" S	068°07'08" W

Rothera Research Station (UK) lies about 250 m west of the western boundary of the Area (see inset on Map 2).

GENERAL DESCRIPTION

Small areas of permanent ice occur to the north and south of the summit of the ASPA. There are no permanent streams or pools. The rocks are predominantly heterogeneous intrusions of diorite, granodiorite and adamellite of the mid-Cretaceous-Lower Tertiary Andean Intrusive Suite. Veins of copper ore are prominent bright green stains on the rock. Soil is restricted to small pockets of glacial till and sand on the rock bluffs. Local deeper deposits produce scattered small circles and polygons of frost sorted material. There are no extensive areas of patterned ground. Accumulations of recent and decaying limpet (*Nacella concinna*) shells forming patches of calcareous soil around prominent rock outcrops used as bird perches by Dominican gulls (*Larus dominicanus*). There are no accumulations of organic matter. There are no special or rare geological or geomorphological features in the Area.

The limited terrestrial biological interest within the Area is confined to the rock bluffs where there is a locally abundant growth of lichens. The vegetation is representative of the southern "maritime" Antarctic fellfield ecosystem and is dominated by the fruticose lichens *Usnea antarctica*, *Usnea sphacelata*, and *Pseudephebe minuscula*, and the foliose lichen *Umbilicaria decussata*. Numerous crustose lichens are found, but bryophytes (mainly *Andreaea* spp.) are sparse. A single very small population of Antarctic pearlwort (*Colobanthus quitensis*) occurs below the northern cliff of the Area. The invertebrate fauna is impoverished and consists only of a few species of mites and springtails, of which *Halozetes belgicae* and *Cryptopygus antarcticus* are the most common. There are no special or rare terrestrial flora or fauna in the Area.

Brown and south polar skuas (*Catharacta lonnbergii* and *C. maccormicki*) are the most abundant breeding birds found in the Area, with up to five pairs of skuas recorded nesting. A pair of Dominican gulls (*Larus dominicanus*) nest in the Area and one Wilson's storm petrels (*Oceanites oceanicus*) nest has been found.

6(ii) Access to the Area

- Access to the Area shall be by foot.
- Helicopter landings are prohibited within the Area.
- The operation of aircraft should be carried out, to the maximum extent possible, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). However, the Area is only c. 250 m from the Rothera Research Station runway and for reasons of safety it is recognized that full compliance may not always be possible.
- The Area boundary extends to the 5 m contour at the coast. There is unrestricted pedestrian access below this contour height around the boundary of the Area. The recommended pedestrian access route follows the Mean High Water Mark (MHWM) and is shown on Map 2. During periods when the ground is snow-covered and seaice has formed, pedestrians should ensure that they are at a safe distance from the shoreline and are not in danger of straying onto unreliable seaice or into tide cracks.

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

A rock cairn marks the summit of the Area (36 m; Lat. 68°34'01.5'' S, Long. 068°06'58'' W) and 35 m to the east south east of it there is another cairn marking a survey station (35.4 m; Lat. 68°34'02'' S, Long. 068°06'55'' W).

Rothera Research Station (UK) lies about 250 m west of the western boundary of the Area (see inset on Map 2). A number of masts and aerials exist on the raised beach that is adjacent to the southern boundary of the Area.

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

ASPAs 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. The locations of these ASPAs are shown on Map 1.

6 (v) Special zones within the Area

None.

7. Permit Conditions

7(i) General permit conditions

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

- it is issued only for compelling scientific reasons which cannot be served elsewhere; or
- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardise the environmental or scientific values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or an authorised copy, must be carried within the Area;
- permits shall be issued for a stated period;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

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

- Access to, and movement within, the Area shall be on foot.
- Land vehicles are prohibited in the Area.
- Landing of helicopters within the Area is prohibited.
- All movement shall be undertaken carefully so as to minimize disturbance to soil and vegetation.

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

Activities which are or may be conducted within the Area are:

- scientific research or monitoring which will not jeopardise the ecosystems of the Area;
- essential management activities.

7(iv) Installation, modification or removal of structures

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of field camps

Camping in the Area is prohibited. Accommodation may be available at Rothera Research Station.

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. No poultry or egg products shall be taken into the Area. Further guidance can be found in the CEP Non-native Species Manual and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable shall not be permitted.

Fuel, food and other materials are not to be deposited within the Area, unless authorized by Permit for specific scientific or management purposes. Permanent depots are not permitted. All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of the stated period, and shall be stored and handled so that risk of their introduction into the environment is minimised. 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 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 to the Protocol on Environmental Protection to the Antarctic Treaty. Where taking of, or harmful interference with, animals is involved this should be in accordance with the SCAR Code of Conduct for the use of Animals for Scientific Purposes in Antarctica, as a minimum standard.

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

Material of a biological or geological nature may be collected and/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, flora or fauna that their distribution or abundance within the Area would be significantly affected. Material of human origin not brought into the site by the Permit holder, or otherwise authorised, which is likely to compromise the values of the Area shall be removed unless the impact of removal is likely to be greater than leaving the material in situ. In the latter case the appropriate authority shall be notified.

7 (ix) Disposal of wastes

All wastes shall be removed from the Area in accordance with Annex III (Waste disposal and waste management) of the Protocol on Environmental Protection to the Antarctic Treaty (1998). All solid and/or liquid 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 scientific research, monitoring and site inspection activities, which may involve the collection of a small number of samples for analysis, to erect or maintain signboards, or to carry out protective measures.
- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Scientific activities shall be performed in accordance with SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica.

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 as an Appendix in the Guide to the Preparation of Management Plans for Antarctic Specially Protected

Areas (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. Wherever possible, Parties should deposit the original or copies of the original visit reports, in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the management plan.

8. Supporting documentation

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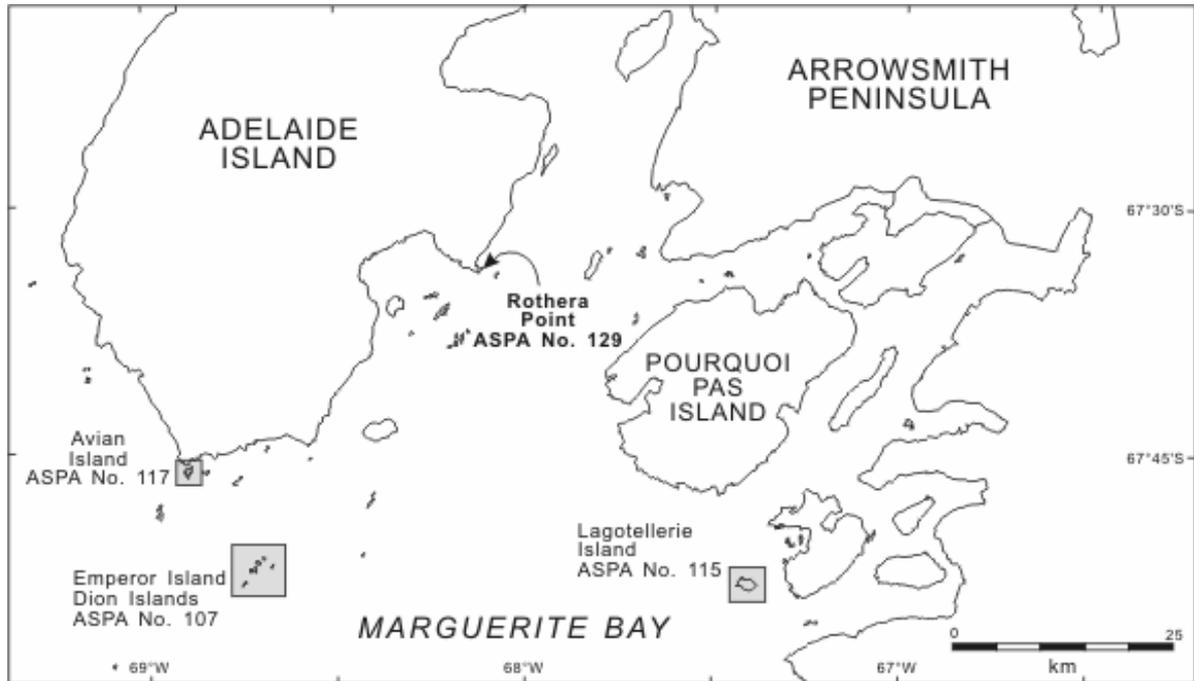
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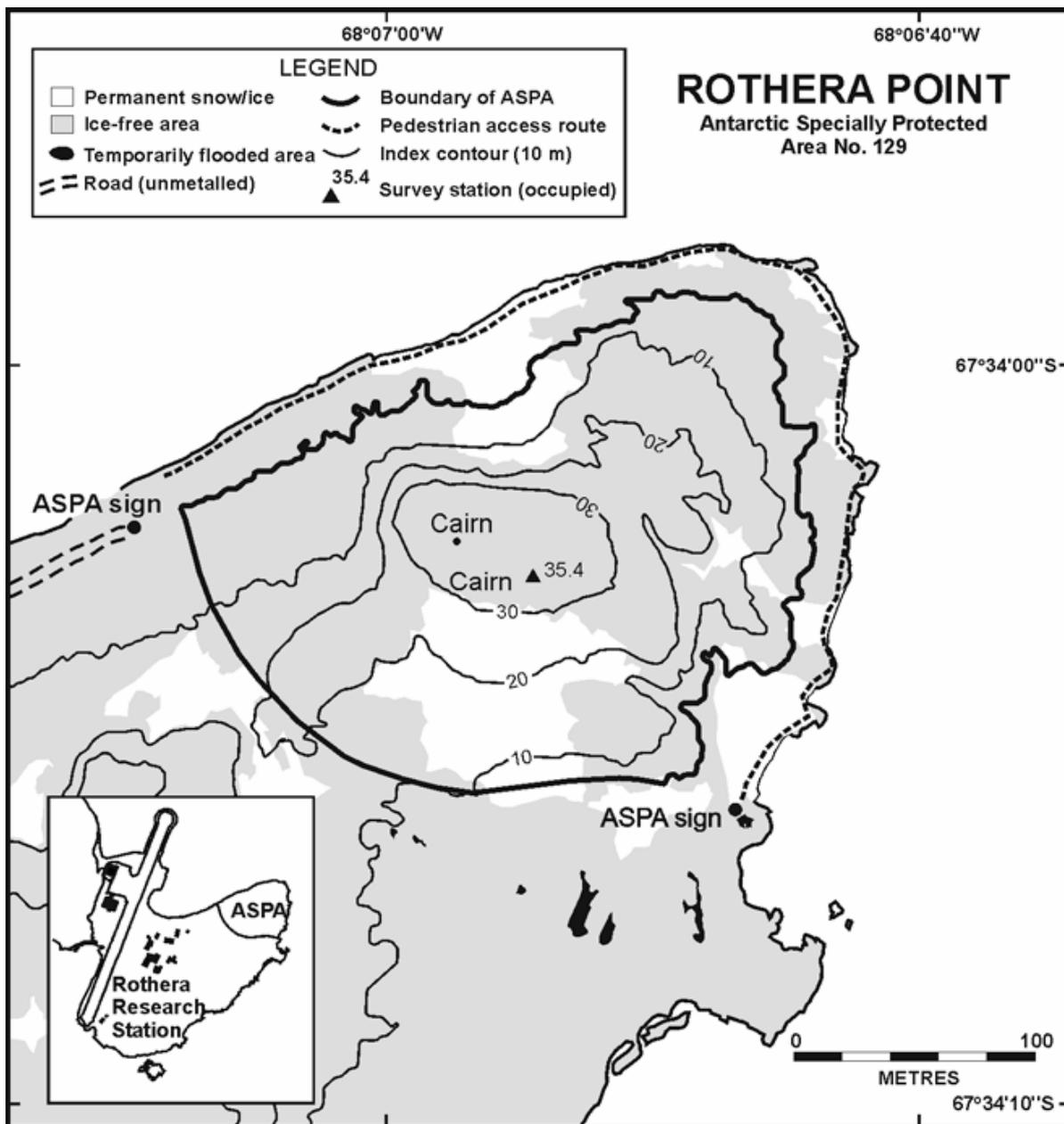
Shears, J. R., and Downie, R. 1999. Initial Environmental Evaluation for the proposed construction of an accommodation building and operations tower at Rothera Research Station, Rothera Point, Adelaide Island, Antarctica. British Antarctic Survey, Cambridge, 22 pp.

Map 1. ASPA No. 129 Rothera Point, location map.
Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.



Map 2. ASPA No. 129 Rothera Point, topographic map.

Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71°S. Central meridian 67°45'W.



**Antarctic Specially Protected Area No 133
(Harmony Point, Nelson Island, South Shetland Islands):
Revised Management Plan**

The Representatives,

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

Recalling

- Recommendation XIII-8 (1985), which designated Harmony Point, Nelson Island, South Shetland Islands as Site of Special Scientific Interest (“SSSI”) No 14;
- Resolution 7 (1995), which extended the expiry date for SSSI 14;
- Measure 3 (1997), which adopted a revised Management Plan for SSSI 14; Decision 1 (2002), which renamed and renumbered SSSI 14 as ASPA 133;
- Measure 2 (2005), which annexed a revised Management Plan for ASPA 133;

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

Recalling that Measure 3 (1997) has not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 133;

Desiring to replace the existing Management Plan for ASPA 133 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 133 (Harmony Point, Nelson Island, South Shetland Islands), which is annexed to this Measure, be approved; and
2. the Management Plan for ASPA 133 annexed to Measure 2 (2005) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area No. 133

HARMONY POINT, NELSON ISLAND, SOUTH SHETLAND ISLANDS

Introduction

This Area was originally designated as Site of Special Scientific Interest No. 14 under Antarctic ATCM Recommendation XIII-8 (1985), after a proposal by Argentina, because the Area is an excellent example of the maritime Antarctic communities of birds and land ecosystems present in the South Shetland Islands, making it possible to carry out long-term research programs without damage or harmful interference.

In 1997, the Management Plan was adapted to the requirements of Annex V of the Protocol on Environmental Protection to the Antarctic Treaty, and approved through Measure 3 (1997). This version consists of the revision to the Management Plan approved pursuant to Measure 2 (2005), and it is the second revision since entry into force of Annex V.

The original goals for designating this Area are still relevant, and are specified on point 2. The anthropic disturbance could jeopardize the long term studies carried out there, especially during the breeding season.

1. Description of values to be protected

The values to be protected in the Area still relate to the composition and biological diversity of the site.

Ice-free land supports large breeding colonies of 12 seabird species, among which we find one of the largest single colonies of chinstrap penguin (*Pygoscelis antarctica*) of Antarctica. In the Area, there is also a large giant petrel colony (*Macronectes giganteus*), a species which is highly sensitive to human disturbance, and a large colony of gentoo penguin (*Pygoscelis papua*).

The Area has profuse vegetation, developed on various types of soils, particularly characterized by the presence of vast moss carpets, as well as lichens and fungi. It is also possible to find two species of vascular plants in the Area. As vegetation is one of the factors responsible for soil formation, the protection of the Area ensures the development of research linked to the soils and the flora present in the Area.

2. Aims and objectives

- Preventing unnecessary human disturbance;
- Permitting the development of any scientific research provided it does not compromise the values for which the Area is being protected;
- Avoiding major changes in the structure and composition of the flora and fauna communities;
- Preventing or minimising the introduction to the Area of non-native plants, animals and microbes;
- Minimising the possibility of the introduction of pathogens which may cause disease in flora or fauna populations within the Area;

3. Management activities

The staff authorised to access the ASPA shall be specifically instructed on the conditions of the Management Plan.

Approach distances to fauna must be respected, except when the scientific projects may require otherwise and this is specified in the relevant permits.

Collection of samples will be limited to the minimum required for the authorised scientific research plans.

All signs and structures erected within the Area for scientific or management purposes will be properly secured and maintained in good condition.

Due to the vast moss carpets developed in the Area, and the presence of large seabird colonies adjacent to the areas where scientists and the support staff circulate, tracks towards research sites can be marked, preferably using those previously marked or used.

4. Period of designation

The Area is designated for an indefinite period.

5. Maps

Map 1, attached to this Management Plan as an Annex at the end of the document, shows the location of ASPA No. 133, Harmony Point (Nelson Island).

6. Description of the Area

6(i) Geographical coordinates and boundaries

The Area is located in the west coast of Nelson Island (62° 18'S; 59° 14'W), between the King George (25 de Mayo) Island, to the northeast, and the Robert Island, to the southwest, and includes Harmony Point and the Toe, the sector covered by ice and the adjacent marine area, as shown in Map 1.

6(ii) Natural features

Geomorphologically, Harmony Point presents three well defined units: an andesitic plateau, coastal and shelf outcrops and ancient sea levels.

The plateau reaches 40 meters above sea level and its area is covered by detritus resulting from the action of erosion agents on andesitic rocks, with a well-developed vegetation of mosses and lichens. There are three successive raised paleobeaches, between the coast and the glacier. The paleobeaches are defined by pebble accumulations of variable heights in some instances and the development of soil in others. Lakes and streams with a limited flow appear on the undulations. Some isolated andesitic rocks and ancient nunataks can be seen outside the limits of the glacier, evidencing that the past extension of the glacier covered Harmony Point.

The Area holds breeding colonies of 12 species: 3,347 pairs of gentoo penguins (*Pygoscelis papua*), 89,685 pairs of chinstrap penguins (*Pygoscelis antarctica*), 479 pairs of cape petrel (*Daption capense*), 45 pairs of blue eyed shag (*Phalacrocorax*

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atriceps), 144 pairs of snowy sheathbill (*Chionis alba*), 71 pairs of skuas (61 pairs of Antarctic skuas (*Catharacta antarctica*) and 11 of *C. maccormicki* skuas), 128 pairs of Dominican gulls (*Larus dominicanus*) and 746 pairs of giant petrels (*Macronectes giganteus*).

Other seabirds nesting in the Area are the Wilson's storm petrel (*Oceanites oceanicus*) and the black-bellied storm petrel (*Fregatta tropica*) which, together, represent around 1000 pairs, and the Antarctic tern (*Sterna vittata*), with an estimated population of between 100 and 150 individuals (57-76 nests).

Most bird colonies are distributed over the north-western and south coast of Harmony Point. Giant petrel colonies are located around Gurruchaga shelter.

There are usually three species of mammals in the Area: the Weddell seal (*Leptonychotes weddelli*), the elephant seal (*Mirounga leonina*) and the Antarctic fur seal (*Arctocephalus gazella*). Occasionally some individual crabeater seals (*Lobodon carcinophagus*) have also been seen. The number of mammals in the area varies. The maximum numbers of sighted Antarctic fur seals, Weddell seals and elephant seals are 320, 550 and 100 respectively. The Weddell seals usually breed in the Area in high figures, reaching up to 60 females with their pups in a single season. Births of fur and elephant seals have also been recorded, although the numbers there are much lower.

There are some extensive areas covered by a very rich and diverse development of bryophytes and lichen-dominated plant communities (presently being classified), mainly dominated by *Usnea fasciata* and by *Himantormia luburis*, including, although to a lesser degree, two vascular plant species (*Deschampsia antarctica* and *Colobanthus quitensis*) present in Antarctica, especially in the areas less affected by recent anthropic perturbation or breeding activities. Moss turf subformations are located in wind protected and moist places, whilst lichen-dominated subformations occur in places with a high wind exposure.

Five soil orders have been identified so far in the Area, according to the taxonomic system: Soil Taxonomy (1999): Histosols (Hydric Cryfibrists), Entisols (Lithic Criorthents), Spodosols (Oxiaquic Humicryods), Mollisols (Lithic Haplocryolls) and Inceptisols (Lithic Eutrocryepts e Histic Cryaquepts).

6(iii) Access to the Area

The Area can be accessed by air or by sea. To access by sea, the landing site is located about 200 meters to the right of the shelter, at the bottom of the cove, over a protected gravel beach and with no significant presence of fauna.

The navigation beacon located in the westernmost tip of Harmony Point is accessed by landing south of the beacon. Both the navigation beacon and the Toe are only accessed by sea.

Access by air is only permitted when there are no means for access by sea. To avoid interfering with the bird breeding settlements near the shelter, especially the giant petrel, access by air is permitted for small aircrafts landing over the Nelson Island glacier. During landing manoeuvres, the aircrafts may not fly over the ice-free zone of the Area, in order to avoid causing any disturbance to bird colonies. Where absolutely necessary, helicopters may be permitted to land in ice-free areas. In this regards, the provisions of

the “Guidelines for operation of aircrafts over bird colonies” (Resolution 2, 2004) shall be observed as a minimum standard, except in cases of emergency or for air safety purposes.

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

There are permanent year-round structures within the Area.

Shelters: The "Gurruchaga" shelter (ARG, c. 30 m²) is used to provide accommodation to the research teams visiting the Area. There is also a storage building of 12 m². These facilities are only used during spring and summer, and have a maximum capacity of 3 people (See section 7 (ix) Disposal of wastes).

Beacons: There is a Chilean navigation radio beacon at the westernmost tip of Harmony Point, and an Argentine one at the Toe.

Signposts: A sign indicating where the protected Area starts on the sand beach in front of the shelter. Another sign inside the shelter displays the shelter name and owner.

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

- ASPA No. 112, Coppermine Peninsula, Robert Island, South Shetland Islands lies about 30 km south west.
- ASPA No. 125, Fildes Peninsula, King George / 25 de Mayo Island, South Shetland Islands lies about 23 km north-north east.
- ASPA No. 150, Ardley Island, King George / 25 de Mayo Island, South Shetland Islands lies about 19 km north east.
- ASPA No. 128, Western Shore of Admiralty Bay, King George Island (25 de Mayo), South Shetland Islands lies about 45 km east-northeast.
- ASPA No. 132, Potter Peninsula, King George / 25 de Mayo Island, South Shetland Islands lies about 30 km east-north east.
- ASPA No. 171, Narebski Point (south-eastern coast of Barton Peninsula, 25 de Mayo/King George Island, about 25 km northeast of Harmony Point.

6(vi) Restricted zones within the Area

There are no restricted zones within the protected Area.

7. Permit conditions

7(i) General conditions

Access to the Area is prohibited except in accordance with a Permit issued by appropriate national authorities.

Conditions for the issuance of a Permit to access the Area:

- The activity serves a scientific, ASPA management or outreach purpose, in accordance with the objectives of the Management Plan, which cannot be served elsewhere; and any management activity (inspection, maintenance or review), is

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in support of the objectives of this Management Plan;

- the Permit is carried by staff authorised to access the Area;
- a post-visit report is supplied to the appropriate national authority mentioned in the Permit upon completion of the activity, within the terms established by national authorities issuing the Permit.
- Neither tourism nor any other recreational activities are permitted.

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

All movement within the ASPA shall be exclusively on foot.

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

- Scientific research which cannot be conducted elsewhere and which will not jeopardise the natural ecosystem of the Area;
- Essential management activities;
- Activities contributing to raise awareness of scientific activities, under National Antarctic 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 subject to the relevant Permit.

Any scientific equipment to be installed in the Area, as well as any research marker, shall be approved by a Permit and be clearly labelled, indicating the country, name of principal investigator and year of installation. All such materials should be of such nature as to pose minimal risks of contamination to the Area, or the risk of interfering with the fauna or damaging the vegetation.

No research traces are to remain once the Permit has expired. If a specific project cannot be finished within the timeframe specified in the Permit, such circumstance shall be informed in the post-visit report, and an extension of the validity of the Permit authorising any materials to remain in the Area shall be requested.

7(v) Location of field camps

The Gurruchaga shelter will usually be available for the Parties using the Area. The use of the shelter for scientific purposes, by staff other than Argentine Antarctic Program staff shall be arranged in advance with such Program. If it is necessary to install tents they will have to be located in the immediate vicinity of the shelter. No other locations shall be used for this purpose, in order to restrict the human impact.

Such exclusion is not valid for installing tents with scientific instruments or materials, or those that are used as an observation base, which shall be removed upon conclusion of the activity.

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

No living animals or plant material shall be deliberately introduced into the Area.

All reasonable precautions against the unintentional introduction of alien species to the Area shall be adopted. It should be taken into account that alien species are most frequently and effectively introduced by humans. Clothes (pockets, boots, velcro fasteners on garments) and personal equipment (bags, backpacks, camera bags, tripods), as well as scientific instruments and work tools may carry insect larvae, seeds or propagules. For more information, refer to the “Non-Native Species Manual – CEP 2011”

No herbicides or pesticides shall be brought into the Area. Any other chemical, which shall be introduced under the relevant Permit, shall be removed from the Area upon conclusion of the activity. The purpose and type of chemicals shall be documented in as much detail as possible for other scientists’ future information.

Fuel, food and other material are not to be stored in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted, provided it is stored inside the shelter or close to it. Any fuel used at the Gurruchaga shelter shall be handled pursuant to procedures established by the Argentine Antarctic Program involved in the activity.

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

All forms of taking or harmful interference are prohibited, except in accordance with a permit. Where an activity involves taking or harmful interference, it should be carried out in accordance with the SCAR Code of Conduct for Use of Animals for Scientific Purposes in Antarctica, as a minimum standard.

Information on taking and harmful interference will be duly exchanged through the Antarctic Treaty Information Exchange system, as established by Art. 10.1 of Annex V to the Madrid Protocol.

Scientists taking samples of any kind in the Area will ensure that they are familiar with samples previously taken, in order to minimise the risk of a potential duplication. For that purpose, they must refer to the Antarctic Treaty Electronic Information Exchange System (available at <http://www.ats.aq/s/ie.htm>) and/or contact the relevant National Antarctic Programs.

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. Removal of dead biological specimens for scientific purposes must not exceed levels that deteriorate the nutritional base of local scavengers and with the sole purpose of performing pathological analyses.

7 (ix) Disposal of waste

All non-physiological waste shall be removed from the Area. Wastewater and liquid domestic waste may be dumped into the sea, in accordance with Article 5 of Annex III to the Madrid Protocol.

Waste generated as a consequence of research activities carried out in the Area may be temporarily stored next to the Gurruchaga shelter awaiting removal. Such waste must be disposed of pursuant to Annex III to the Madrid Protocol, labelled as trash and duly sealed to prevent accidental leaks.

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

Access Permits to the Area may be granted in order to conduct biological monitoring and site inspection activities, including the collection of plant material and animal samples for scientific purposes, the erection or maintenance of signposts, and any other management measures. All structures and markers installed in the Area must be authorised by a Permit and clearly identified by country, name of principal researcher and year of installation. Research markers and structures must be removed on or before the expiry of the Permit. If specific projects cannot be concluded within the permitted time, an application must be made for an extension to leave the items in the Area.

7(xi) Requirements for reports

Parties granting permits to access ASPA 133 should ensure that the principal holder for each permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports must be submitted as soon as possible, within the terms established by the relevant competent authorities. The reports must include the information outlined in the Visit Report form, in accordance with Resolution 2 (2011).

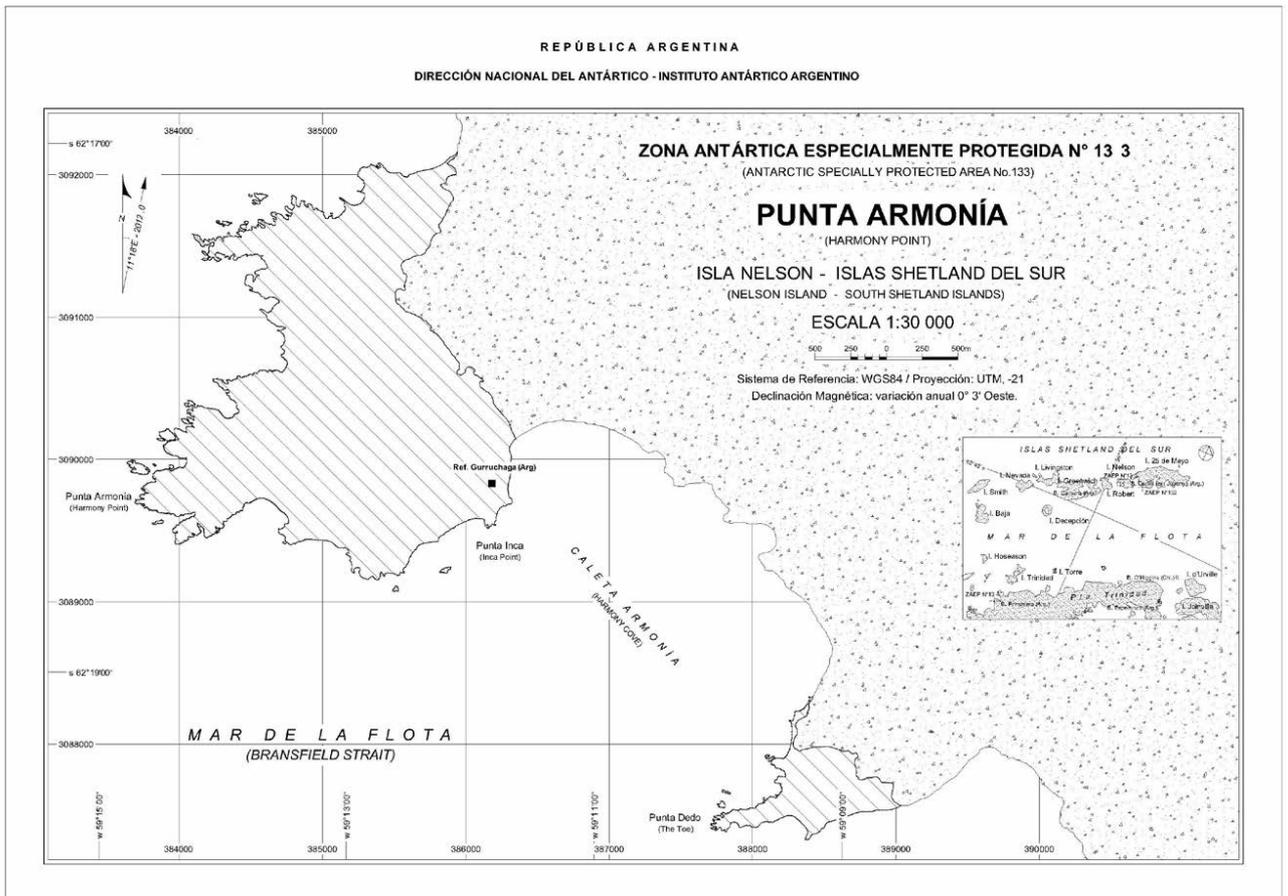
Parties granting permits to Access ASPA 133 should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of the activities conducted by persons subject to their jurisdiction. Wherever possible, Parties should deposit originals or copies of such original reports in an archive, to be used both for review of the Management Plan and in organising the scientific use of the Area.

8. Supporting documentation.

Non-Native Species Manual. Resolution 6 (2011) – ATCM XXXIV – CEP XIV, Buenos Aires (available at http://www.ats.aq/documents/atcm34/ww/atcm34_ww004_e.pdf)

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

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



Map 1: Location of Antarctic Specially Protected Area No. 133. In continuous diagonal lines, ice-free areas. In dotted pattern, areas covered in ice.

Antarctic Specially Protected Area No 140 (Parts of Deception Island): Revised Management Plan

The Representatives,

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

Recalling

- Recommendation XIII-8 (1985), which designated Shores of Port Foster, Deception Island, South Shetland Islands as Site of Special Scientific Interest (“SSSI”) No 21 and annexed a Management Plan for the site;
- Resolution 7 (1995), which extended the expiry date for SSSI 21;
- Resolution 1 (1998), which allocates responsibility among Consultative Parties for the revision of Management Plans for protected areas;
- Measure 2 (2000), which extended the expiry date for SSSI 21;
- Decision 1 (2002), which renamed and renumbered SSSI 21 as ASPA 140;
- Measure 3 (2005), which adopted a revised Management Plan for ASPA 140;

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

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

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 140;

Desiring to replace the existing Management Plan for ASPA 140 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Protected Area No 140 (Parts of Deception Island), which is annexed to this Measure, be approved; and
2. the Management Plan for ASPA 140 annexed to Measure 3 (2005) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area No 140

PARTS OF DECEPTION ISLAND, SOUTH SHETLAND ISLANDS

Introduction

The primary reason for the designation of Parts of Deception Island, (Lat. 62°57'S, Long. 60°38'W), South Shetland Islands, as an Antarctic Specially Protected Area (ASPAs) is to protect environmental values, predominantly the terrestrial flora within the Area. The flora of the island is unique in Antarctic terms, particularly where associated with these geothermal areas, but also because of the recently formed surfaces that provide known-age habitats for the study of colonisation and other dynamic ecological processes by terrestrial organisms (Smith 1988).

Deception Island is an active volcano. Recent eruptions occurring in 1967, 1969 and 1970 (Baker *et al.* 1975) altered many of the topographical features of the island and created new, and locally transient, surfaces for the colonisation of plants and other terrestrial biota (Collins 1969; Cameron & Benoit 1970; Smith 1984b; c). There are a number of sites of geothermal activity, some with fumaroles (Smellie *et al.* 2002).

Five small Sites around the coast of Port Foster were adopted under Recommendation XIII-8 (ATCM XIII, Brussels, 1985) as Site of Special Scientific Interest No 21 on the grounds that '*Deception Island is exceptional because of its volcanic activity, having had major eruptions in 1967, 1969 and 1970. Parts of the island were completely destroyed, new areas were created, and others were covered by varying depths of ash. Few areas of the interior were unaffected. The island offers unique opportunities to study colonization processes in an Antarctic environment*'.

Following an extensive scientific survey, protection of the island's botanical values was enhanced through Measure 3 (2005) when the number of Sites of botanical interest

included within the ASPA was increased to 11.

ASPAs 140 makes a substantial contribution to the Antarctic protected areas system as it (a) contains a particularly wide diversity of species, (b) is distinct from other areas due to the geothermally-heated ground in some parts of the island which create habitats of great ecological importance unique to the Antarctic Peninsula region and (c) is vulnerable to human interference, in particular, due to highly restricted spatial distribution of many plant species, particularly those associated with heated ground. While ASPAs 140 is protected primarily for its outstanding environmental values (specifically its biological diversity) it is also protected for its scientific values (ie, for terrestrial biology, zoology, geomorphology and geology). In particular, scientific research includes long-term colonisation studies and ground temperature measurements.

The 11 Sites within the Area (c. 2.4km²) encompass terrestrial and lagoon habitats around geo-thermally heated ground, areas of rich flora and known-age surfaces created following eruptions of 1967, 1969 and 1970 which are potentially useful for recolonisation studies. The Area is considered to be of sufficient size to provide adequate protection of the values identified, which may be highly susceptible to direct physical disturbance, due to activities of national and non-governmental visitors, and the identified boundaries provide an adequate buffer around sensitive features.

1. Description of values to be protected

Following a detailed botanical survey of the island in 2002 (reviewed in 2010), 11 Sites of unique botanical interest were identified. Consequently, the values specified in the original designation were reaffirmed and considerably augmented.

These values are set out as follows:

- The island has the greatest number of rare (ie, known to grow at a few localities in the Antarctic and often in small quantity) and extremely rare (ie, known to grow at only one or two localities in the Antarctic) plant species of any site in the Antarctic. Twenty eight of the 54 mosses recorded on the island, four of the eight liverworts and 14 of the *c.* 75 lichens are considered to be rare or extremely rare. Annex 1 lists the plant species classed as rare or extremely rare in the Antarctic Treaty area, which occur on Deception Island. These represent 25%, 17% and *c.* 4% of the total number of mosses, liverworts and lichens, respectively, known from the Antarctic (Aptroot & van der Knaap 1993; Bednarek-Ochyra *et al.* 2000; Ochyra *et al.* 2008; Øvstedal & Lewis Smith 2001). Thirteen species of moss (including two endemics), two species of liverwort and three species of lichen growing on Deception Island have not been recorded elsewhere in the Antarctic. No other site in the Antarctic is comparable. This suggests that there is a significant deposition of immigrant propagules (by wind and seabirds), particularly of southern South American provenance, over the Antarctic, which become established only where favourable germinating conditions prevail (eg, the heat and moisture provided around fumaroles) (Smith 1984b; c). Such sites are unique in the Antarctic Treaty area.
- The more stable geothermal areas, some of which have fumaroles issuing steam and sulphurous gas, have developed bryophyte communities of varying complexity and density, each with a distinct and unique flora. Most of these areas were created during the 1967-70 series of eruptions, but at least one (Mt. Pond) predates that period. Species growing close to active vents are continuously subjected to temperatures between 30 to 50°C, thereby posing important questions regarding their physiological tolerance.
- Areas of volcanic ash, mudflows, scoria and lapilli deposited between 1967 and 1970 provide unique known-age surfaces. These are currently being colonised by vegetation and other terrestrial biota, allowing the dynamics of immigration and colonisation to be monitored. These areas are unstable and subject to wind and water erosion, so exposing some areas to continual surface change and a cycle of recolonisation.
- Kroner Lake, the only intertidal lagoon with hot springs in Antarctica, supports a unique community of brackish-water algae.
- Several Sites within the Area, unaffected by ash deposits during the 1967-70 eruptions, support long-established mature communities with diverse vegetation and are typical of the older stable ecosystems on the island.
- The largest known stand of Antarctic pearlwort (*Colobanthus quitensis*), one of only two flowering plants in the Antarctic, is located within the Area. After being virtually eradicated by burial in ash during the 1967 eruption, it has recovered and is now spreading at an unprecedented rate. This correlates with the current trend in regional climate change, particularly increasing temperature.
- The Area contains some Sites where on-going scientific research is performed including long-term colonization experiments (Collins Point) and long-term ground temperature variation measurements (Caliente Hill).

- The Area also contains some Sites with surfaces that date from the eruption in 1967, which allowing accurate monitoring of colonisation by plants and other biota and are of important scientific value.

2. Aims and objectives

Management of the Area aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in that Area;
- prevent or minimise the introduction to the Area of alien plants, animals and microorganisms;
- ensure that the flora is not adversely affected by excessive sampling within the Area;
- preserve the natural ecosystem of the Area as a reference area for future comparative studies and for monitoring floristic and ecological change, colonisation processes and community development;

3. Management activities

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

- Visits shall be made as necessary to assess whether the individual Sites continue to serve the purposes for which they were designated and to ensure management and maintenance measures are adequate.
- Markers, signs or other structures (eg, fences, cairns) erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- In accordance with the requirements of Annex III of the Protocol on Environmental Protection to the Antarctic Treaty, abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.
- A map showing the location of each Site on Deception Island (stating any special restrictions that apply) shall be displayed prominently and a copy of this Management Plan shall be made available at Gabriel de Castilla Station (Spain) and Decepción Station (Argentina). Copies of the Management Plan shall be freely available and carried aboard all vessels planning visits to the island.
- Where appropriate, National Antarctic Programmes are encouraged to liaise closely to ensure management activities are implemented (including through the Deception Island Antarctic Specially Managed Area Management Group). In particular, National Antarctic Programmes are encouraged to consult with one another to prevent excessive sampling of biological material within the Area, particularly given the often slow rate of re-growth and limited quantity and distribution of some flora. Also, National Antarctic Programmes are encouraged to consider joint implementation of guidelines intended to minimize the introduction and dispersal of non-native species within the Area.
- At Site K Ronald Hill to Kroner Lake, any wind-blown debris from HSM No 71 shall be removed. At Site G Pendulum Cove, any wind-blown debris from HSM No 76 shall be removed (see Section 7(viii)).

- At Site A Collins Point, the existing staked plots should be maintained to allow continued monitoring of vegetation change since 1969.

4. Period of designation

Designated for an indefinite period.

5. Maps

Figure 1: Antarctic Specially Protected Area No 140, Deception Island, showing the location of Sites A – L (Scale 1:100 000).

Figures 1a–d: Topographic Maps of Antarctic Specially Protected Area No 140 showing Sites A – L (Scale 1: 25 000). The ‘hill shade’ effect has been added to highlight the topography of the areas.

6. Description of the Area

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

GENERAL DESCRIPTION

Research by Smith (1984) and Peat et al. (2007) described the recognised biogeographical regions present within the Antarctic Peninsula. Antarctica can be divided into three major biological provinces: northern maritime, southern maritime and continental. Deception Island lies within the northern maritime zone (Smith 1984).

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, Deception Island is predominantly Environment Domain G (Antarctic Peninsula off-shore islands geologic). The scarcity of Environment Domain G, relative to the other environmental domain areas, means that substantial efforts have been made to conserve the values found within this environment type elsewhere: other protected areas containing Domain G include ASPAs 109, 111, 112, 114, 125, 126, 128, 145, 149, 150, and 152 and ASMAs 1 and 4. Environment Domain B (Antarctic Peninsula mid-northern latitudes geologic) is also present. Other protected areas containing Environment Domain B include ASPAs 108, 115, 134 and 153 and ASMA 4.

NATURAL FEATURES, BOUNDARIES, AND SCIENTIFIC VALUES

ASPAs 140 comprises 11 Sites, shown in Figures 1 and 1a-1d. Annotated photographs of each Site are shown in Annex 2. This fragmented distribution is characteristic of the vegetation cover of Deception Island. Because of the patchy nature of stable and moist substrata not subjected to erosion, the vegetation has a disjunct distribution and is consequently restricted to widely scattered, and often very small, habitats.

The Sites are lettered A to L (but excluding I), in a clockwise direction from the south-west of the caldera and referred to by the most prominent named geographical feature associated with each Site. Photographs of each Site are shown in Annex 2. Boundary co-ordinates are listed in Annex 3, but as many of the boundaries follow natural features, the boundary description outlines below should also be consulted.

Site A - Collins Point

Area encompassed. The north-facing slopes between Collins Point and the unnamed point 1.15 km to the east (0.6km west of Entrance Point), directly opposite Fildes Point, and extending from the back of the beach to a ridge extending up to c. 1km inland from the shoreline.

Boundaries. The eastern boundary of Site A runs south from the shore at the unnamed point 0.6 km west of Entrance Point, following the outline of a ridge to an elevation of 184m. The western boundary extends from Collins Point, following a ridge south to an elevation of 145m. The southern boundary is delimited by the arcuate ridge crest (following a line of summits east to west at 172, 223 and 214m) joining points 184 and 145m. The beach area, including the Collins Point light beacon (maintained by the Chilean Navy), to the 10m contour is excluded from the Site.

Scientific value. No geothermally-heated ground is known within the Site boundary. The Site contains some of the best examples of the island's longest established vegetation, largely unaffected by the recent eruptions, with high species diversity and several Antarctic rarities, some in considerable abundance. A few small plants of *Colobanthus quitensis* have recently become established, while the large liverwort (*Marchantia berteroana*) is a fairly recent and spreading colonist. Research on seals is undertaken on the beach to the north of the Site, and the Site also contains a colony of kelp gulls in the low cliffs above the beach. Six 50 × 50cm plots marked with wooden corner stakes (Lat. 62°60'00''S, Long. 060°34'48''W) were established by the British Antarctic Survey in 1969 to monitor changes in the vegetation in subsequent years (Collins 1969).

Site B - Crater Lake

Area encompassed. Crater Lake and its shoreline, the flat ground to its north and the scoria- covered lava tongue to the south.

Boundaries. The northern boundary extends along the foot of the slope to the north of the broad valley c. 300m north of Crater Lake (at c. 30m altitude). The western boundary follows the ridgeline immediately west of the lake, and to the east of the small unnamed lake at Lat. 62°59'00''S, Long. 060°40'30''W. The southwestern and southern boundaries follow the top of the slope (at altitude c. 80m) that extend to the southwest and south of the lake. The eastern boundary passes to the east of the lava tongue south of Crater Lake, around the eastern rim of the lake and c. 300m across the flat plain to the north of the Crater Lake.

Scientific value. No geothermally-heated ground is known within the Site boundary. The principal area of botanical interest lies on a scoria-covered lava tongue south of the lake. The Site was unaffected by the recent eruptions. The vegetation on the scoria tongue has a diverse cryptogamic flora, including several Antarctic rarities, and exceptional development of turf- forming moss, dominated by one relatively common species (*Polytrichastrum alpinum*). Of particular interest is that it reproduces sexually in great abundance here. Sporophytes of this species are not known in such profusion in this, or any other moss, anywhere else in the Antarctic. The extensive, virtually monospecific, moss carpet (*Sanionia uncinata*), on the flat ground to the north of Crater Lake, is one of the largest continuously vegetated stands on the island.

Site C – Caliente Hill, southern end of Fumarole Bay

Area encompassed. A narrow line of fumaroles extending c. 40 × 3m along the gently sloping summit ridge at c. 95 to 107m elevation on Caliente Hill above the north-west side of Albufera Lagoon northwest of Decepción Station (Argentina) at the southern end of Fumarole Bay.

Boundaries. The area includes all the ground above the 90m contour on the hill, with the exception of the ground south east of a point 10m north west of the cairn (Lat. 62°58'27''S, Long. 060°42'31''W) at the southeast end of the ridge. Access to the cairn at the southeast end of the ridge is not restricted.

Scientific value. Geothermally-heated ground is included within the Site. Several rare species of moss, some unique to the island, colonise the heated soil crust close to the vents, of which only two or three are visible. The vegetation is extremely sparse and not obvious, in total encompassing less than c. 1m² in area, and is therefore particularly vulnerable to trampling and over-sampling. Structures within the Site include experimental apparatus monitoring long-term ground temperature variations (operated by the Spanish Antarctic programme) and several short metal stakes arranged along the ridgeline near the highest point of the ridge.

Site D - Fumarole Bay

Area encompassed. The unstable moist scree slopes below the precipitous lava cliffs on the east side of the southern end of Stonethrow Ridge to the break of slope beyond the beach west of mid-Fumarole Bay. No structures are located within the Site, although much timber debris is found at the back of the beach several metres above the high tide mark. The timber may have been deposited at this location by a tsunami generated by earlier vulcanological activity.

Boundaries. The southern end of the cliffs terminate in a prominent ridge sloping southeastward down to the beach. The southern boundary of the Site extends from the base of this ridge (at altitude c. 10m) along the ridge line to the base of the cliffs at an altitude of c. 50m. The western boundary follows the limit of the scree at the base of the cliffs roughly northwards for 800m at altitude of approximately 50m. The eastern boundary extends northwards along the break-of-slope at the back of the beach for 800m including all the large boulders. The northern boundary (c. 100m in length) joins the break of slope at the back of the beach to the scree at the base of the lava flow cliffs. The flat beach area from the shore, including two prominent inter-tidal fumaroles to the south of Fumarole Bay, to the break-of-slope is excluded from the Site.

Scientific value. No geothermally-heated ground is known within the Site, although fumarole activity is present in the inter-tidal zone east of the Site. The Site has a complex geology and contains the most diverse flora on the island, including several Antarctic rarities. It was unaffected by the recent eruptions.

Site E – west of Stonethrow Ridge

Area encompassed. The Site encompasses an area of fumarole activity and includes a red scoria cone at c. 270m altitude, on the northern side of the east-west trending ridge, c. 600m south- southwest of the highest point on Stonethrow Ridge (330m), west of central Fumarole Bay. It comprises two fumaroles about 20m apart, the more easterly fumarole being more highly vegetated with lichens, mosses and liverworts covering an area of c. 15 × 5m.

Boundaries. The boundary extends to 10m beyond all evidence of geothermal activity and the non-heated ground linking the two fumaroles.

Scientific value. Areas of geothermally-heated ground are present within the Site. The Site possesses several very rare mosses, liverworts and lichens, two of the dominant species being a liverwort (*Clasmatocolea grandiflora*) and lichen (*Stereocaulon condensatum*), neither of which is known elsewhere in Antarctica. Photographs taken in the mid-1980s indicate that the development and diversity of this vegetation has advanced considerably. A skua nest (noted in 1993 and 2002 and occupied in 2010) is present within the vegetation. These birds may be responsible for introducing some of the plants from Tierra del Fuego, notably the dominant liverwort.

Site F - Telefon Bay

Area encompassed. The Site incorporates several features created during the 1967 eruption in Telefon Bay: Pisagua Hill on the south side of the Site, the small shallow Ajmonecat Lake on the ash plain north of Stancomb Cove and the low flat ash plain extending from the shoreline of Telefon Bay to the steep slopes and lava outcrops c. 0.5km inland. Pisagua Hill was created as a new island in 1967, but is now joined to the main island by the aforementioned ash plain. At the northern end of the plain is Extremadura Cove, which was a lake until the narrow isthmus (c. 2m wide and 50m long) separating it from Port Foster was breached sometime around 2006. Extremadura Cove is excluded from the Site.

Boundaries. The north shoreline of the lagoon (Stancomb Cove) at the south-west of Telefon Bay marks the southern boundary of the Site, while the southwest shore of the Extremadura Cove to the north of Telefon Bay marks the northeastern boundary of the Site. The southeast boundary extends along the shore south of Pisagua Hill, northwards to the shoreline of the Extremadura Cove at the northern end of Telefon Bay. The northwest boundary is roughly delineated by the 10m contour of Telefon Ridge that links Stancomb Cove to Extremadura Cove. Ajmonecat Lake (Lat. 62°55'23''S, Long. 060°40'45''W), including its shoreline, is included in the Site. The shoreline of Telefon Bay is excluded from the Site to allow access past the Site.

Scientific value. No geothermally-heated ground is known within the Site. The main point of botanical interest is that all surfaces within the Site date from 1967, thereby allowing accurate monitoring of colonisation by plants and other biota. The Site has a generally barren appearance, but close inspection reveals an abundance of inconspicuous mosses and lichens. In the absence of geothermal activity here, colonisation processes may be related to aspects of the current trend in climate change. Although species diversity is low, the developing communities are typical of non-heated habitats throughout the island.

Site G - Pendulum Cove

Area encompassed. The Site comprises the uneven gentle slope of coarse grey, crimson, and red scoria and occasional disintegrating blocks of yellowish tuff, east-northeast of Crimson Hill and c. 0.4 – 0.8km east of Pendulum Cove. It extends c. 500m from west to east and is up to c. 400m wide from north to south. It was created largely by the 1969 eruption which destroyed the nearby abandoned Chilean Base (Historic Site and Monument No 76). The Site includes the slope and undulating “plateau” behind Pendulum Cove.

Boundaries. The western boundary follows the 40m contour line and the eastern boundary follows the 140m contour line east-southeast of Pendulum Cove. The

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northern and southern boundaries follow the edge of the volcanic debris-covered permanent ice that borders the Site.

Scientific value. Geothermal activity was recorded during a survey in 1987, with substantial heat being emitted from crevices amongst scoria. There was no such evidence in 2002. Although vegetation is very sparse, this known-age site is being colonised by numerous moss and lichen species. Two of the mosses (*Racomitrium lanuginosum* and *R. heterostichoides*) are unique both on the island and in the Antarctic, and both are very rare here. Several other mosses are Antarctic rarities.

Site H - Mt. Pond

Area encompassed. The Site is situated c. 1.4 to 2km north-north-west of Mount Pond summit. The extensive area of geothermally-heated ground includes an area (c. 150 × 500m) on the north eastern side of the gently sloping upper part of a broad ridge at c. 385 to 500m elevation (Smith 1988). At the northern end of the Site there are numerous inconspicuous fumarole vents in low mounds of very fine, compacted baked soil. The higher, southern, part of the Site is close to a large rime dome at 512m, in the lee of which (at c. 500 to 505m) are numerous active fumaroles, also surrounded by fine, compacted baked soil, on a steep, moist, sheltered slope. The extensive areas of heated ground surrounding the fumaroles comprise a fine soil with a soft crust that is extremely vulnerable to trampling. There are several stands of dense, thick (up to 10cm) bryophyte vegetation associated with these areas. The adjacent yellowish tuff outcrops support a different community of mosses and lichens.

Boundaries. The northern boundary is marked by Lat. 62°55'51''S, the southern boundary by Lat. 62°56'12''S and the eastern boundary is marked by Long. 060°33'30''W. The western boundary follows the ridgeline of the broad ridge that slopes north northwest from the summit of Mt. Pond between Long. 060°33'48''W and Long. 060°34'51''W.

Scientific value. This is an outstanding site of botanical interest, unique in the Antarctic. It possesses several moss species which are either unique to the Antarctic or are extremely rare in Antarctica. The development of the moss turf (*Dicranella hookeri* and *Philonotis polymorpha*) in the main upper part of the Site is exceptional, and two or more species have colonised profusely since last inspected in 1994. The large liverwort (*Marchantia berteroana*) is rapidly colonising the warm moist soil crust at the periphery of the moss stands. At least one species of toadstool fungus also occurs amongst the moss, the highest known record for these organisms in Antarctica. A totally different community of mosses and lichens occurs on the rock outcrops, and also includes several extremely rare species (notably *Schistidium andinum* and *S. praemorsum*).

Site J - Perchué Cone

Area encompassed. This ash cone lies c. 750m northeast of Ronald Hill and comprises a very narrow line of fumaroles and adjacent heated ground on the west-facing slope at c. 160-170m elevation. The geothermal area covers c. 25 × 10m, and the fine ash and lapilli surface of the entire slope is very vulnerable to pedestrian damage.

Boundaries. The boundary encompasses all of the ash and cinder cone referred to as Perchué Cone.

Scientific value. The Site contains several mosses that are extremely rare in Antarctica. Photographic evidence suggests that the extent of moss colonisation has decreased since the mid-1980s.

Site K – Ronald Hill to Kroner Lake

Area encompassed. This Site includes the circular flat plain of the crater immediately to the south of Ronald Hill, and extends along the prominent broad shallow outwash gully with a low bank on either side, leading southwards from here to Kroner Lake. The substratum throughout the area is consolidated mud, fine ash and lapilli deposited by the lahar during the 1969 eruption. Part of the Site, notably the gully, remains geothermally active. The Site also includes the intertidal geothermal lagoon (Kroner Lake) as it is part of the same volcanological feature. This small, shallow, circular, brackish crater lake was broached by the sea during the 1980's, and is now the only geothermally heated lagoon in the Antarctic.

Boundaries. The boundary surrounds the crater basin, gully, Kroner Lake and an area between c. 100 – 150m wide around the lake. A corridor below Ronald Hill, from the break-of-slope to the lowermost massive boulders about 10 to 20m beyond, remains outside the boundary to allow access past the Area.

Scientific value. The surfaces of this Site are of a known age and are being colonised by numerous moss, liverwort and lichen species, several of which are extremely rare in the Antarctic (eg, the mosses *Notoligotrichum trichodon* and *Polytrichastrum longisetum*, and a rare lichen, *Peltigera didactyla*, is colonising >1ha of the crater floor). The geothermal northern intertidal shore of Kroner Lake possesses a unique community of algae.

Site L - South East Point

Area encompassed. An east-west trending rocky ridge c. 0.7km north of South East Point, extending from the top of the sea cliff (c. 20m altitude) westwards for c. 250m, to a point about 80m altitude. The north edge of the ridge is a low vertical lava outcrop, giving way to a steep unstable slope leading to the floor of a gully parallel to the ridge. The south side of the Site is the gently sloping ridge crest covered with ash and lapilli.

Boundaries. The Site extends 50m north and south of the lava outcrop.

Scientific value. This Site has the most extensive population of Antarctic pearlwort (*Colobanthus quitensis*) known in the Antarctic. It was the largest population before the 1967 eruption (Longton 1967), covering c. 300m², but was almost completely destroyed by ash burial. It gradually recovered, but since about 1985-1990 there has been a massive increase in seedling establishment and the population has expanded downwind (westwards, uphill). It is now very abundant in an area of c. 2ha. It is also remarkable for the absence of the other native vascular plant, Antarctic hairgrass (*Deschampsia antarctica*), almost always associated with this plant. Photographs of the Site immediately after the eruption revealed almost total loss of lichens, but these too have recolonised rapidly and extensively, the large bushy *Usnea antarctica* being particularly abundant and attaining a considerable size after the relatively short period since recolonisation. The cryptogamic flora of the Site is generally sparse and typical of most of the island. The Site is particularly important for monitoring the reproduction and spread of the pearlwort in a known-age site.

6(ii) Access to the Area

- Access to the Sites shall be by foot or small boat.
- Helicopter landings are prohibited within the Area. The Management Plan for Deception Island ASMA 4 shows recommended helicopter landing sites on

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Deception Island, which are also shown in Figure 1. Helicopter landings sites which may be useful for accessing Sites are located at: Decepción Station (Argentina; Lat. 62°58'30''S, Long. 060°42'00''W), northern Fumarole Bay (Lat. 62°57'18''S, Long. 060°42'48''W), the south of Cross Hill (Lat. 62°56'39''S, Long. 060°41'36''W), eastern Telefon Bay (Lat. 62°55'18''S, Long. 060°38'18''W), Pendulum Cove (Lat. 62°56'12''S, Long. 060°35'45''W) and Whalers Bay (Lat. 62°58'48''S, Long. 060°33'12''W).

- All travel to the Sites shall be undertaken carefully so as to minimize disturbance to soil and vegetation en route.
- The operation of aircraft should be carried out, as a minimum requirement, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). Particular care should be taken when overflying Site A Collins Point, which contains a colony of kelp gulls in the low cliffs above the beach.

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

Two research stations are found close to the ASPA sites: Decepción Station (Argentina; Lat. 62°58'30''S, Long. 060°41'54''W) and Gabriel de Castilla Station (Spain; Lat. 62°58'36''S, Long. 060°40'30''W). Two Historic Sites or Monuments are found close to the ASPA sites: Whalers Bay (HSM 71; Lat. 62°58'42''S, Long. 060°33'36''W) and the ruins of the Base Pedro Aguirre Cerda Station (HSM 76; Lat. 62°56'12''S, Long. 060°35'36''W). Collins Point navigation beacon is situated at Lat. 62°59'42''S, Long. 060°35'12''W. At Site A, Collins Point, there are six 50 × 50cm plots marked with wooden corner stakes, although not all of the four stakes per plot remain (Lat. 63°00'00''S, Long. 060°34'48''W). These were established by the British Antarctic Survey in 1969 to monitor changes in the vegetation in subsequent years (Collins 1969); data were obtained in 1969 and 2002. These markers should be maintained.

Structures within the Site C, Caliente Hill, include some experimental apparatus monitoring long-term ground temperature variations (operated by the Spanish National Antarctic Programme) and several short metal stakes arranged along the ridgeline near the summit.

Other structures near to the Area are listed in the ASMA Management Plan for Deception Island.

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

ASPA 145 comprises two Sites of benthic importance within Port Foster. Deception Island and Port Foster are managed within ASMA 4 Deception Island.

6(v) Special zones within the Area

None.

7. Permit conditions

7(i) General permit conditions

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

- it is issued only for compelling scientific reasons which cannot be served elsewhere;
- or
- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardise the floristic, ecological or scientific values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or an authorised copy, must be carried within the Area;
- permits shall be issued for a stated 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

- Land vehicles are prohibited in the Area.
- Helicopter landings are prohibited within the Area. The Management Plan for Deception Island ASMA 4 shows recommended helicopter landing sites on Deception Island (see also Figure 1).
- Movement within the Area Sites shall be on foot.
- Rowing boats are permitted for sampling purposes in the lakes in Site B - Crater Lake and Site F - Telefon Bay, and the lagoon in Site K - Ronald Hill to Kroner Lake. Prior to use at each Site, boats shall be cleaned to reduce the risk of introductions of non-native species from outside the Treaty area and other Antarctic locations, including other Sites within ASPA 140.
- All movement shall be undertaken carefully so as to minimize disturbance to soil and vegetation. In particular, the vegetation on Site C - Caliente Hill is sparse and not obvious and is therefore particularly vulnerable to trampling.

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

Activities include:

- compelling scientific research which cannot be undertaken elsewhere and which will not jeopardize the flora and ecology of the Area;
- essential management activities, including monitoring.
- surveys, to be undertaken as necessary, to determine the state of the botanical values for which each Site has been designated, in support of the aims of this Management Plan.

7(iv) Installation, modification or removal of structures

Structures shall not be erected within the Area except as specified in a Permit. All scientific equipment, botanical quadrats or other markers 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 (see Section 7(vi)).

7(v) Location of field camps

Camping is not permitted within the Area. The ASMA Management Plan for Deception Island shows recommended sites for field camps on the island, but outside ASPA 140. Campsites which may be useful for accessing Sites are located at: northern Fumarole Bay (Lat. 62°57'18''S, Long. 060°42'42''W), the south of Cross Hill (Lat. 62°56'36''S, Long. 060°41'30''W), eastern Telefon Bay (Lat. 62°55'18''S, Long. 060°38'12''W), Pendulum Cove (Lat. 62°56'12''S, Long. 060°35'42''W) and Whalers Bay (Lat. 62°58'54''S, Long. 060°33'0''W) (see Figure 1).

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. No poultry or egg products shall be taken into the Area. Further guidance can be found in the CEP Non-native Species Manual (Edition 2011) and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable shall not be permitted.

Fuel, food and other materials are not to be deposited within the Area, unless authorized by Permit for specific scientific or management purposes. Permanent depots are not permitted. All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of the stated period, and shall be stored and handled so that risk of their introduction into the environment is minimised. 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 and fauna

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

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

Material of a biological, geological (including soil and lake sediment), or hydrological nature 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, flora or fauna that their

distribution or abundance within the Area would be significantly affected. Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed 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. If wind-blown debris is found in the Area it should be removed. Plastic debris should be disposed of in accordance with Annex III (Waste disposal and waste management) of the Protocol on Environmental Protection to the Antarctic Treaty (1998). Other wind-blown material should be returned to the Historic Site or Monument from which it originated and secured to prevent further dispersal by wind. A report describing the nature of the material removed from the ASPA and the location within the Historic Site and Monument where it has been secured and stored, should be submitted to the Deception Island Antarctic Specially Managed Area (ASMA) Management Group, via the Chair, to establish the most appropriate way to deal with the debris (ie, conservation to preserve any historic value or appropriate disposal) (see Deception Island ASMA website: <http://www.deceptionisland.aq/contact.php>).

7(ix) Disposal of waste

All wastes shall be removed from the Area in accordance with Annex III (Waste disposal and waste management) of the Protocol on Environmental Protection to the Antarctic Treaty (1998). In order to avoid anthropogenic microbial and nutrient enrichment of soils, no solid or liquid human waste should be deposited within the Area. Human wastes may be disposed of within Port Foster, but avoiding ASPA 145.

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, vulcanological or seismic monitoring and site inspection activities.
- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Permits may be granted to allow for monitoring of the Area, or to allow for some active management as set out in Section 3.

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 as an Appendix in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (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. Wherever possible, Parties should deposit the original or copies of the 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.

8. Supporting documentation

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Figure 1. Map of Deception Island showing the 11 sites that make up ASPA 140 Parts of Deception Island, South Shetland Islands.

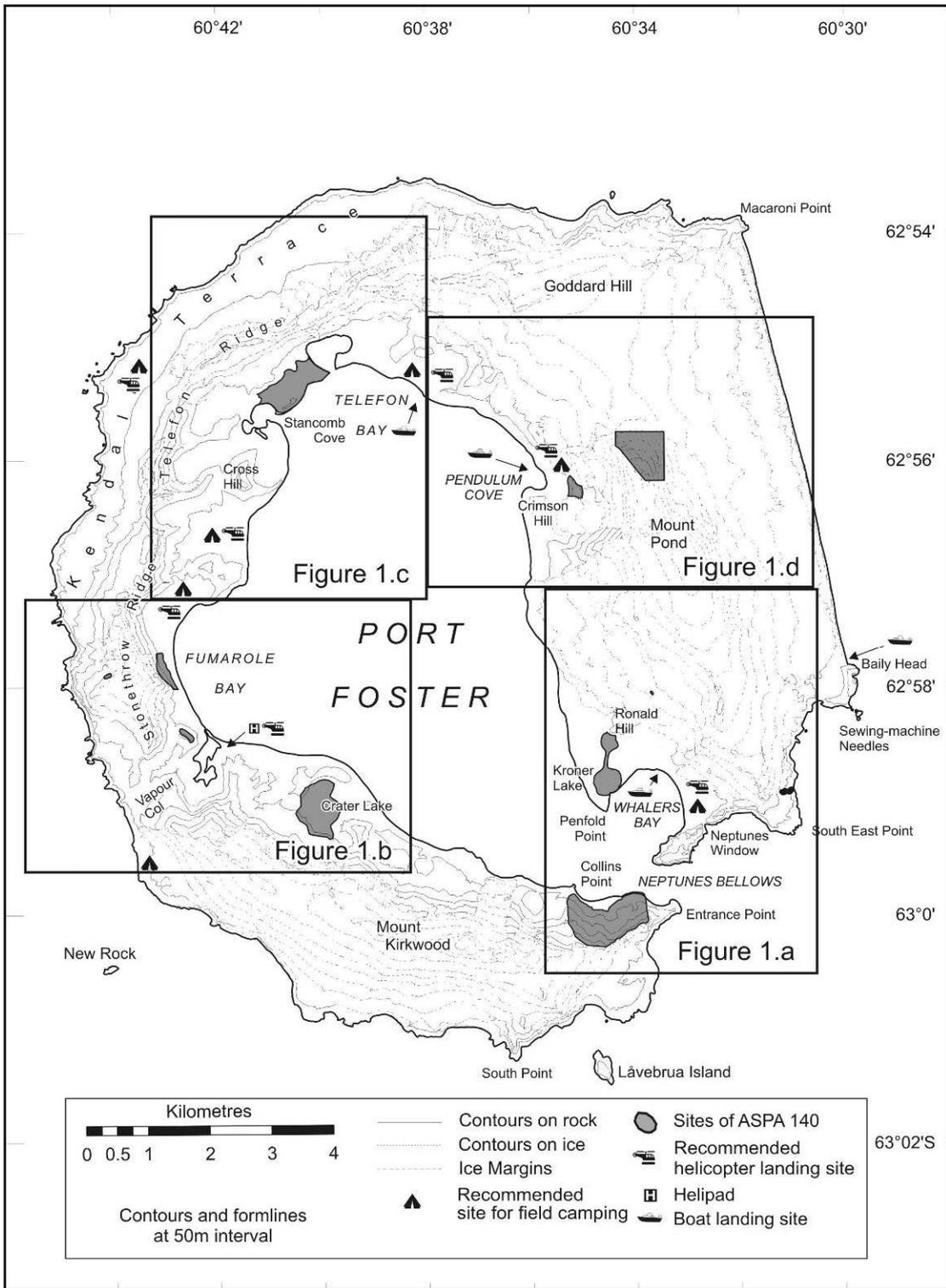


Figure 1a. Map showing the location of ASPA No. 140 Sites A, J, K and L.

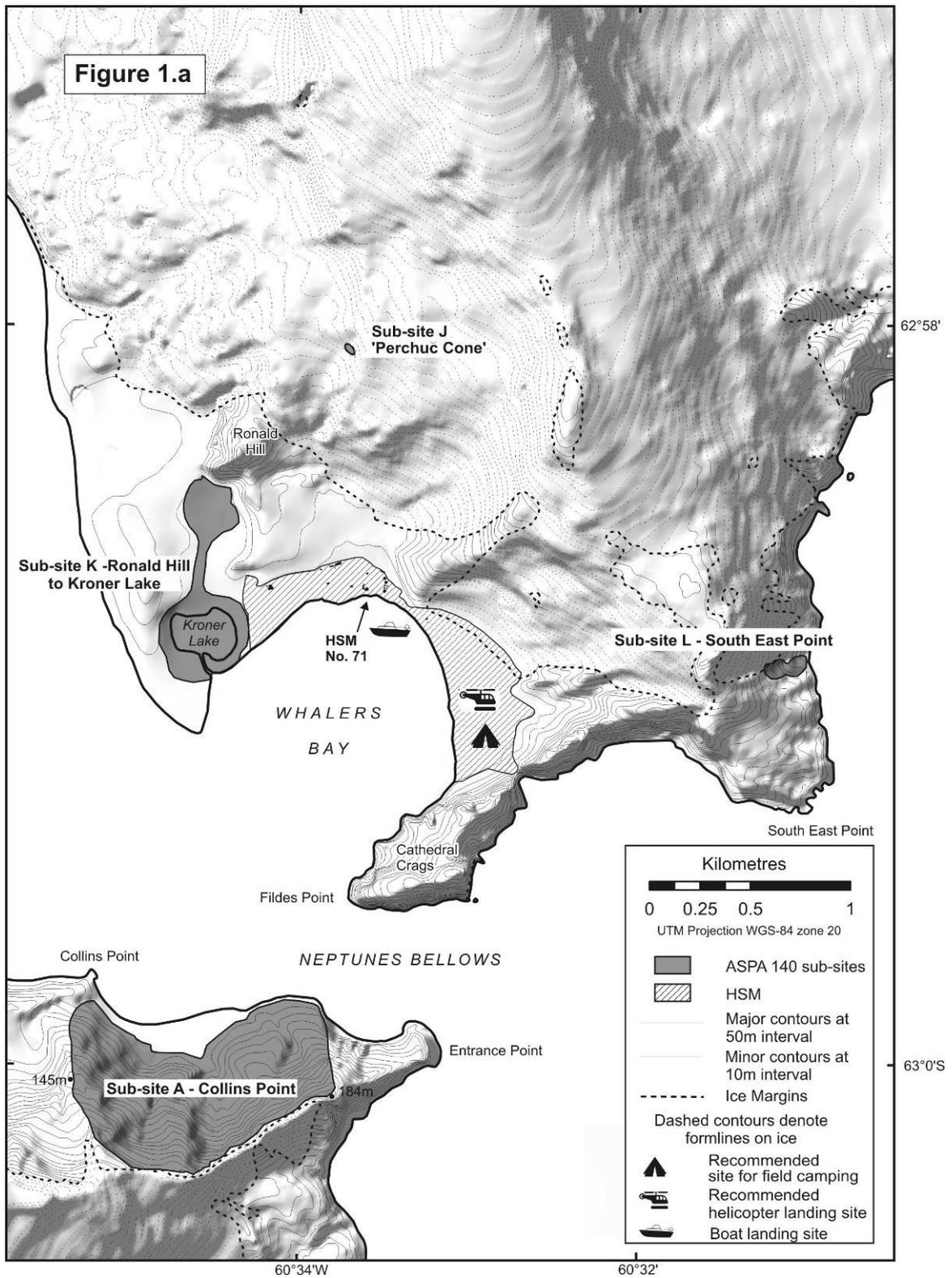


Figure 1b. Map showing the location of ASPA No. 140 Sites B, C, D and E.

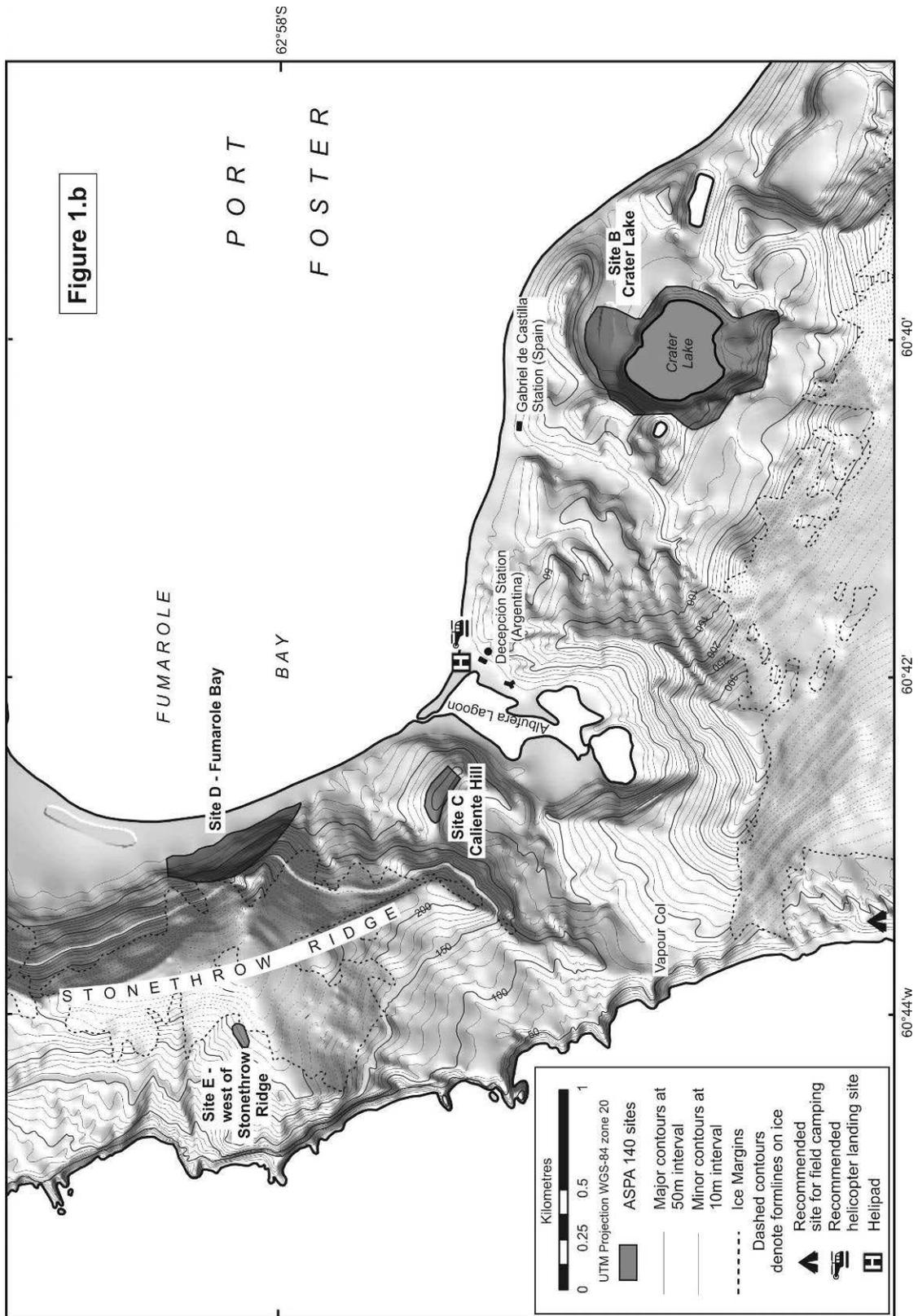


Figure 1c. Map showing the location of ASPA No. 140 Site F.

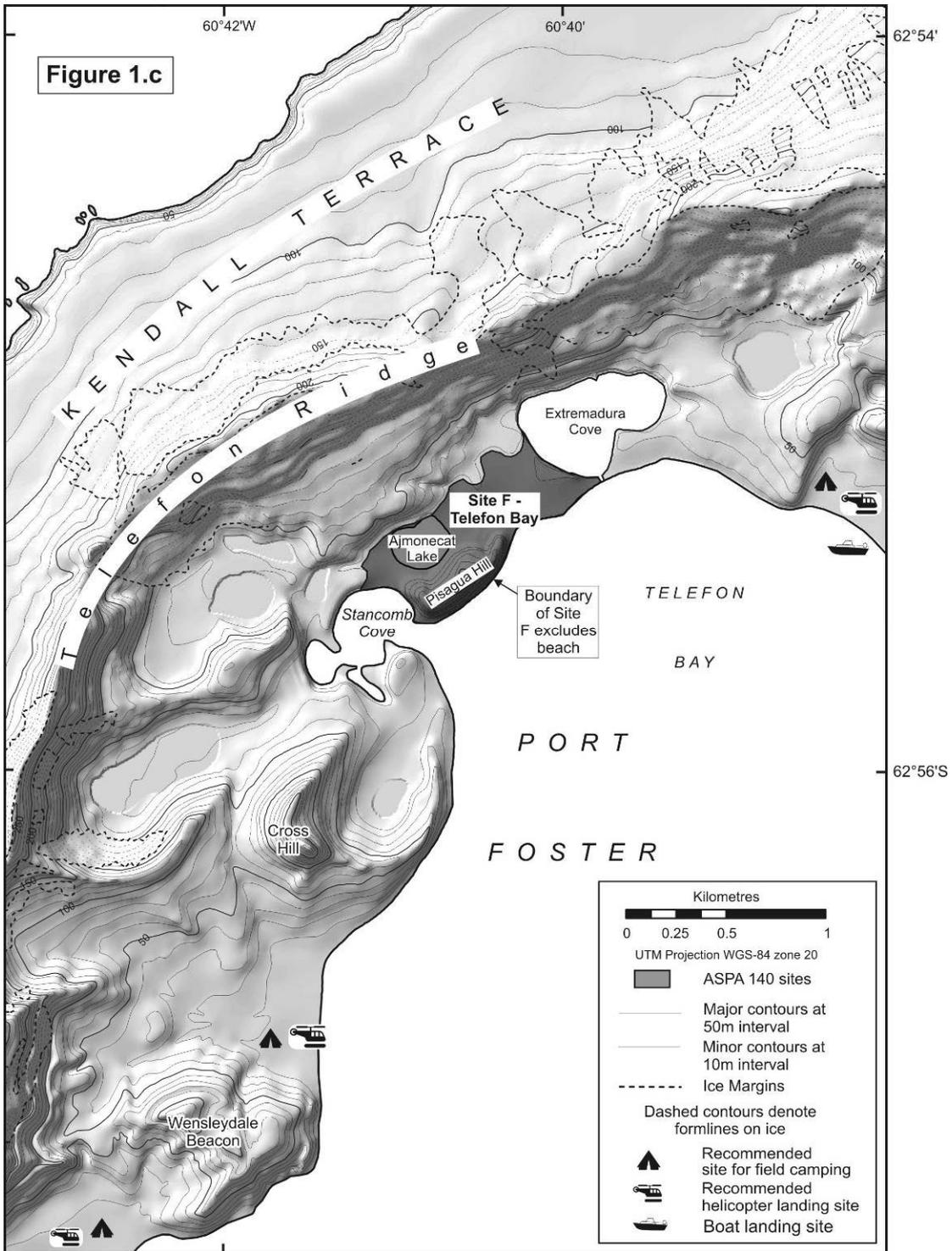
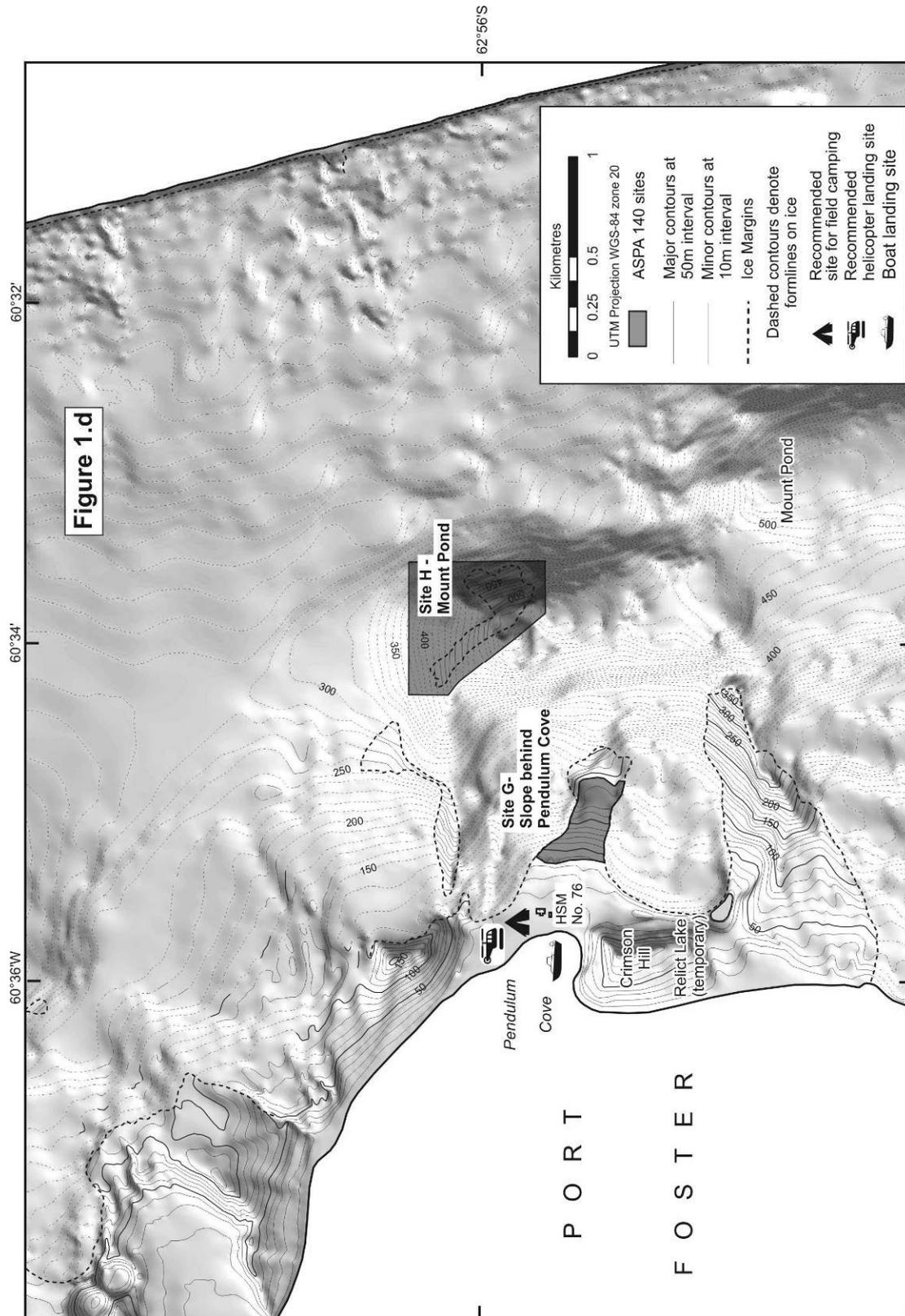


Figure 1d. Map showing the location of ASPA No. 140 Sites G and H.



Annex 1. List of plant species, classed as rare or very rare in the Antarctic Treaty Area, occurring on Deception Island.

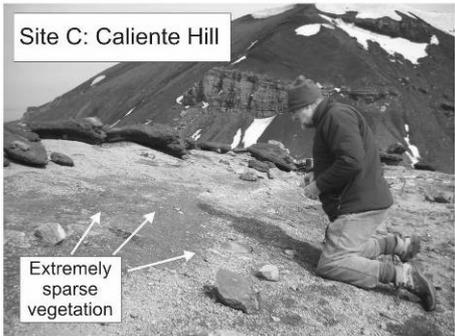
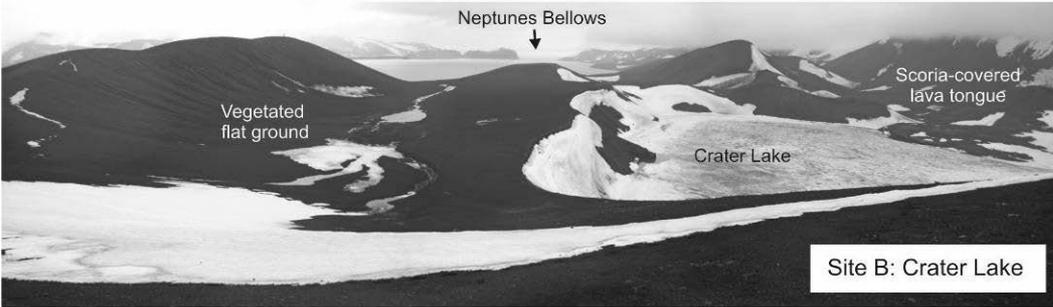
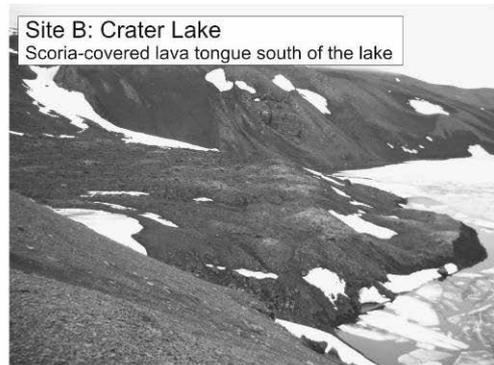
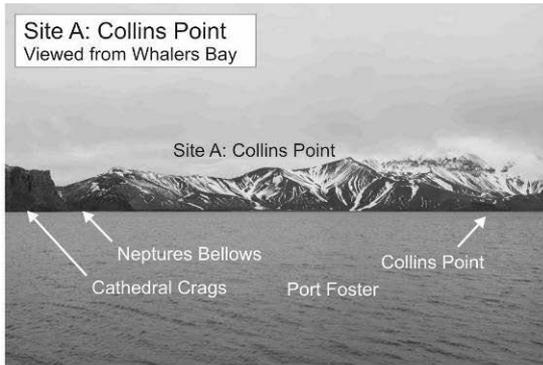
A. Bryophytes (L = Liverwort)

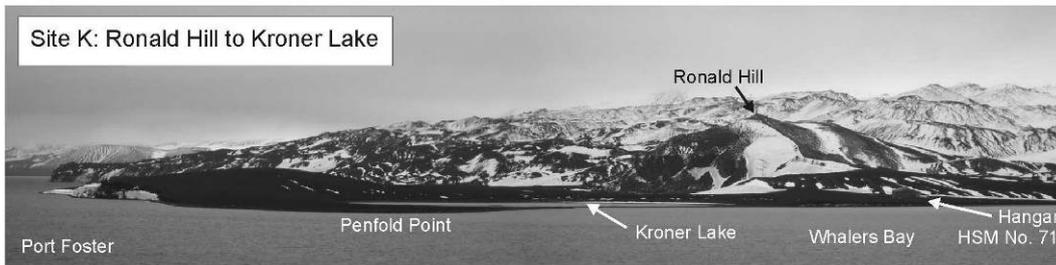
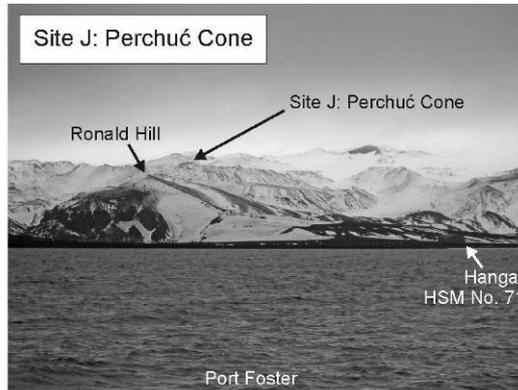
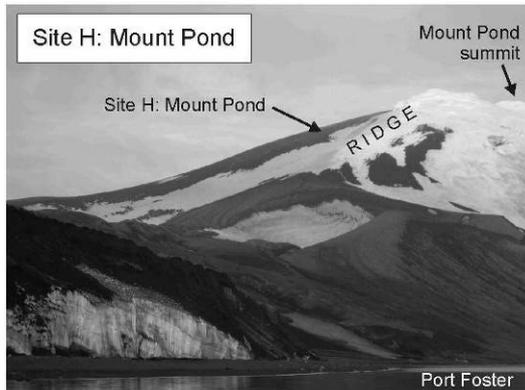
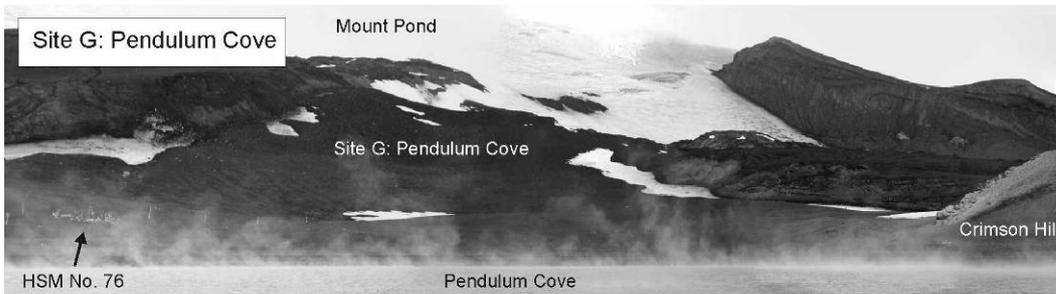
Species	Sites where	Notes
<i>Brachythecium austroglareosum</i>	D	Few other known Antarctic sites
<i>B. fuegianum</i>	G	Only known Antarctic site
<i>Bryum amblyodon</i>	C, D, G, K	Few other known Antarctic sites
<i>B. dichotomum</i>	C, E, H, J	Only known Antarctic site
<i>B. orbiculatifolium</i>	H, K	One other known Antarctic site
<i>B. pallescens</i>	D	Few other known Antarctic sites
<i>Cryptochila grandiflora</i> (L)	E	Only known Antarctic site
<i>Dicranella hookeri</i>	C, E, H	Only known Antarctic site
<i>Didymodon brachyphillus</i>	A, D, G, H	Locally more abundant than any other
<i>Ditrichum conicum</i>	E	Only known Antarctic site
<i>D. ditrichoideum</i>	C, G, J	Only known Antarctic site
<i>D. heteromallum</i>	C, H	Only known Antarctic site
<i>D. hyalinum</i>	G	Few other known Antarctic sites
<i>D. hyalinocuspdatum</i>	G	Few other known Antarctic sites
<i>Grimmia plagiopodia</i>	A, D, G	A continental Antarctic species
<i>Hymenoloma antarcticum</i>	B, C, D, E, G, K	Few other known Antarctic sites
<i>H. crispulum</i>	G	Few other known Antarctic sites
<i>Notoligotrichum trichodon</i>	K	One other known Antarctic site
<i>Philonotis polymorpha</i>	E, H	Only known Antarctic site
<i>Platyneurum jungermannioides</i>	D	Few other known Antarctic sites
<i>Polytrichastrum longisetum</i>	K	One other known Antarctic site
<i>Pohlia wahlenbergii</i>	C, E, H	One other known Antarctic site
<i>Racomitrium heterostichoides</i>	G	Only known Antarctic site
<i>R. lanuginosum</i>	G	Only known Antarctic site
<i>R. subsecundum</i>	C	Only known Antarctic site
<i>S. amblyophyllum</i>	C, D, G, H	Few other known Antarctic sites
<i>S. andinum</i>	H	Few other known Antarctic sites
<i>S. deceptionensis</i> sp. nov.	C	Deception endemic
<i>S. leptoneurum</i> sp. nov.	D	Deception endemic
<i>Schistidium praemorsum</i>	H	One other known Antarctic site
<i>Syntrichia andersonii</i>	D, L	Only known Antarctic site

B. Lichens

Species	Sites where species	Notes
<i>Acarospora austroshetlandica</i>	A	One other known Antarctic site
<i>Caloplaca johnstonii</i>	B, D, F, L	Few other known Antarctic sites
<i>Catapyrenium lachneoides</i>	?	Few other known Antarctic sites
<i>Cladonia galindezii</i>	A, B, D	More abundant than any other known
<i>Degelia sp.</i>	K	Only known Antarctic site
<i>Ochrolechia parella</i>	A, B, D	More abundant than any other known
<i>Peltigera didactyla</i>	B, K	Very rare in B; very small colonising
<i>Pertusaria excludens</i>	D	Few other known Antarctic sites
<i>P. oculae-ranae</i>	G	Only known Antarctic site
<i>Placopsis parellina</i>	A, B, D, G, H	More abundant than any other known
<i>Protoparmelia loricata</i>	B	Few other known Antarctic sites
<i>Psoroma saccharatum</i>	D	Only known Antarctic site
<i>Stereocaulon condensatum</i>	E	Only known Antarctic site
<i>S. vesuvianum</i>	B, G	Few other known Antarctic sites

Annex 2. Photographs of the Sites comprising ASPA 140. Photographs were taken between 19-26 Jan 2010 (K. Hughes: A, B, C, E, F, G, J, K, L; P. Convey: D, H).





Annex 3. Boundary coordinates for the Sites that comprise ASPA 140 Parts of Deception Island. Many of the boundaries follow natural features and detailed descriptions of the boundaries are found in Section 6. The boundary coordinates are numbered, with number 1 the most northerly co-ordinate and further coordinates numbered sequentially in a clockwise direction around each Site.

Site	Number	Latitude	Longitude
A: Collins Point	1	62°59'50" S	060°33'55" W
	2	63°00'06" S	060°33'51" W
	3	63°00'16" S	060°34'27" W
	4	63°00'15" S	060°34'53" W
	5	63°00'06" S	060°35'15" W
	6	62°59'47" S	060°35'19" W
	7	62°59'59" S	060°34'48" W
	8	62°59'49" S	060°34'07" W
B: Crater Lake	1	62°58'48" S	060°40'02" W
	2	62°58'50" S	060°39'45" W
	3	62°58'56" S	060°39'52" W
	4	62°59'01" S	060°39'37" W
	5	62°59'11" S	060°39'47" W
	6	62°59'18" S	060°39'45" W
	7	62°59'16" S	060°40'15" W
	8	62°59'04" S	060°40'31" W
	9	62°58'56" S	060°40'25" W
C: Caliente Hill	1	62°58'33" S	060°42'12" W
	2	62°58'27" S	060°42'28" W
	3	62°58'29" S	060°42'33" W
	4	62°58'25" S	060°42'51" W
D: Fumarole Bay	1	62°57'42" S	060°43'05" W
	2	62°58'04" S	060°42'42" W
	3	62°57'53" S	060°43'08" W
	4	62°57'43" S	060°43'13" W
E: west of Stonethrow Ridge	1	62°57'51" S	060°44'00" W
	2	62°57'54" S	060°44'00" W
	3	62°57'54" S	060°44'10" W
	4	62°57'51" S	060°44'10" W
F: Telefon Bay	1	62°55'02" S	060°40'17" W
	2	62°55'11" S	060°39'45" W
	3	62°55'35" S	060°40'43" W
	4	62°55'30" S	060°41'13" W
	5	62°55'21" S	060°41'07" W
G: Pendulum Cove	1	62°56'10" S	060°35'15" W
	2	62°56'20" S	060°34'41" W
	3	62°56'28" S	060°34'44" W

	4	62°56'21'' S	060°35'16'' W
H: Mt. Pond	1	62°55'51'' S	060°33'30'' W
	2	62°56'12'' S	060°33'30'' W
	3	62°56'12'' S	060°33'48'' W
	4	62°55'57'' S	060°34'42'' W
	5	62°55'51'' S	060°34'42'' W
J: Perchué Cone	Point location	62°58'02'' S	060°33'39'' W
K: Ronald Hill to Kroner Lake	1	62°58'25'' S	060°34'22'' W
	2	62°58'32'' S	060°34'20'' W
	3	62°58'34'' S	060°34'27'' W
	4	62°58'41'' S	060°34'30'' W
	5	62°58'44'' S	060°34'18'' W
	6	62°58'50'' S	060°34'18'' W
	7	62°58'58'' S	060°34'38'' W
	8	62°58'49'' S	060°34'53'' W
	9	62°58'41'' S	060°34'40'' W
	10	62°58'24'' S	060°34'44'' W
L: South-east Point	1	62°58'53'' S	060°31'01'' W
	2	62°58'56'' S	060°30'59'' W
	3	62°58'57'' S	060°31'13'' W
	4	62°58'55'' S	060°31'14'' W

Annex 4. Recommended access to the Sites that comprise ASPA 140.

Site	Name	Recommended access route
A	Collins Point	By boat: land at the coast to the north of the site (Port
B	Crater Lake	Overland: traverse the west side of the ridge that rises to the south of Gabriel de Castilla Station for 500m, then travel east for 200 m until the western boundary of
C	Caliente Hill	Overland: access the site from Fumarole Bay to the north of the site, or along the prominent ridge that lies to
D	Fumarole Bay	By boat: access anywhere along the coast of Fumarole
E	west of Stonethrow Ridge	Overland: from Fumarole Bay, head southwest pass Albufera Lagoon then head north, traversing the west slope of Stonethrow Ridge. The Site lies on the north side
F	Telefon Bay	By boat: access the Site from either Telefon Bay or
G	Pendulum Cove	By boat: access the site from Pendulum Cove, Port Foster,
H	Mt. Pont	Overland: access with caution from Pendulum Cove via
J	Perchué Cone	Overland: access from Whalers Bay via Ronald Hill.
K	Ronald Hill to Kroner Lake	By boat: land in Whalers Bay, south of the Site - do not take boats into Kroner Lake to access the site (see Section 7(ii) for details)
L	South-east Point	On foot: Access overland, with caution, from either Whalers Bay (to the west of the Site) or Bailey

**Antarctic Specially Protected Area No 172
(Lower Taylor Glacier and Blood Falls, Taylor Valley,
McMurdo Dry Valleys, Victoria Land): Management Plan**

The Representatives,

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

Recalling Measure 1 (2004), which designated McMurdo Dry Valleys, Southern Victoria Land as Antarctic Specially Managed Area (“ASMA”) No 2 and annexed a Management Plan for the Area;

Noting that the Committee for Environmental Protection has endorsed a Proposal for a new ASPA at Lower Taylor Glacier and Blood Falls, Taylor Valley, McMurdo Dry Valleys, Victoria Land, lying within ASMA 2, and endorsed the Management Plan annexed to this Measure;

Recognising that this area supports outstanding environmental, scientific, historic, aesthetic or wilderness values, or ongoing or planned scientific research, and would benefit from special protection;

Desiring to designate Lower Taylor Glacier and Blood Falls, Taylor Valley, McMurdo Dry Valleys, Victoria Land as an ASPA and to approve the Management Plan for this Area;

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

That:

1. Lower Taylor Glacier and Blood Falls, Taylor Valley, McMurdo Dry Valleys, Victoria Land be designated as Antarctic Specially Protected Area No 172; and
2. the Management Plan, which is annexed to this Measure, be approved.

Management Plan for Antarctic Specially Protected Area No 172

Lower Taylor Glacier and Blood Falls, McMurdo Dry Valleys, Victoria Land

Introduction

Blood Falls is an iron-rich saline discharge located at the terminus of the Taylor Glacier, Taylor Valley, McMurdo Dry Valleys. The source of the discharge is believed to be a subglacial marine salt deposit and brine reservoir located beneath the ablation zone of the Taylor Glacier, estimated to be located between one to six kilometres above Blood Falls. Approximate area and coordinates: sub-surface area 436km² (centered at 161°40.230'E, 77°50.220'S); sub-aerial area 0.11km² (centered at the Blood Falls discharge at 162°15.809'E, 77°43.365'). The primary reasons for designation of the Area are its unique physical properties, and the unusual microbial ecology and geochemistry. The Area is an important site for exobiological studies and provides a unique opportunity to sample the subglacial environment without direct contact. The influence of Blood Falls on adjacent Lake Bonney is also of significant scientific interest. Furthermore, the ablation zone of the Taylor Glacier is an important site for paleoclimatic and glaciological research. The lower Taylor Glacier subglacial brine reservoir and Blood Falls are globally unique and a site of outstanding scientific importance. Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) the Area lies within Environment S – McMurdo – South Victoria Land geologic. Designation of the Area allows for scientific access to ice deep within Taylor Glacier, provided measures are in place to ensure this does not compromise the Blood Falls reservoir and hydrological system.

1. Description of values to be protected

Blood Falls is a distinctive glacial feature located at 162°16.288'E, 77°43.329'S, at the terminus of the Taylor Glacier in the Taylor Valley, McMurdo Dry Valleys, southern Victoria Land (Map 1). The feature forms where an iron-rich, saline liquid discharge of subglacial origin emerges at the surface and then rapidly oxidizes to give it a distinctive red coloration (Figure 1). Available evidence suggests the source of the discharge is a subglacial marine salt deposit and brine reservoir located beneath the Taylor Glacier (Keys 1980; Hubbard *et al.* 2004) (Map 1). The feature is unique in its physical configuration, microbial biology and geochemistry and has an important influence on the local ecosystem of Lake Bonney. Furthermore, the episodic discharge events at Blood Falls provide a unique opportunity to sample the properties of the subglacial reservoir and its ecosystem.

Blood Falls was first observed by Griffith Taylor, Robert F. Scott's Senior Geologist, in 1911. However, scientific research into its unusual morphological and geochemical characteristics did not commence until the late 1950s (Hamilton *et al.* 1962; Angino *et al.* 1964; Black *et al.* 1965). The feature named as Blood Falls is the primary discharge site at the terminus of the Taylor Glacier (Map 2). A secondary lateral saline discharge has been observed to emerge at the surface from under sediments ~40 m north from the Taylor Glacier at the margin of the Santa Fe Stream delta (162°16.042'E, 77°43.297'S,

Map 2). The exact location and form of the subglacial reservoir source feeding Blood Falls is currently uncertain, although geological, glacio-chemical and geophysical mapping results suggest that the reservoir is located between one to six kilometres from the terminus (Keys 1980; Hubbard *et al.* 2004). It has been estimated that the brine reservoir became encased by ice approximately 3 to 5 Ma BP (Mikucki *et al.* 2004) and may represent the oldest liquid feature in the Taylor Valley (Lyons *et al.* 2005).

The Blood Falls outflow contains a unique microbial community of apparently marine origin. The microbes may survive in the subglacial environment for millions of years without external carbon input. On account of its high iron and salt content, the microbial ecosystem at Blood Falls is an important site for exobiological studies and may provide an analogue for the conditions found beneath the polar ice caps on Mars. It is therefore important to ensure that the Blood Falls microbial community, the brine reservoir and associated subglacial hydrological system are protected.

The discharge episodically released from Blood Falls into adjacent Lake Bonney alters the geochemical composition of the lake and provides nutrients that are otherwise limited, making the site valuable for investigation of the impacts of subglacial outflow on lake ecosystems.

The Taylor Glacier is an important site for Antarctic glaciological and paleoclimatic studies. It provides a unique opportunity to study Antarctic outlet glacier behaviour in relation to environmental change, using ice core paleoclimatic data from Taylor Dome, geologic evidence from the Taylor Valley and climatic data from nearby US Long Term Ecological Research (LTER) sites (Kavanaugh *et al.* 2009a; Bliss *et al.* 2011). The lower ablation zone of the Taylor Glacier has been identified as a potentially valuable site for paleoclimatic studies, as it exposes ice from the last glacial period and allows past concentrations of trace gases to be measured at a high temporal resolution (Aciego *et al.* 2007). In addition, the Taylor Glacier is of scientific value for glaciological studies, in particular glacier dynamics and the relationships between stresses and glacier flow, and for other glaciological research (Kavanaugh & Cuffey 2009).

The Blood Falls system is a valuable site for study of microbiology, water chemistry, glaciology, and paleoclimatology. The most unusual aspects of the Blood Falls system are its physical configuration, brine chemistry and microbial ecosystem. Blood Falls also exerts considerable influence over the geochemistry and microbiology of Lake Bonney. The Area possesses outstanding aesthetic values and significant educational value, as the site has been the subject of a range of scientific and media articles in recent years. Blood Falls and the Taylor Glacier brine reservoir merit special protection due to their outstanding scientific values, unique configuration, ancient origin, importance to ecosystems in the local area, and their vulnerability to disturbance by human activities.

On the basis of presently available knowledge, the input of contaminants directly into the subglacial reservoir or into areas of the bed from which subglacial fluids could flow towards the reservoir has been identified as the most likely potential mechanism for contamination of the Taylor Glacier brine reservoir. However, the uncertainties surrounding the location of the subglacial reservoir and its connectivity with the subglacial hydrological system make it difficult to assess the likelihood of this occurring and for this reason a precautionary approach has been adopted when defining the boundaries of the sub-surface component of the Area.

2. Aims and objectives

Management at the lower Taylor Glacier and Blood Falls 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, in particular on the microbial community, water chemistry and physical configuration of the lower Taylor Glacier and Blood Falls;
- allow other scientific research and visits for education / outreach provided they will not jeopardize the values of the Area;
- minimize the possibility of introduction of alien plants, animals and microbes into the Area;
- allow visits for management purposes in support of the aims of the Management Plan.

1. Management activities

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

- Markers 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 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 (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate;
- A copy of this Management Plan shall be kept available in the principal research hut facilities proximal to the Area, in particular the Lake Bonney, Lake Hoare, Lake Fryxell, F6, and New Harbor camps, and at McMurdo Station and Scott Base;
- National Antarctic programmes operating in the region shall consult together for the purpose of ensuring that the above provisions are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA 172: Lower Taylor Glacier and Blood Falls sub-surface protected area boundary. Projection: Lambert Conformal Conic; Standard parallels: 1st 77°35'S; 2nd 77°50'S; Central Meridian: 161°30'E; Latitude of Origin: 78°00'S; Spheroid and horizontal datum: WGS84; Contour interval 200m.

Inset 1: Location of ASMA 2 McMurdo Dry Valleys in the Ross Sea region.

Inset 2: Location of the Taylor Glacier in ASMA 2 McMurdo Dry Valleys.

Map 2: ASPA 172: Blood Falls sub-surface and sub-aerial protected area boundary and designated camp site. Projection: Lambert Conformal Conic; Standard parallels: 1st 77°43'S; 2nd 77°44'S; Central Meridian: 162°16'E; Latitude of Origin: 78°00'S; Spheroid and horizontal datum: WGS84; Contour interval 20m.

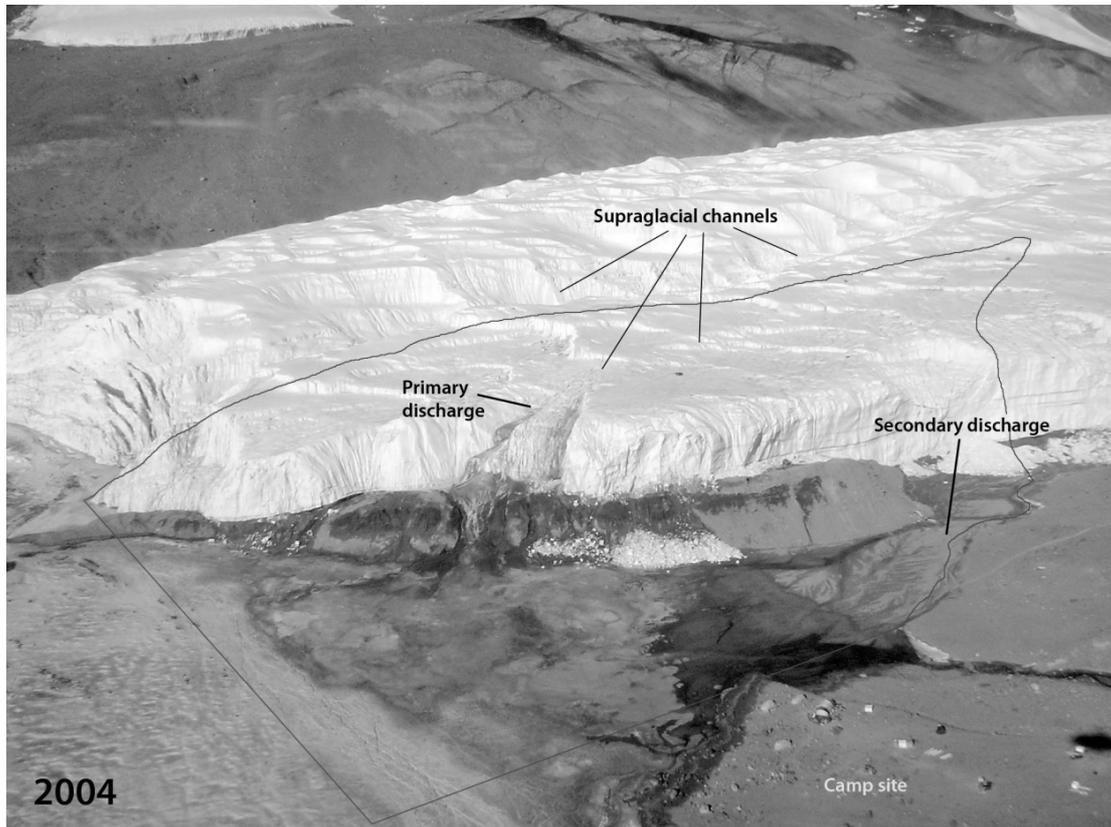


Figure 1. Aerial view of the terminus of the Taylor Glacier in 2004, with Blood Falls at center and Lake Bonney at lower left (Photographer unknown: 18 Nov 2004).

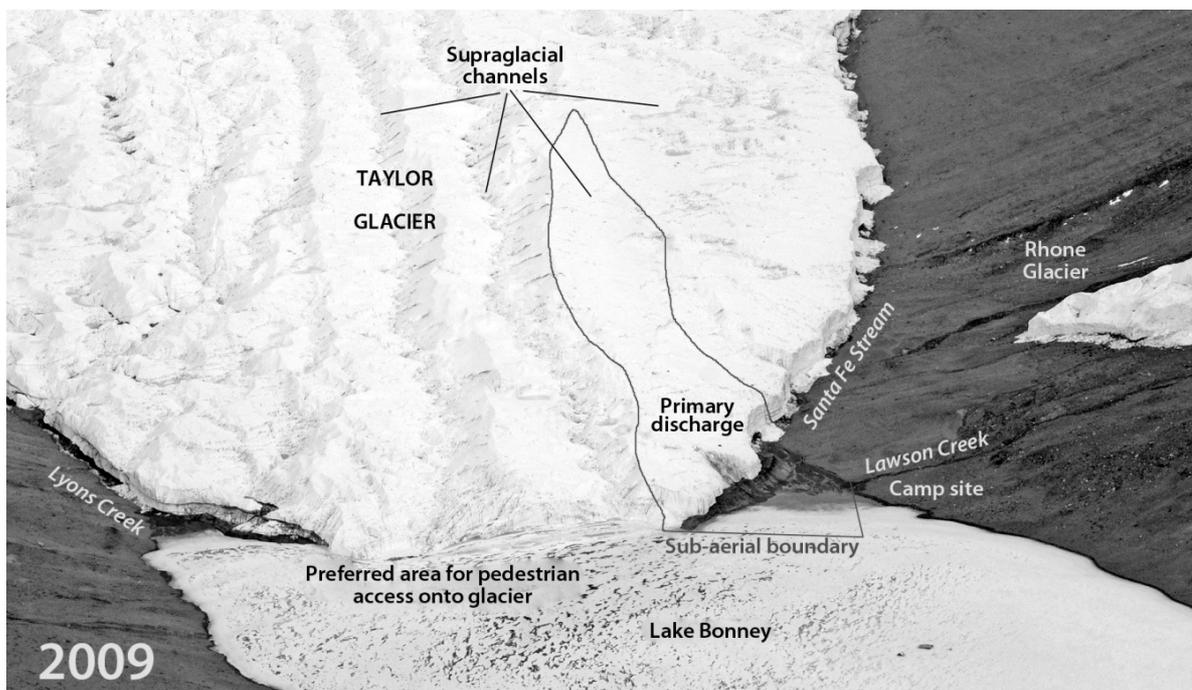


Figure 2. Aerial view of the terminus of the Taylor Glacier in 2009, showing the extent of the sub-aerial component of the Area. A comparison with Figure 1 highlights the extent to which the size of the discharge varies over time (C. Harris, ERA / USAP: 10 Dec 2009).

6. Description of the Area

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

Overview

Blood Falls (located at 162°16.288'E, 77°43.329'S) is an iron-rich, hypersaline discharge that emerges from a crevasse near the terminus of Taylor Glacier, in the McMurdo Dry Valleys, southern Victoria Land. The brine initially lacks color, but freezes to a bubbly white icing as it flows off the glacier and then oxidises to produce its distinctive red-orange colour. Many traces of iron coloured material remain encapsulated in former crevasses and cracks in the glacier especially near the primary discharge point. A secondary, much smaller and less distinct, surface discharge has been observed twice (1958, 1976) ~40m north of Taylor Glacier at the margin of the Santa Fe stream delta (162°16.042'E, 77°43.297'S, Map 2). The secondary discharge has a similar physical and chemical composition to the primary outlet at Blood Falls (Keys 1980).

The volume and physical extent of the primary Blood Falls surface outflow and icing accumulation varies over time, ranging from a few hundred to several thousand cubic metres of saline icing, and the discharge events occur at intervals of one to three years or more (Keys 1980). An unknown proportion of brine sometimes drains, before it freezes (e.g. 1972, 1978) into Lake Bonney. At its minimum extent, the discharge appears as a small area of discoloration at the Taylor Glacier terminus, but can extend tens of metres across Lake Bonney at its maximum (see eg, Figures 1 & 2).

The source of the brine discharges is subglacial, and the water in the discharge brine is melted glacial ice but the nature of the source is unclear (Keys pers. comm. 2012). Chemical and isotopic analyses indicate that a marine salt deposit or deposits are

melting and / or have melted ice of Taylor Glacier (Keys 1980). Deepened subglacial topography beneath the Taylor Glacier between one to six kilometres from the terminus suggests the salt body is likely to be located there but there could be other locations further up glacier. The thickness and extent of the resulting subglacial brine, or the exact location and nature of the resulting reservoir(s) and brine drainage paths have yet to be firmly established (Keys 1980; Hubbard *et al.* 2004).

Boundaries and coordinates

The boundaries of the Area are designed to protect the values of the subglacial brine reservoir and the Blood Falls surface discharge, taking into account the size of the catchment, likely hydrological connections and practicality. Because there is evidence that hydrological connections and interactions between the surface and bed of the Taylor Glacier are likely to be minimal, restricting access on and / or over the majority of the surface of the catchment is not considered necessary. However, a small area encompassing the confirmed primary and secondary Blood Falls discharges, including a part of the Taylor Glacier surface that drains directly into the primary discharge, is included within the boundary at the surface to provide adequate protection for the confirmed outflow areas (Map 2). The ‘possible discharge’ location examples shown on Map 1 are not currently included within the Area because they remain unconfirmed. They may represent exposures that indicate basal processes that may at one time have involved the reservoir or related features rather than be points of contemporary discharge. Moreover these features do not feed into the reservoir or primary outflow site at Blood Falls.

Subglacial interconnections, on the other hand, could be extensive, so a relatively large sub-surface component extending ~50km up-glacier aims to protect the main part of the subglacial catchment of the lower Taylor Glacier that could be interconnected with the brine reservoir (Map 1). This extent is currently considered sufficient to protect the values of the reservoir, although it is recognized that some interconnections may extend further since technically the catchment extends far onto the polar plateau; the western boundary was therefore selected in part as a practical limit beyond which the risks to the Area are considered minimal.

In summary, the vertical and lateral extents of the Area were defined on the grounds that the boundary:

- protects the integrity of the subglacial reservoir and the confirmed primary and secondary Blood Falls discharge areas;
- allows for uncertainties in the location of the reservoir and in the connectivity within the subglacial hydrological system;
- provides a practical boundary based on catchments that is straightforward to map and identify in the field; and
- does not unnecessarily restrict activities on and / or over the surface of the Taylor Glacier.

Key boundary coordinates are summarized in Table 1.

Table 1: Summary list of key protected area boundary coordinates (see Maps 1 & 2)

Location	Label	Longitude	Latitude (S)
<i>Sub-surface boundary</i>			
Blood Falls primary discharge	A	162° 16.305'	77° 43.325'
Taylor / Ferrar glaciers ice divide, southern margin of Kukri	B	161° 57.300'	77° 49.100'
Knobhead, foot of NE ridge	C	161° 44.383'	77° 52.257'
Kennar Valley, center at Taylor Glacier margin	D	160° 25.998'	77° 44.547'
Beehive Mountain, foot of SW ridge	E	160° 33.328'	77° 39.670'
Mudrey Cirque SW extent	F	160° 42.988'	77° 39.205'
Mudrey Cirque SE extent	G	160° 48.710'	77° 39.525'
<i>Sub-aerial boundary</i>			
Taylor Glacier terminus, prominent ice / moraine outcrop	<i>a</i>	162° 16.639'	77° 43.356'
Supraglacial catchment feeding Blood Falls, western	<i>b</i>	162° 14.508'	77° 43.482'
Taylor Glacier, northern margin	<i>c</i>	162° 15.758'	77° 43.320'
Santa Fe Stream delta, western margin	<i>d</i>	162° 15.792'	77° 43.315'
Lawson Creek, boulder on west bank	<i>e</i>	162° 16.178'	77° 43.268'
Lake Bonney, ~80m east from shore at Santa Fe Stream	<i>f</i>	162° 16.639'	77° 43.268'

Sub-surface

The sub-surface boundary encompasses the entire ablation zone of the Taylor Glacier, from a depth of 100m below the surface to the glacier bed. In order to aid identification of the boundary at the surface, and because of practical constraints over the availability of data on the configuration of the 100m depth within the glacier, the surface margin of the Taylor Glacier is used as a surrogate for the 100m depth line and thus is used to define the lateral extent of the sub-surface component of the Area. The following description first defines the lateral extent of the sub-surface component of the Area and subsequently defines the vertical extent.

The sub-surface component of the protected area boundary extends from the primary Blood Falls discharge site (162°16.288'E 77°43.329'S) (labelled 'A' in Table 1 and on Maps 1 & 2) and follows the Taylor Glacier terminus southward 0.8km to the southern margin of the glacier at Lyons Creek. The boundary of the Area thence extends 19.3km SW (Map 1), following the southern margin of the Taylor Glacier to the western extremity of the Kukri Hills. The boundary thence extends 7.8km east to an approximate position where the ice divides between the Taylor and Ferrar glaciers along the southern margin of the Kukri Hills, located at 161°57.30'E, 77°49.10'S ('B', Table 1, Map 1). The boundary thence extends 7.9km SW, following the approximate divide between the Taylor and Ferrar glaciers to the eastern extremity of Knobhead at 161°44.383'E, 77°52.257'S ('C', Table 1, Map 1). The boundary thence follows the southern margin of the Taylor Glacier westward 11.8km to Windy Gully, crosses Windy Gully and thence extends 45.2km NW, following the margins of the Taylor, Beacon and Turnabout glaciers to the Kennar Valley, located at 160°25.998'E, 77°44.547'S ('D', Table 1, Map 1). The boundary thence extends NE across the Taylor Glacier 9.5km to the foot of Beehive Mountain at 160°33.328'E, 77°39.670'S ('E', Table 1, Map 1). As a visual reference, the protected area boundary runs parallel to a distinct ridge evident in the surface of the Taylor Glacier immediately downstream from an area of heavy crevassing.

From Beehive Mountain, the boundary extends 5km east to the boundary between Mudrey Cirque and the Taylor Glacier at 160°42.988'E, 77°39.205'S ('F', Table 1, Map 1). The boundary thence follows the margin of Mudrey Cirque for 9.6km to rejoin the Taylor Glacier at 160°48.710'E, 77°39.525'S ('G', Table 1, Map 1) and thence extends

59.6km SE to the foot of the Cavendish Icefalls, following the northern margin of the Taylor Glacier. The boundary thence extends north and east along the Taylor Glacier margin for 16.9km, excluding Simmons Lake and Lake Joyce, and extends a further 15.4km east to the primary Blood Falls discharge site ('A', Table 1, Map 2).

The vertical extent of the sub-surface component of the Area is defined in terms of depth below the surface of the Taylor Glacier (Figure 3). The sub-surface boundary extends from a depth of 100m below the Taylor Glacier surface to the glacier bed, which is defined as the underlying bedrock surface below the glacier. The subglacial hydrological system, the Blood Falls brine reservoir, and any layers of mixed ice / sediment and / or unconsolidated sediments are included within the boundary. The sub-surface component of the Area does not impose additional constraints on activities conducted at the surface or within the upper 100m depth within the body of the Taylor Glacier.

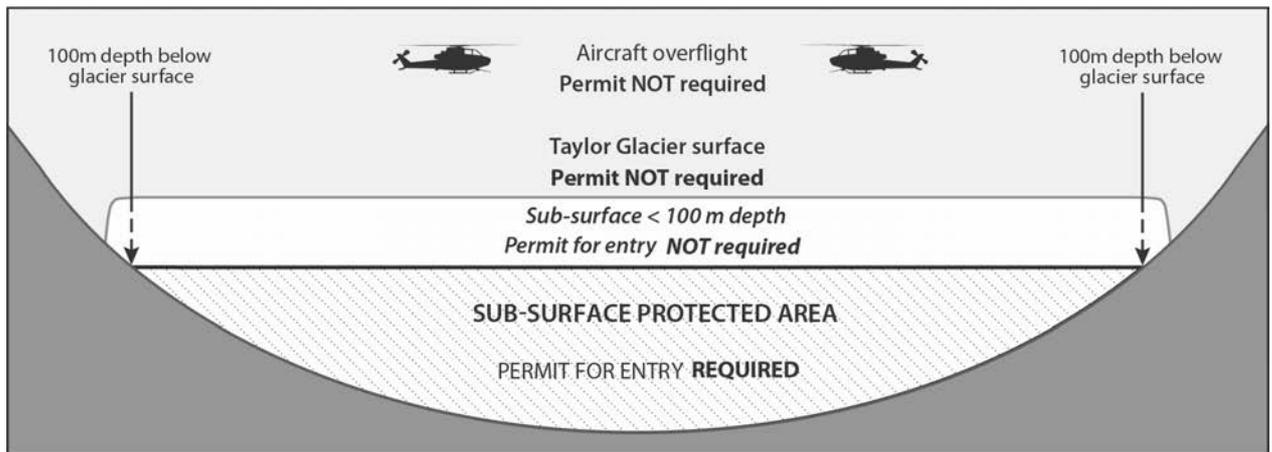


Figure 3: Depth-based definition of the vertical extent of the sub-surface component of the lower Taylor Glacier and Blood Falls protected area

Sub-aerial

This sub-aerial component of the Area comprises the delta of Santa Fe Stream, part of the western extremity of Lake Bonney, and a small supraglacial catchment surrounding Blood Falls that is defined by a system of ice ridges that persist in the local glacier morphology over at least decadal time-scales. The SE boundary of the sub-aerial component of the Area is indicated by a prominent ice and moraine outcrop extending from the Taylor Glacier terminus at 162°16.639'E, 77°43.356'S (labelled 'a' in Table 1 and on Map 2). The boundary thence extends SW and up-glacier for 900.8m, following the southern margin of the supraglacial catchment surrounding Blood Falls to the most westerly extent of the supraglacial catchment, located at 162°14.508'E, 77°43.482'S ('b', Table 1, Map 2). The boundary thence extends NE by 594.5m to the Taylor Glacier margin at 162°15.758'E, 77°43.320'S ('c', Table 1, Map 2), following the northern margin of the supraglacial catchment. The boundary of the Area thence extends 16.8m NE in a straight line, to the top of the river bank above the Santa Fe Stream delta at 162°15.792'E, 77°43.315'S ('d', Table 1, Map 2). The boundary thence extends NE for 198.7m, following the top of the bank to the point at which it meets Lawson Creek, at 162°16.178'E, 77°43.268'S ('e', Table 1, Map 2). The boundary thence extends due east in a straight line for 180.5m to a point on Lake Bonney at 162°16.639'E, 77°43.268'S ('f', Table 1, Map 2) and thence due south in a straight line for 166.5m to the prominent ice and moraine outcrop.

Climate

Two meteorological stations operated by the McMurdo Dry Valleys Long Term Ecological Research (LTER) programme are located close to Blood Falls (http://www.mcmlter.org/queries/avg_met_queries.jsp): 'Lake Bonney' (Point 'a', 162°27.881'E, 77°42.881'S) located ~4.5km to the east, and 'Taylor Glacier' (162°07.881'E, 77°44.401'S), located ~4km up-glacier. The mean annual air temperature at both stations was approximately -17°C during the period 1995 – 2009. The lowest temperature at these stations during this period was -48.26°C, recorded at Lake Bonney in August 2008, whilst the maximum of 10.64°C was recorded at Lake Bonney in December 2001. August was the coolest month at both stations, with January and December the warmest at Lake Bonney and Taylor Glacier respectively.

Mean annual wind speeds over the same period (1995 – 2009) ranged from 3.89m/s at Lake Bonney to 5.16m/s at the Taylor Glacier, with the maximum of 30.8m/s recorded at Taylor Glacier in August 2004. Taylor Valley topography, in particular Nussbaum Riegel, encourages formation of isolated weather systems within the Lake Bonney basin and limits the flow of coastal winds into the area (Fountain *et al.* 1999).

Average mean annual precipitation at Lake Bonney between 1995 and 2009 was 340mm water equivalent. Ablation rates on the Taylor Glacier are highest in the area surrounding the Cavendish Ice Falls, reaching a maximum at the base of Windy Gully (~0.4m a⁻¹), and are lowest up-glacier of Beacon Valley (~0 to 0.125m a⁻¹). Ablation rates on the lower Taylor Glacier generally range from 0.15 to 0.3m a⁻¹ (Bliss *et al.* 2011).

Geology and geomorphology

The Taylor Valley is comprised of a mosaic of tills of varying ages and rock types, including: Precambrian metamorphic basement rocks (Ross Supergroup), early Paleozoic intrusives (Granite Harbor formation), a series of sedimentary rocks of Devonian to Jurassic age (Beacon Supergroup) and the Jurassic age Ferrar Dolerite sills (Pugh *et al.* 2003).

The Blood Falls subglacial reservoir is thought to be a marine brine originating from a marine incursion into the McMurdo Dry Valleys during the Pliocene (3 to 5 Ma BP) and may represent the oldest liquid water feature in the Dry Valleys (Lyons *et al.* 2005). It has been proposed that during the subsequent retreat of seawater from the Taylor Valley, the brine was trapped close to the modern-day terminus of the Taylor Glacier and was then 'sealed' beneath the glacier as ice advanced during the late Pliocene or Pleistocene (Marchant *et al.* 1993). The brine deposit is now thought to form a subglacial reservoir, which episodically emerges at the surface at the primary outflow and the secondary lateral discharge site. It has been suggested the brine has been modified since entrapment, partly due to inputs from chemical weathering (Keys 1980; Lyons *et al.* 2005; Mikucki *et al.* 2009).

Soils and sediment

Taylor Valley soils are generally poorly developed and largely composed of sand (95-99% by weight) (Burkins *et al.* 2000; Barrett *et al.* 2004). Taylor Valley soils have some of the lowest organic matter concentrations on Earth (Campbell & Claridge 1987; Burkins *et al.* 2000) and soils within the Lake Bonney basin are particularly low in organic carbon content (Barrett *et al.* 2004). In the Taylor Valley, soils generally extend

to a depth of 10 to 30cm, below which is permafrost (Campbell & Claridge 1987). In addition to glacial till, the Taylor Valley floor is covered by lacustrine sediments, deposited by the formerly extensive glacial Lake Washburn, which extend to a depth of approximately 300m (Hendy *et al.* 1979; Stuiver *et al.* 1981; Hall & Denton 2000).

Moraines at the snout of the Taylor Glacier are composed of reworked lacustrine sediment, which dates from approximately 300 ka BP (Higgins *et al.* 2000). Sediments at the Taylor Glacier margin are also composed of silty and sandy tills, formed by melt-out from debris-rich basal glacier ice and from erosion by ice marginal streams (Higgins *et al.* 2000). A thick basal ice sequence characterised by fine-grained sediments and thought to contain salts originating from the Blood Falls subglacial reservoir was documented in a tunnel excavated on the northern margin of the Taylor Glacier (Samyn *et al.* 2005, 2008; Mager 2006; Mager *et al.* 2007). These observations suggest that the base of the Taylor Glacier is interacting with the underlying sediment and that localised melting and refreezing may be occurring (Souchez *et al.* 2004; Samyn *et al.* 2005; Mager *et al.* 2007).

Glaciology and glacial hydrology

The Taylor Glacier is an outlet glacier of the East Antarctic Ice Sheet and terminates in the western lobe of Lake Bonney. A comprehensive study has recently been undertaken to investigate the dynamics of the Taylor Glacier ablation zone, including its geometry and surface velocity field (Kavanaugh *et al.* 2009a), its force balance (Kavanaugh & Cuffey 2009) and its contemporary mass balance (Fountain *et al.* 2006; Kavanaugh *et al.* 2009b). Results suggest that the glacier primarily flows through deformation of cold ice and that the Taylor Glacier is approximately in mass balance. Ice samples from the lower Taylor Glacier ablation zone have been used in paleoclimatic studies and the ice has been dated to the last glacial period (Aciego *et al.* 2007). Other recent glaciological studies conducted on the Taylor Glacier have investigated the evolution of the dry ice cliffs at the terminus (Pettit *et al.* 2006; Carmichael *et al.* 2007), carried out textural and gas measurements on basal ice within a subglacial tunnel proximal to the primary Blood Falls outlet (Samyn *et al.* 2005, 2008; Mager *et al.* 2007) and assessed the surface energy budget of the glacier (Bliss *et al.* 2011). Studies of the supraglacial hydrology of the Taylor Glacier suggest that meltwater channels cover approximately 40% of the lower ablation zone of the Taylor Glacier and melting within the channels contributes significantly to total runoff into Lake Bonney (Johnston *et al.* 2005). Two large channels drain across the primary Blood Falls outlet, but it is considered highly unlikely that direct connections exist between surface meltwater channels and the Blood Falls subglacial reservoir due to the cold temperatures of the near-surface ice and the lack of crevasse penetration beyond 100m depth (Cuffey, Fountain, Pettit and Severinghaus, pers. comms. 2010).

The extent of subglacial meltwater beneath the Taylor Glacier and its connectivity with the Blood Falls system is currently uncertain. Inferred basal temperatures suggest that the majority of the Taylor Glacier base is substantially below the pressure melting point (Samyn *et al.* 2005, 2008) and a radar survey conducted by Holt *et al.* (2006) found no evidence of widespread liquid water beneath the Taylor Glacier. Measurements made by Samyn *et al.* (2005) recorded a basal temperature of -17°C at the side of the glacier near Blood Falls. However, ice thickness and plausible gradients of englacial temperature are consistent with temperatures around -5 to -7°C at the base of the glacier within 1–3km of Blood Falls, similar to the measured temperatures of brine discharging at the primary and secondary sites (Keys 1980). Ice-penetrating radar surveys suggest that water, probably hypersaline, may exist within an 80m bedrock depression, located between 4 and 6km from the Taylor Glacier terminus (Hubbard *et al.* 2004).

Saline water is released episodically from the subglacial reservoir of Blood Falls, usually via the primary outlet and on occasions via the secondary lateral discharge site. However, detailed underwater surveys of the Taylor Glacier terminus conducted by the ENDURANCE (Environmentally Non-Disturbing Under- Ice Robotic Antarctic Explorer) AUV (autonomous underwater vehicle) suggest that the subglacial brine may enter Lake Bonney across the majority of the Taylor Glacier terminus (Stone *et al.* 2010; Priscu, pers. comm. 2011). In addition, a number of sites have been identified on both the northern and southern margins of the Taylor Glacier where salts and orange discoloration exist in layers (examples of which are identified on Map 1 as ‘Possible discharge’), but the nature of these features has yet to be confirmed (Keys 1980; Nylén, pers. comm. 2010). The trigger for subglacial release events is uncertain, although it has been suggested that after accumulating under pressure beneath the glacier, the brine must travel through a discrete subglacial conduit which controls the location of the primary discharge: this behavior is similar to some aperiodic glacier bursts (jökulhlaups) where basal melting processes and changing stress patterns (such as physical shifts of the Taylor Glacier) may create a passage for the brine through impounding basal ice or force the subglacial liquid out from its bedrock depression (Keys 1980; Higgins *et al.* 2000; Mikucki 2005).

The primary Blood Falls discharge is cold (-6°C), high in dissolved organic carbon, iron and sodium chloride, and has a conductivity approximately 2.5 times seawater (Mikucki *et al.* 2004; Mikucki 2005).

**Antarctic Specially Managed Area No 4
(Deception Island): Revised Management Plan**

The Representatives,

Recalling Articles 4, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, providing for the designation of Antarctic Specially Managed Areas (“ASMA”) and the approval of Management Plans for those Areas;

Recalling Measure 3 (2005), which designated Deception Island as ASMA No 4 and adopted a Management Plan for the Area;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASMA 4;

Desiring to replace the existing Management Plan for ASMA 4 with the revised Management Plan;

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

That:

1. the revised Management Plan for Antarctic Specially Managed Area No 4 (Deception Island), which is annexed to this Measure, be approved; and
2. the Management Plan for ASMA 4 annexed to Measure 3 (2005) shall cease to be effective.

Deception Island Management Package

Introduction

Deception Island is a unique Antarctic island with important natural, scientific, historic, educational and aesthetic values.

Over the years, different parts of the island have been given legal protection under the Antarctic Treaty following piecemeal proposals, but no coherent strategy had been formulated for protecting the whole island. In 2000, an integrated strategy for the management of activities there was agreed by Argentina, Chile, Norway, Spain and the UK.

This strategy recommended an island-wide approach. Deception Island would be proposed as an Antarctic Specially Managed Area (ASMA) comprising a matrix of Antarctic Specially Protected Areas (ASPAs), Historic Sites and Monuments (HSMs), and further zones in which activities would be subject to a code of conduct.

In March 2001, the Instituto Antártico Chileno hosted a workshop in Santiago to progress the Management Plan for Deception Island. The Deception Island working group was widened to include the USA, as well as the Antarctic and Southern Ocean Coalition (ASOC) and the International Association of Antarctica Tour Operators (IAATO) as advisors to the group.

During February 2002, the Dirección Nacional del Antártico (Argentina) hosted an expedition to the island at Decepción Station. Representatives from the six National Antarctic Programmes, as well as ASOC and IAATO, participated. The overall goal of the expedition was to undertake baseline survey fieldwork to assist with the joint preparation by the six Antarctic Treaty Consultative Parties of a Management Package for Deception Island.

Following further extensive consultation, the first version of the Management Package for Deception Island was produced. Its aim is to conserve and protect the unique environment of Deception Island, whilst managing the variety of competing demands placed upon it, including science, tourism, and the conservation of its natural and historic values. It also aims to safeguard those working on, or visiting, the island. Information Papers submitted to the CEP (XII SATCM/IP8, XXIV ATCM/IP63, XXV ATCM/IP28 and XXVI ATCM/IP48) give further detail of the extensive consultation and site investigations which have resulted in the production of the Management Package for Deception Island.

In accordance with Article 6 (3) of Annex V to the Environmental Protocol, a review process for the management plan was initiated in 2010, and on basis of discussions and new information a revised management plan was produced in 2012 and submitted to the CEP/ATCM for consideration and approval.

Management Plan for Antarctic Specially Managed Area No 4 Deception Island, South Shetland Islands, Antarctica

1. Values to be protected and activities to be managed

Deception Island (latitude 62°57'S, longitude 60°38'W), South Shetland Islands, is a unique Antarctic island with important natural, scientific, historic, educational and aesthetic values.

i. Natural value

- Deception Island is one of only two volcanoes in the Antarctic where eruptions have been observed. It was responsible for numerous ash layers dispersed across the South Shetland Islands, Bransfield Strait and the Scotia Sea. Ash from the island has even been recorded in an ice core sample from South Pole. The volcano erupted during two short periods in the 20th century, most recently between 1967-1970. It contains a restless caldera that is actively deforming. It is likely, therefore, that Deception Island will witness further eruptions in the future.
- The Area has an exceptionally important floral assemblage, including at least 18 species which have not been recorded elsewhere in the Antarctic. No other Antarctic area is comparable. Of particular importance are the very small, unique biological communities associated with the island's geothermal areas, and the most extensive known community of the flowering plant Antarctic pearlwort (*Colobanthus quitensis*).
- Nine species of seabird breed on the island, including one of the world's largest colonies of chinstrap penguins (*Pygoscelis antarctica*).
- The benthic habitat of Port Foster is of ecological interest due to the natural perturbations caused by volcanic activity.

ii. Scientific value and activities

- The Area is of outstanding scientific interest, in particular for studies in geoscience and biological science. It offers the rare opportunity to study the effects of environmental change on an ecosystem, and the dynamics of the ecosystem as it recovers from natural disturbance.
- Long term geochemical, seismological and biological data-sets have been collected at Decepción Station (Argentina) and Gabriel de Castilla Station (Spain)¹.

iii. Historic value

- The Area has had a long history of human activity since c.1820, including exploration, sealing, whaling, aviation and scientific research, and as such has played a significant role in Antarctic affairs.

- At Whalers Bay, the Norwegian Hektor whaling station, the cemetery and other artefacts, some of which pre-date the whaling station, are the most significant whaling remains in the Antarctic. The British ‘Base B’, which was established in the abandoned whaling station, was the first base of the secret World War II expedition ‘Operation Tabarin’, the forerunner to the British Antarctic Survey. As such, it was one of the earliest permanent research stations in Antarctica. The whalers’ remains and ‘Base B’ are listed as Historic Site and Monument (HSM) No. 71. Appendix 3 contains the Conservation Strategy for HSM No. 71.
- The remains of the Chilean Presidente Pedro Aguirre Cerda Station at Pendulum Cove are listed as HSM No. 76. Meteorological and volcanological studies were undertaken at the base from 1955 until its destruction by volcanic eruptions in 1967 and 1969.

v. Aesthetic value

- Deception Island’s flooded caldera, its ‘horse-shoe’ shape and linear glaciated eastern coastline, its barren volcanic slopes, steaming beaches and ash-layered glaciers provide a unique Antarctic landscape.

iv. Educational values

- Deception Island is one of the few places in the world where vessels can sail directly into the centre of a restless volcanic caldera, providing the opportunity for visitors to learn about volcanoes and other aspects of the natural world, as well as early Antarctic exploration, whaling and science. Deception Island is also one of the most frequently visited sites in Antarctica by tourists.

2. Aims and objectives

The main aim of this Management Package is to conserve and protect the unique and outstanding environment of Deception Island, whilst managing the variety of competing demands placed upon it, including science, tourism, and the conservation of its natural and historic values. It also aims to protect the safety of those working on, or visiting, the island.

¹ Spain has been collecting seismological data since the opening of Gabriel de Castilla station in 1989; the data-sets are available in the National Polar Data Center (NPDC) of Spain. Biological data sets have been collected at irregular intervals from 2001 and are also available in the NPDC.

The objectives of management at Deception Island are to:

- assist in the planning and co-ordination of activities in the Area, encourage co-operation between Antarctic Treaty Parties and other stakeholders, and manage potential or actual conflicts of interest between different activities, including science, logistics and tourism;
- avoid unnecessary degradation, by human disturbance, to the unique natural values of the Area;
- safeguard in particular the scientific and wilderness values of those areas in the Area which thus far have not been significantly modified by human activity (especially the recently created volcanic surfaces);
- minimise the possibility of non-native species being introduced through human activities;
- prevent unnecessary disturbance, destruction or removal of historic buildings, structures and artefacts;
- safeguard those working in or near to, or visiting, the Area from the significant volcanic risk;
- manage visitation to this unique Island, and promote an awareness, through education, of its significance.

3. Management activities

To achieve the aims and objectives of this Management Plan, the following management activities will be undertaken:

- Parties with an active interest in the Area should establish a Deception Island Management Group to:
 - oversee the co-ordination of activities in the Area;
 - facilitate communication between those working in, or visiting, the Area;
 - maintain a record of activities in the Area;
 - disseminate information and educational material on the significance of Deception Island to those visiting, or working there;
 - monitor the site to investigate cumulative impacts derived from science, permanent facilities, tourism/visitor and management activities;
 - oversee the implementation of this Management Plan, and revise it when necessary.
- a general island-wide Code of Conduct for activities in the Area is included in this ASMA Management Plan (see Section 9). Further site-specific Codes of Conduct are included in the Conservation Strategy for Whalers Bay HSM No.71 (Appendix 3), as well as the Code of Conduct for the Facilities Zone (Appendix

4), the Code of Conduct for Visitors (Appendix 5) and Site Visitor Guidelines for Telefon Bay, Whalers Bay, Pendulum Cove and Baily Head. These Codes of Conduct and Site Visitor Guidelines should be used to guide activities in the Area;

- National Antarctic Programmes operating within the Area should ensure that their personnel are briefed on, and are aware of, the requirements of this Management Plan and supporting documentation;
- tour operators visiting the Area should ensure that their staff, crew and passengers are briefed on, and are aware of, the requirements of this Management Plan and supporting documentation;
- signs and markers will be erected where necessary and appropriate to show the boundaries of ASPAs and other zones, such as the location of scientific activities. Signs and markers will be well designed to be informative and obvious, yet unobtrusive. They will also be secured and maintained in good condition, and removed when no longer necessary;
- the volcanic alert scheme (as at Appendix 6) will be implemented. It, and the emergency evacuation plan, will be kept under review;
- Parties authorizing activities in the South Shetland Island area should ensure that those responsible for the activity are aware of the desirability of avoiding use of Deception Island as an emergency harbour in cases of maritime accidents/incidents due to both the ecological sensitivities and safety issues of the island. Parties should ensure that those responsible for the activity make themselves familiar with alternative emergency harbours in the area and encourage these to be used if the situation at hand deems this possible and appropriate.
- copies of this Management Plan and supporting documentation, in English and Spanish, will be made available at Decepción Station (Argentina), and Gabriel de Castilla Station (Spain). In addition, the Deception Island Management Group should encourage National Antarctic Operators, tour companies and, as far as practicable, yacht operators visiting the Area, to have available copies of this Management Plan when they visit the Area;
- visits should be made to the Area as necessary (no less than once every 5 years) by members of the Deception Island Management Group to ensure that the requirements of the Management Plan are being met.

4. Period of designation

Designated for an indefinite period of time.

5. Description of the Area

i. Geographical co-ordinates, boundary markers and natural features

General description

Deception Island (latitude 62°57'S, longitude 60°38'W) is situated in the Bransfield Strait at the southern end of the South Shetland Islands, off the north-west coast of the Antarctic Peninsula (Figures 1 and 2). The boundary of the ASMA is defined as the outer coastline of the island above the low tide water level. It includes the waters and seabed of Port Foster to the north of a line drawn across Neptunes Bellows between Entrance Point and Cathedral Crags (Figure 3). No boundary markers are required for the ASMA, as the coast is clearly defined and visually obvious.

Geology, geomorphology and volcanic activity

Deception Island is an active basaltic volcano. It has a submerged basal diameter of approximately 30 km and rises to 1.5 km above the sea floor. The volcano has a large flooded caldera, giving the island a distinctive horseshoe shape broken only on the south-eastern side by Neptunes Bellows, a narrow shallow passage about 500 m wide.

The eruption which formed the caldera occurred possibly 10,000 years ago. A large scale, violently explosive eruption evacuated about 30 km³ of molten rock so rapidly that the volcano summit region collapsed to form the Port Foster caldera. Associated ashfalls and tsunamis had a significant environmental impact on the northern Antarctic Peninsula region. The volcano was particularly active during the late 18th and 19th centuries, when numerous eruptions occurred. By contrast, 20th century eruptions were restricted to two short periods, around 1906–1910 and 1967–1970. In 1992, seismic activity on Deception Island was accompanied by ground deformation and increased groundwater temperatures around Decepción Station.

The volcano has since returned to its normal, essentially quiescent state. However, the floor of Port Foster is rising at a geologically rapid rate (approximately 30 cm per annum). Together with the record of historical eruptions and the presence of long lived areas of geothermal activity, it is classified as a restless caldera with a significant volcanic risk.

Approximately 57% of the island is covered by permanent glaciers, many of which are overlain with volcanic ash. Mounds and low ridges of glacially transported debris (moraines) are present around the margins of the glaciers.

An almost complete ring of hills, rising to 539 m at Mount Pond, encircles the sunken interior of Port Foster, and is the principal drainage divide on the island. Ephemeral springs flow toward the outer and inner coasts. Several lakes are located on the inner divide of the watershed.

Climate

The climate of Deception Island is polar maritime. Mean annual air temperature at sea level is –2.9°C. Extreme temperatures range from 11°C at the warmest to –28 °C at the

coldest. Precipitation, which falls on more than 50% of summer days, is high for the region, with a mean annual equivalent of rainfall of approximately 500 mm. Prevailing winds are from the north-east and west.

Marine ecology

The marine ecology of Port Foster has been significantly influenced by volcanic activity and sediment deposition. ASPA No. 145, comprising two sub-sites, is located in the Area. The Management Plan for ASPA 145, contained in Appendix 2, gives further detail of the marine ecology of Port Foster.

Flora

Deception Island is a unique and exceptionally important botanical site. The flora includes at least 18 species of moss, liverwort and lichen which have not been recorded elsewhere in the Antarctic. Small communities, which include rare species and unique associations of taxa, grow at a number of geothermal areas on the island, some of which have fumaroles. Furthermore, the most extensive known concentration of Antarctic pearlwort (*Colobanthus quitensis*) is located between Baily Head and South East Point.

In many areas, ground surfaces created by the 1967-70 eruptions are being colonized rapidly, probably enhanced by the increasing summer temperatures now occurring in the Antarctic Peninsula as a result of regional climate change.

ASPA No. 140, comprising 11 sub-sites, is located in the Area. The Management Plan for ASPA No. 140 is contained in Appendix 1. This gives further details of the flora of Deception Island.

Invertebrates

Recorded terrestrial and freshwater invertebrates on Deception Island include 18 species of Acarina (mite), 1 species of Diptera (fly), 3 species of Tardigrada (tardigrade), 9 species of Collembola (springtail), 3 freshwater Crustacea (crustacean), 14 Nematoda (nematode), 1 Gastrotricha (gastrotrich) and 5 Rotifera (rotifer). Colonies of seabird ticks (*Ixodes uriae*) are frequently found beneath rocks adjacent to penguin rookeries (e.g. at the Vapour Col rookery).

The intertidal zone of the sedimentary shores harbour a number of invertebrate species, mostly in the saturated zone: 3 species of amphipods, 3 species of prosobranchs and a yet unidentified assemblage of oligochaete and polychaete species. Invertebrate abundance and biodiversity is higher in cobble and boulder beaches than in sandy sediments. Red and green macroalgae are frequently observed in these areas, either stranded or attached to the stones.

Birds

Nine species of bird breed within the Area. The most numerous is the chinstrap penguin (*Pygoscelis antarctica*), with an estimated population of around 70,000 breeding pairs

in total on the island. The largest rookery is at Baily Head, with the latest estimates indicating 50,000 breeding pairs². In the last 20 years the chinstrap penguin population has declined in the Area, probably due to the effects of climate change on krill abundance. The most recent studies indicate a 50% decline in breeding pairs at Baily Head since the 1986/87 season census³.

Although Macaroni penguins (*Eudyptes chrysolophus*) have been observed occasionally nesting in small numbers on the island, no breeding birds have been observed over the last two decades. Brown skuas (*Catharacta antarctica lonnbergi*), south polar skuas (*Catharacta maccormicki*), kelp gulls (*Larus dominicanus*), cape petrels (*Daption capensis*), Wilson's storm-petrels (*Oceanites oceanicus*), Antarctic terns (*Sterna vittata*), Antarctic cormorant (*Phalacrocorax bransfieldensis*) and snowy sheathbills (*Chionis alba*) also breed within the Area.

Mammals

Deception Island has no breeding mammals. Antarctic fur seals (*Arctocephalus gazella*), Weddell seals (*Leptonychotes weddelli*), crabeater seals (*Lobodon carcinophagus*), southern elephant seals (*Mirounga leonina*) and leopard seals (*Hydrurga leptonyx*) haul out on the beaches of the inner and outer coast. At rare intervals whales – mostly humpback whale (*Megaptera novaeangliae*) - can be observed in Port Foster. Humpback whales are also routinely seen feeding in the island's coastal waters from late December onwards. A high number of Antarctic fur seals (around 500) normally can be observed on the beach located between Entrance Point and Collins Point.

ii. Structures within the Area

Decepción Station (Argentina) (latitude 62°58'20" S; longitude 60°41'40" W) is situated on the southern shore of Fumarole Bay. Gabriel de Castilla Station (Spain) (latitude 62°58'40"S, longitude 60°40'30"W) is located approximately 1 km to the south-east. Further details on both stations are contained in the Facilities Zone Code of Conduct (Appendix 4).

The remains of Hektor Whaling Station (Norway) and other remains which pre-date the whaling station, the Whalers Cemetery and the former British 'Base B' (Historic Site and Monument (HSM) No. 71) are located at Whalers Bay (see Appendix 3). A number of steam boilers from the whaling station can be found washed up on the southwest coast of Port Foster. The remains of the Chilean Presidente Pedro Aguirre Cerda Station

² Estimates are based on surveys conducted by US in the 2011/12 season. The survey findings have been submitted for publication (see footnote 3 for submission details).

³ Naveen, R., H. J. Lynch, S. Forrest, T. Mueller, and M. Polito. 2012. First direct, site-wide penguin survey at Deception Island, Antarctica suggests significant declines in breeding chinstrap penguins. In review at Polar Biology.

Barbosa, A., Benzal, J., De Leon, A., Moreno, J. Population decline of chinstrap penguins (*Pygoscelis antarctica*) on Deception Island, South Shetlands, Antarctica. In review at Polar Biology (2^a review).

(HSM No. 76) is located at Pendulum Cove. A derelict wooden refuge hut is located approximately 1 km to the south-west of HSM No.76.

A light beacon, maintained by the Chilean Navy, is located on Collins Point. A collapsed light tower, dating from the whaling era, is below it. The remains of a further light tower dating from the whaling era is located at South East Point.

The stern of the *Southern Hunter*, a whale-catcher belonging to the Christian Salvesen Company, which foundered on Ravn Rock, Neptunes Bellows in 1956, remains on the un-named beach to the west of Entrance Point.

A number of beacons and cairns marking sites used for topographical survey are present within the Area.

6. Protected areas and managed zones within the Area

Figure 3 shows the location of the following ASPAs, HSMs, Facility Zone and other sites with special management provisions within the Area.

- ASPA No. 140, comprising 11 terrestrial sites;
- ASPA No. 145, comprising 2 marine sites within Port Foster;
- HSM No. 71, the remains of Hektor Whaling Station and other remains which pre-date the whaling station, the Whalers Cemetery and 'Base B', Whalers Bay;
- HSM No. 76, the remains of Pedro Aguirre Cerda Station, Pendulum Cove;
- A Facilities Zone, located on the west side of Port Foster, which includes Decepción Station and Gabriel de Castilla Station;
- Four sites for which Site Visitor Guidelines have been adopted: Pendulum Cove, Baily Head, Whalers Bay and Telefon Bay.

7. Maps

Map 1: The location of Deception Island ASMA No. 4 in relation to the Antarctic Peninsula.

Map 2: Deception Island - topography

Map 3: Deception Island Antarctic Specially Managed Area No 4

8. Supporting Documents

This Management Plan includes the following supporting documents as appendices:

- Management Plan for Antarctic Specially Protected Area No. 140 (Appendix 1)
- Management Plan for Antarctic Specially Protected Area No. 145 (Appendix 2)
- Conservation Strategy for HSM No. 71, Whalers Bay (Appendix 3)
- Code of Conduct for Facilities Zone (Appendix 4)
- Code of Conduct for visitors at Deception Island (Appendix 5)
- Alert Scheme and Escape Strategy for volcanic eruptions on Deception Island (Appendix 6)
- Site Visitor Guidelines: Telefon Bay (Appendix 7)
- Site Visitor Guidelines: Whalers Bay (Appendix 8)
- Site Visitor Guidelines: Baily Head (Appendix 9)
- Site Visitor Guidelines: Pendulum Cove (Appendix 10)
- Practical biosecurity measures (Appendix 11).

Those appendices containing management plans for ASPAs or Site Visitor Guidelines will be maintained updated with the latest versions of these documents as they have been adopted by the ATCM.

9. General Code of Conduct

i. Volcanic risk

All activities undertaken within the Area should be planned and conducted taking into account the significant risk to human life posed by the threat of volcanic eruption (see Appendix 6).

ii. Access to and movement within the Area

Access to the Area is generally by ship or yacht, with landings usually taking place by small boat, or less frequently by helicopter.

Vessels arriving in or departing from Port Foster should announce over VHF Marine Channel 16 the intended time and direction of passage through Neptunes Bellows.

Ships may transit ASPA 145, but anchoring within either of the two sub-sites should be avoided except in extreme emergencies.

There are no restrictions on landings on any beaches outside the protected areas covered in Section 6, although recommended landing sites are shown in Figure 3. Boat landings should avoid disturbing birds and seals. Extreme caution should be exercised when attempting landings on the outer coast owing to the significant swell and submerged rocks.

Recommended landing sites for helicopters are shown in Figure 3. Helicopters should avoid overflying areas with high concentrations of birds (i.e. penguin rookeries or other seabird breeding colonies). Aircraft operations over the Area should be carried out, as a minimum requirement, in compliance with ATCM Resolution 4 (2004), “Guidelines for the Operation of Aircraft near Concentrations of birds in Antarctica”.

Movement within the area should generally be on foot. All-Terrain Vehicles may also be used with care for scientific support or logistical purposes along the beaches outside of ASPA 140. All movement should be undertaken carefully to minimise disturbance to animals, soil and vegetated areas, and not damage or dislodge flora.

iii. Activities that are or may be conducted within the Area, including restrictions on time or place

- Scientific research, or the logistical support of scientific research, which will not jeopardise the values of the Area;
- Management activities, including the restoration of historic buildings, clean-up of abandoned work-sites, and monitoring the implementation of this Management Plan;
- Tourist or private expedition visits consistent with the Codes of Conduct for Visitors (Appendix 5) and the provisions of this Management Plan;

Overwintering at Deception Island (unless for scientific purposes) is discouraged due to the peculiarities regarding safety (including during rescue operations) with respect to any potential volcanic activity on the island.

Further restrictions apply to activities within ASPA 140 and ASPA 145 (see Appendices 1 and 2).

iv. Installation, modification or removal of structures

Site selection, installation, modification or removal of temporary refuges, hides, or tents should be undertaken in a manner that does not compromise the values of the Area.

Scientific equipment installed in the Area should be clearly identified by country, name of principal investigator, contact details, and date of installation. All such items should be made of materials that pose minimal risk of contamination to the area. All equipment and associated materials should be removed when no longer in use.

v. Location of field camps

Field camps should be located on non-vegetated sites, such as on barren ash plains, slopes or beaches, or on thick snow or ice cover when practicable, and should also avoid

concentrations of mammals or breeding birds. Field camps should also avoid areas of geothermally heated ground or fumaroles. Similarly, campsites should avoid dry lake or stream beds. Previously occupied campsites should be re-used where appropriate.

Figure 3 shows the recommended sites for field camps within the Area.

vi. Taking or harmful interference with native flora or fauna

Taking or harmful interference with native flora or fauna is prohibited, except by Permit issued in accordance with Annex II to the *Protocol on Environmental Protection to the Antarctic Treaty* (1998). Where taking or harmful interference with animals for scientific purposes is involved, the *SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica* should be used as a minimum standard.

vii. Collection or removal of anything not brought into the Area

Material should only be removed from the area for scientific, management, conservation or archeological purposes, and should be limited to the minimum necessary to fulfill those needs.

If objects likely to stem from one of the Historic Sites and Monuments in the Area are found in other areas of the island they should be returned to the Historic Site or Monument from which they originated and secured to prevent further dispersal by wind. A report describing the nature of the material and the location within the Historic Site and Monument where it has been secured and stored, should be submitted to the Chair of the Deception Island Management Group, to establish the most appropriate way to deal with the debris (ie. conservation to preserve any historic value or appropriate disposal).

viii. Restrictions on materials and organisms which may be brought into the Area

The introduction of non-native species is prohibited, except by Permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Recommended measures aimed at minimising the unintentional introduction of non-native species are put forward in Appendix 11. To minimise the risk of accidental or unintentional introduction of non-native species the 'Non-native species manual' attached to ATCM Resolution 6 (2011) should be consulted.

viii. The disposal of waste

All wastes other than human wastes and domestic liquid waste shall be removed from the Area. Human and domestic liquid wastes from stations or field camps may be disposed of to Port Foster below the low water mark, and not within the boundaries of ASPA No. 145. Freshwater streams or lakes, or vegetated areas, shall not be used to dispose of human wastes.

ix. Requirement for reports

Reports of activities within the Area, which are not already covered under existing reporting requirements should be made available to the Chair of the Deception Island Management Group.

10. Advance exchange of information

- IAATO should, as far as practicable, provide the Chair of the Deception Island Management Group with details of scheduled visits by IAATO-registered vessels. Tour operators not affiliated to IAATO should also inform the Chair of the Deception Island Management Group of planned visits.
- All Parties should, as far as practicable, notify the Chair of the Deception Island Management Group of any governmental and non-governmental expeditions authorized by their national competent authority and which plans to visit or conduct activities in the Area.
- All National Antarctic Programmes should, as far as practicable, notify the Chair of the Deception Island Management Group of the location, expected duration, and any special considerations related to the deployment of field parties, scientific instrumentation or botanical quadrats at the four sites commonly visited by tourists (Whalers Bay, Pendulum Cove, Baily Head or the eastern end of Telefon Bay). This information will be relayed to IAATO (and as far as practicable to non-IAATO members).

Figure 1. The location of Deception Island in relation to the South Shetland Islands and the Antarctic Peninsula

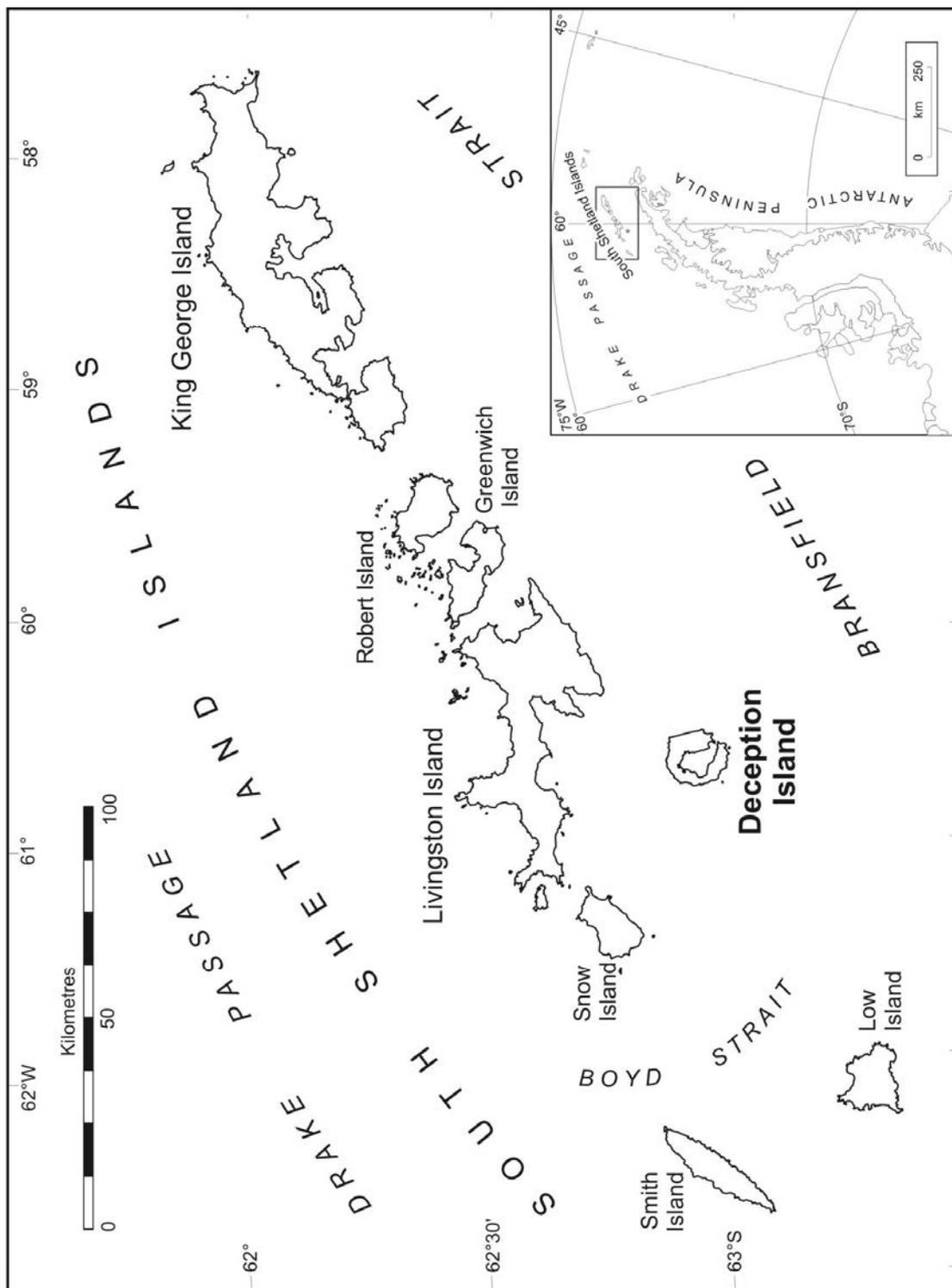


Figure 2. Deception Island - Topography

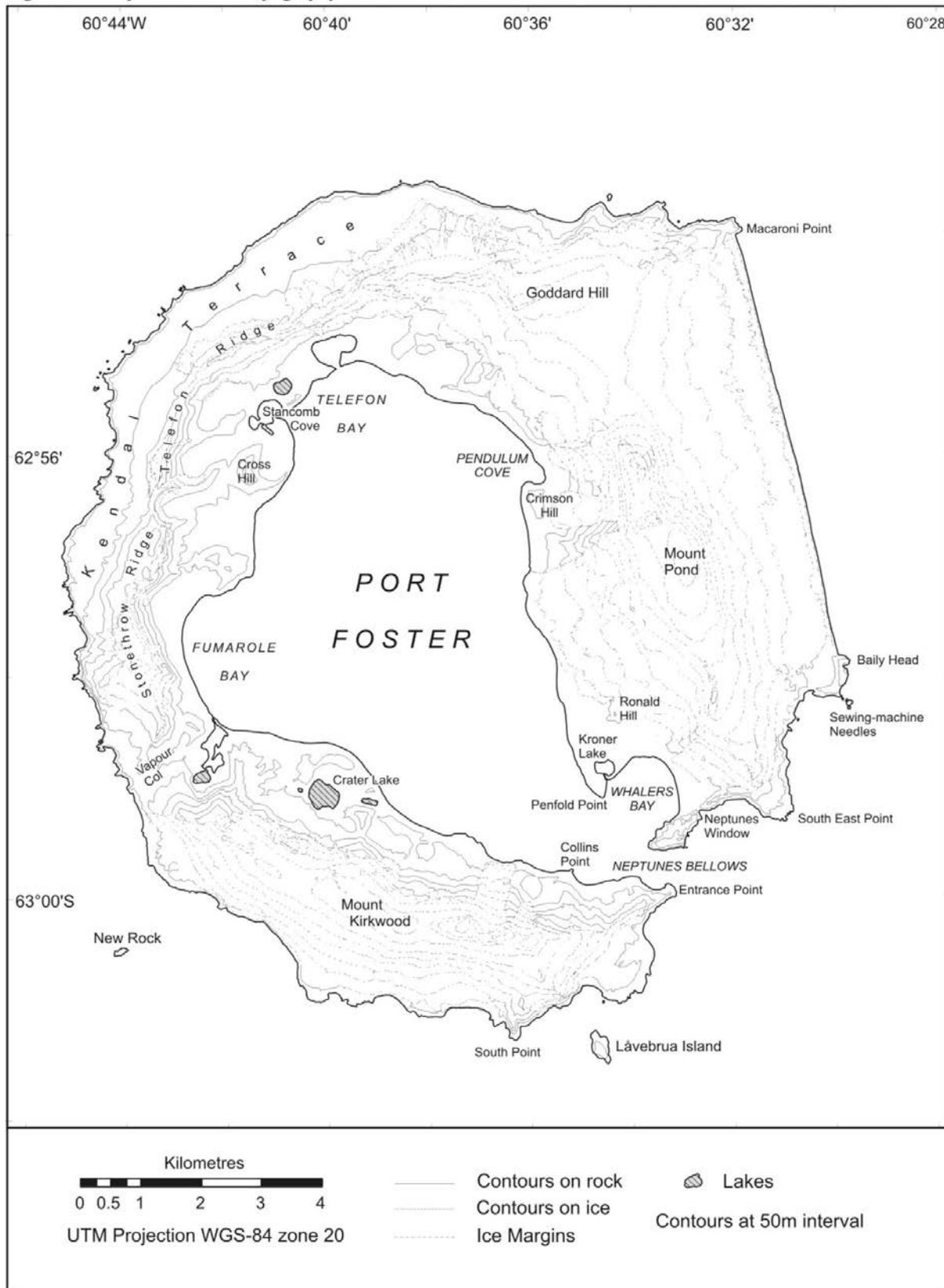
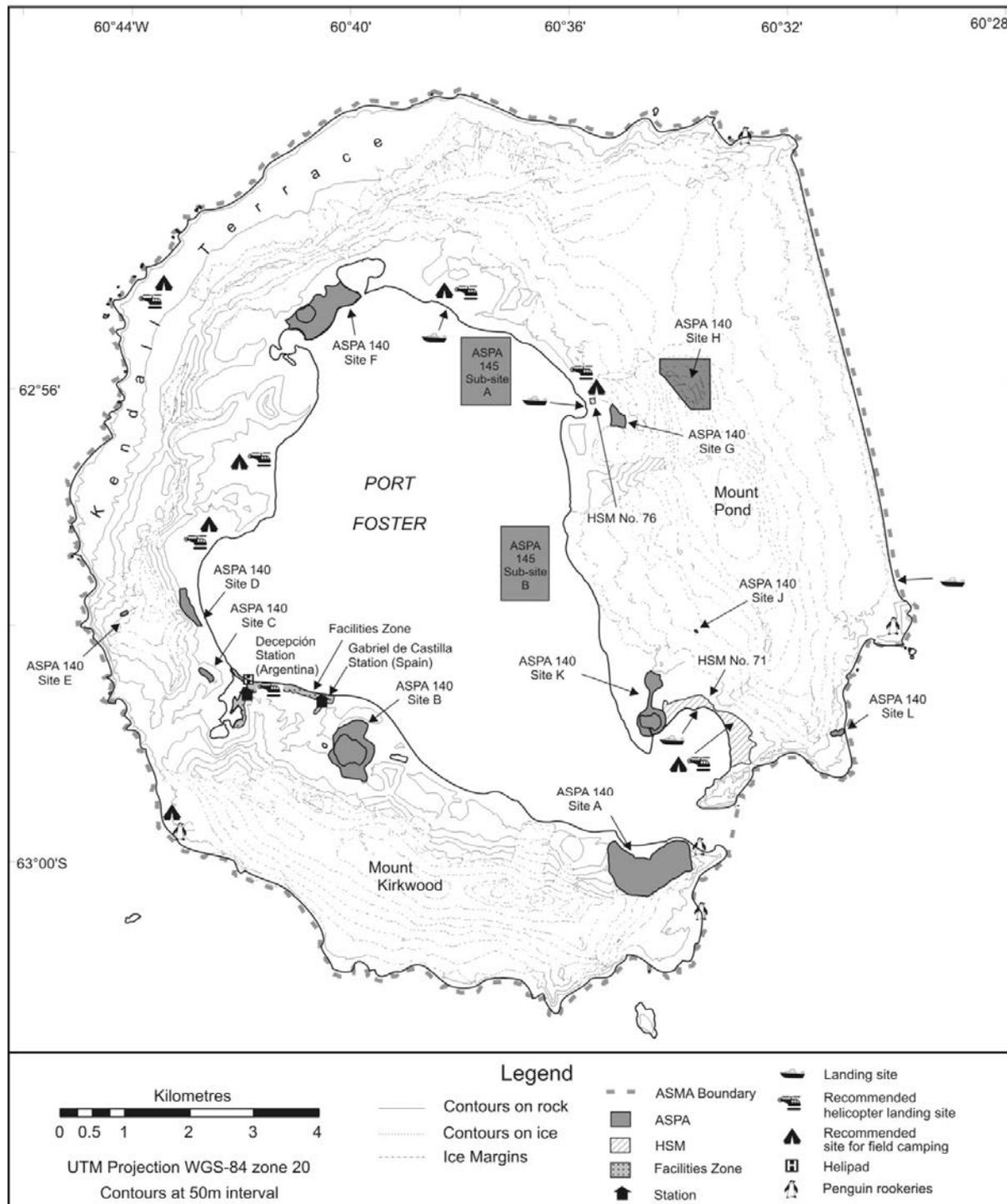


Figure 3. Deception Island Antarctic Specially Managed Area No. 4



Appendix 1: ASPA 140

Currently valid plan is available at http://www.ats.aq/documents/recatt/Att291_e.pdf.

Appendix 2: ASPA 145

Currently valid plan is available at http://www.ats.aq/documents/recatt/Att284_e.pdf.

Appendix 3: Whalers Bay Conservation Strategy

Conservation Strategy for Historic Site and Monument No. 71, Whalers Bay, Deception Island

1. Introduction

1.1 General background

Historic Site and Monument No 71, Whalers Bay (latitude 62° 59'S, longitude 60° 34'W), is located on Deception Island, South Shetland Islands, Antarctica.

The buildings, structures and other artefacts on the shore of Whalers Bay, which date from the period 1906-1931, represent the most significant whaling remains in the Antarctic. Other buildings, structures and artefacts of the British 'Base B' represent an important aspect of the scientific history of the area (1944-1969).

The remains of the Norwegian Hector whaling station at Whalers Bay were originally listed as Historic Site and Monument No. 71 in ATCM Measure 4 (1995) based on a proposal by Chile and Norway. The extent of the historic site was expanded in 2003 by means of ATCM Measure 3 (2003) (see Section 3).

1.2 Brief historical background (1906-1969)

During the 1906-07 austral summer, the Norwegian Captain Adolfus Andresen, founder of the *Sociedad Ballenera de Magallanes*, Chile, began whaling at Deception Island. Whalers Bay served as a sheltered anchorage for factory ships that processed whale blubber. In 1908 a cemetery was established here. The cemetery was partly buried and partly swept away during a volcanic eruption in 1969, at which time it comprised 35 graves and a memorial to ten men who were lost at sea (only one body was recovered). In 1912, a Norwegian company, *Aktieselskabet Hektor*, established the shore-based whaling station in Whalers Bay. Hektor whaling station operated until 1931.

During the 1943-44 austral summer, the UK established a permanent base (Base B) in part of the abandoned whaling station. Base B was operated as a British scientific station, latterly by the British Antarctic Survey, until 1969, when it was severely damaged by a mud and ash flow caused by a volcanic eruption, and was abandoned.

Attachment A contains further detail on the history of Whalers Bay, including a bibliography.

1.3 Aim and objectives of the conservation strategy

The overall aim of the conservation strategy is to protect the values of Whalers Bay Historic Site. The objectives are to:

- ***Maintain and preserve the cultural heritage and the historic values of the site within the constraints of natural processes.*** Minor restoration and conservation work will be considered, whilst it is recognised that natural processes will continue to cause the deterioration of buildings, structures and other artefacts over time.
- ***Prevent unnecessary human disturbance to the site, its features and artifacts.*** Every effort shall be made to ensure that human activity at the site does not diminish its historic values. Any damage, removal or destruction of buildings or structures is prohibited in accordance with Article 8 (4) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty.
- ***Permit ongoing clean up of debris.*** Large quantities of waste are present in and around the buildings at Whalers Bay. Wind-scattered debris is present throughout the site. There is also hazardous waste present, including diesel fuel and asbestos. A major clean up of loose debris and waste, identified by conservation and environmental experts as not forming an important part of the historic remains, was undertaken in April 2004. Furthermore, a program of ongoing clean-up of debris resulting from the gradual deterioration of the structures, will be instigated. Any removal of debris must only be undertaken under the advice of a professional heritage expert, and proper documentation must be secured before such debris is removed.
- ***Educate visitors to understand, respect and care for the historic values of the site.*** Whalers Bay Historic Site is one of the most visited sites in Antarctica. Information on the historic significance of the site, and the need to conserve its values, will be made available to visitors.
- ***Protect the natural and cultural environment of the site.*** Whalers Bay is an integral part of the unique environment of Deception Island. Activities at the site should be undertaken in such a way that minimizes any impact on the natural and cultural environment.

2. Parties undertaking management

Chile, Norway and the UK shall consult within the wider Deception Island Management Group to ensure that the provisions of this conservation strategy are implemented and its aim is met.

3. Description of the site

The site comprises all pre-1970 remains on the shore of Whalers Bay, including those from the early whaling period (1906-12) initiated by Captain Adolfus Andresen of the *Sociedad Ballenera de Magallanes*, Chile; the remains of the Norwegian Hektor Whaling Station established in 1912 and all artefacts associated with its operation until 1931; the site of a cemetery with 35 burials and a memorial to ten men lost at sea; and the remains from the period of British scientific and mapping activity (1944-1969). The site also acknowledges and commemorates the historic value of other events that occurred there, from which nothing remains.

3.1 Site boundary

Figure 1 shows the boundary of the Whalers Bay Historic Site. It comprises most of the beach at Whalers Bay from Neptunes Window to the former BAS aircraft hangar. Boundary markers, which would detract from the aesthetic value of the site, have not been erected. Figure 1 also shows the major historic buildings and structures at the site.

3.2 Historic remains

Table 1 summarises the main buildings, facilities and other structures at the site. More detailed information about these historic structures is provided in Attachment B and their location is shown on Figure 1.

Table 1: Historic remains at the Whalers Bay Historic Site

# ⁴	Structure	Map 1 ⁵
Whaling period		
WB1	Various remains from the whaling period at Deception Island (1906-1931), including: <ul style="list-style-type: none"> - Water boats and rowing boats - Wells and well head houses - Storage building - Wooden and metal barrels - Rampart dams 	14
WB2	Cemetery (1 cross and 1 empty coffin currently visible). NB The pile of stones in front of the original cross does NOT indicate a grave, but is a new addition by visitors. One memorial cross has been moved to the site.	Cross
WB3	Magistrate's residence	3
WB4	Hospital/storage building	2
WB5	Boilers	7
WB6	Cookers and associated equipment, including: <ul style="list-style-type: none"> - cooking grills - driving wheel - steam winch 	7
WB7	Foundation of kitchen/mess building (subsequently reused as the foundations for Priestley House) and piggery	4
WB8	Fuel storage tanks	10, 11
WB9	Half floating dock	12
WB10	Whalers Barracks (subsequently renamed Biscoe House)	5
Scientific period		
WB11	'Hunting Lodge' (UK company Hunting Aerosurveys)	9
WB12	Aircraft hangar ⁶	1
WB13	Massey Ferguson tractor	6

⁴ Reference number is cross-referenced with the information in Attachment B.

⁵ Reference to map location (Figure 1)

⁶ A de Havilland DHC-3 Single Otter was removed from the site in April 2004 by BAS for safe-keeping at the de Havilland Aircraft Heritage Centre, London Colney, UK. The intention is to return it to Whalers Bay once it is safe to do so. This position is due to be reviewed in 2014.

3.3 Natural environment

The 1967 volcanic eruption on Deception Island resulted in the deposition of a 1-5 cm layer of ash over Whalers Bay, whilst the 1969 eruption caused a lahar (mud slide) which partly buried the site. Fragile fluvial terraces are located to the north of the whaling station which were of geological importance, although have now been naturally eroded by meltwater streams.

The immediate area to the west of the Historic Site, including Kroner Lake, the Ronald Hill crater plain and the valley connecting them, is designated as part of ASPA 140 due to its exceptional botanical and limnological importance.

Further areas of botanical importance are located within the Historic Site. These include a geothermally active scoria outcrop to the east of the whaling station, around the 'Hunting Lodge', inside the two accessible whale oil tanks, around the site of the cemetery, and on the cliffs and massive boulders at Cathedral Crags and Neptunes Window. Elsewhere, timber and iron structures, bricks and mortar, are colonised by various crustose lichens, all of which are common on natural substrata on the island.

Kelp gulls (*Larus dominicanus*), Wilson's storm-petrel (*Oceanites oceanicus*) and Antarctic Terns (*Sterna vittata*) breed at Whalers Bay, and Cape petrels (*Daption capensis*) nest in Cathedral Crags, overlooking the site.

4. Management of the site

4.1 Access to, and movement within, the site

All visits at the site should adhere to the adopted visitor site guidelines for Whalers Bay⁷. In addition the following should be used as guidance with respect to access to, and movement within the site:

- Motorized vehicles are only to be used within the HSM for scientific, conservation or clean-up activities (e.g. removal of waste).
- Helicopter landings, where necessary for conservation or management purposes, should only take place in the designated landing site (shown in Figure 1) to avoid dangers associated with loose debris and to prevent damaging structures or causing disturbance to wildlife.
- Field camps for scientific or management purposes should be established in the area to the east of the half floating dock as indicated in the map provided in Attachment B. The use of buildings for camping purposes is prohibited except in an emergency.

⁷ The site guidelines are available at the ATS website at www.ats.aq/siteguidelines/documents/Whalers_bay_e.pdf

4.2 Installation, modification and removal of structures

- In accordance with Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty (1998), the historic structures, facilities and artefacts at the site are not to be damaged, removed or destroyed. Graffiti considered to be of historic importance should not be removed. New graffiti should not be added.
- Conservation and/or restoration work agreed by the Parties undertaking management may be carried out. Work on the buildings and structures may be necessary to render them safe or to prevent damage to the environment.
- No new buildings or other structures (apart from interpretative material agreed by Chile, Norway and the UK, in consultation with the wider Deception Island Management Group) are to be erected at the site.
- Historic remains and artefacts found at other locations on Deception Island, or elsewhere, which originate from Whalers Bay may be returned to the site after due consideration by those Parties undertaking management.

4.3 Visitor guidelines

The Visitor Site Guidelines for Whalers Bay (adopted by ATCM) applies to all visitors, including visits by commercial tour operators (IAATO and non-IAATO affiliated), private expeditions and National Antarctic Programme staff when undertaking recreational visits⁸.

4.4 Information

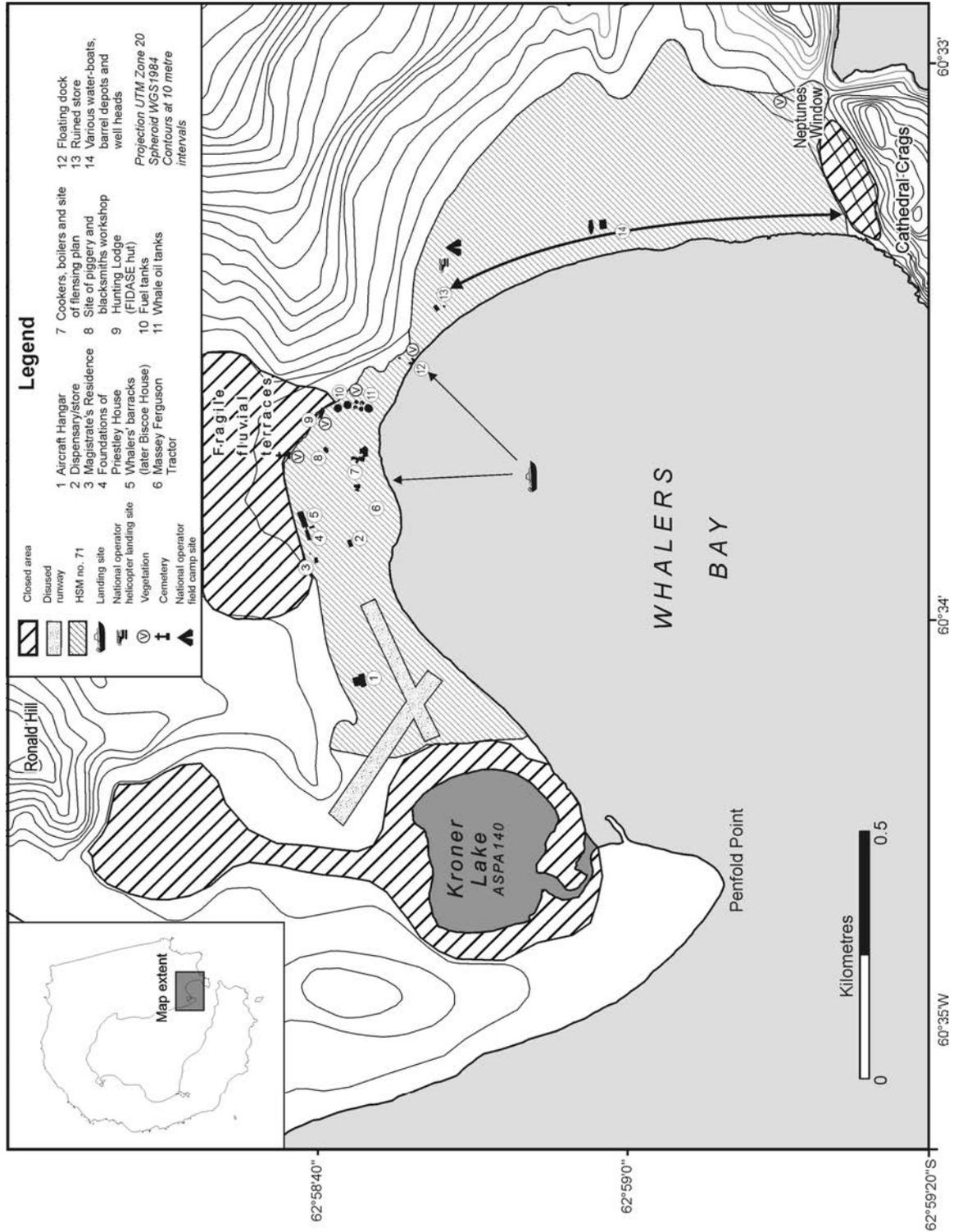
- An informative sign, agreed by the Parties undertaking management, will be located at the recommended landing site. Appropriate and necessary signs advising visitors of any health and safety issues will also be considered.
- Memorial plaques (e.g. listing the names of those buried in the cemetery, or commemorating Captain Adolfus Andresen) may also be located within the site.
- Boundary markers are not considered necessary, as they would detract from the aesthetic value of the site. The boundary generally follows clearly visible natural features.
- The Parties undertaking management will disseminate further information about the significance of the historic site and the need to conserve its values.

⁸ The guidelines are available at the ATS website at www.ats.aq/siteguidelines/documents/Whalers_bay_e.pdf

4.5 Reporting and Recording

The following records are to be maintained by the Parties undertaking management:

- number of tourists landing at the site;
- number of scientists and associated logistics personnel visiting the site;
- conservation and clean-up work carried out; and
- site inspection reports, including reports and photographs on the condition of the historic remains.



Appendix 4: Facilities Zone Code of Conduct

Code of Conduct for the Deception Island ASMA 4 Facilities Zone, including Decepción Station (Argentina) and Gabriel de Castilla Station (Spain)

1. Introduction

The Deception Island ASMA includes a Facilities Zone (Figure 1) within which is located “Decepción” Station (Argentina, Figure 2) and “Gabriel de Castilla” Station (Spain, Figure 3). Figure 1 shows the extent of the Facilities Zone, which includes the two stations, the surrounding beach area, and a small unnamed lake to the west of Crater Lake from which freshwater is extracted. Activities within this zone are to be undertaken in line with this Code of Conduct, the aims of which are to:

- encourage the pursuit of scientific investigation on Deception Island, including the establishment and maintenance of appropriate supporting infrastructure;
- preserve the natural, scientific and cultural values of the Facilities Zone;
- safeguard the health and safety of station personnel.

This Code of Conduct summarises existing station procedures, a copy of which is available (Spanish language version only) at Decepción and Gabriel de Castilla stations.

Staff and visitors will be made aware of the contents of this Code of Conduct during pre-deployment training programmes and briefing sessions on board ship prior to arrival at the station.

A copy of the complete Deception Island ASMA Management Package will be kept at Decepción Station and Gabriel de Castilla Station, where relevant maps and information posters about the ASMA will also be displayed.

2. Buildings and services

2.1 Buildings

- An Environmental Impact Assessment (EIA) must be undertaken for the construction of any new permanent station buildings in line with Annex I to the Environmental Protocol.
- An EIA must also be undertaken for the quarrying of rock to maintain existing buildings, in line with Annex I to the Environmental Protocol, as well as with the prior approval of the national authorities of Argentina (Decepción Station) or Spain (Gabriel de Castilla Station).
- Consideration will be given to reusing existing sites when practicable, in order to minimise disturbance.

- Buildings are to be maintained in good condition. Buildings not currently in use are to be routinely checked, and assessed for likely removal.
- Work-sites are to be kept as neat as possible.

2.2 Power Generation

- Maintain generators in good condition, and undertake routine inspections, so as to minimise emissions and possible fuel leaks.
- Ensure economy in power consumption and hence fuel usage and emissions.
- The use of renewable energy sources will be encouraged, where appropriate.

2.3 Water Supply

- Handling or disposing of wastes, fuel or other chemicals within the stations' water catchment area is prohibited.
- Use of vehicles within the water catchment area will only be for essential purposes.
- Ensure that regular tests of water quality, as well as routine cleaning of water holding tanks, are conducted.
- Regulate water consumption, so as to avoid unnecessary extraction.

3. Fuel handling

- The integrity of bulk fuel storage facilities, supply lines, pumps, reels and other fuel handling equipment will be regularly inspected.
- At both stations, fuel storage includes secondary containment. Drummed fuel should be stored inside. Storage areas should, as far as practicable, be properly ventilated, and sited away from electrical services. Storage facilities should also be sited away from accommodation facilities for safety reasons.
- All practicable measures will be undertaken to avoid fuel spills, in particular during fuel transfer (e.g. ship to shore transfer by pipeline or zodiac, refuelling day tanks).
- Any fuel, oil or lubricant spills will be reported immediately to the Station Leader, and subsequently to the National Authority.
- Ensure that adequate and sufficient spill response equipment (e.g. absorbents) is kept in a known location and available to deal with any spills.
- Station personnel will be trained in how to use spill response equipment. Training exercises will be undertaken at the beginning of each season.
- In case of fuel spills, response actions will be undertaken in line with the Oil Spill Contingency Plan held at each station.
- Oily wastes will be packaged in appropriate containers and disposed of according to station procedures.

4. Fire prevention and fire-fighting

- Signs indicating no-smoking areas, and flammable substances, will be displayed as appropriate.

- Fire fighting equipment will be available at fuel storage sites and elsewhere. Such equipment will be clearly marked.

5. Waste Management

- Waste management, including waste reduction and the provision of equipment and appropriate packaging material, will be considered in the planning and conducting of all activities at Decepción and Gabriel de Castilla stations.
- All station personnel will be instructed on the provisions of Annex III to the Environmental Protocol.
- A waste management co-ordinator will be appointed at each station.
- Wastes will be segregated at source and stored safely on site prior to removal. After each summer season, wastes generated at Decepción and Gabriel de Castilla stations will be removed from the Antarctic Treaty Area.
- Regular tests of water effluents discharged into Port Foster will be undertaken.
- Any substances that may adversely affect the working of effluent treatment plants will not be disposed of through the drainage system (including toilets and wash basins).
- Cleaning up past waste disposal sites on land and abandoned work sites will be considered a priority, except where removal would result in more adverse environmental impacts than leaving the structure or waste material in situ.
- Personnel from both stations should periodically participate in clean-up activities within the facilities area, so as to minimise any scattered wastes around the stations.
- At the end of each summer season, activities connected to clean-up and removal of wastes will be reported to the appropriate national authority.

6. Other Operational Issues

6.1 Communications

- The installation of permanent or temporary aerials is to be carefully considered through the environmental evaluation procedures in place.
- VHF Marine Channel 16 will be monitored.
- All station personnel leaving the Facilities Zone must be equipped with a VHF radio.

6.2 Use of vehicles and small boats

- Vehicles should only be used around and between the stations when necessary.
- Keep to established tracks within the station area where practicable.
- Refuelling and servicing of vehicles will be carried out at the facilities provided for these purposes. Every effort should be made to avoid spills during refuelling and servicing.
- Do not use vehicles close to sensitive scientific equipment, across flora or near concentrations of fauna, or unnecessarily within the water-catchment area.

- Small boats operating out of Decepción or Gabriel de Castilla Station are only to be used within Port Foster, when weather conditions allow, and principally for scientific and logistic reasons. No small boats will be used outside Port Foster. Avoid the use of small boats close to cliffs and/or glaciers, to avoid rock or ice falls.
- When operating one boat, a second boat will be on stand-by, at the Station, for immediate support in an emergency.
- Small boats will be operated by at least two people. Essential equipment will include boating immersion suits, life jackets and appropriate radio links (for example VHF radios).

6.3 Aircraft Operations

- Helicopters will generally take off from and land at the helipad at Decepción Station. Occasionally, operational reasons may require them to take off from, or land at, other appropriate locations within the Facilities Zone.

6.4 Field travel

- All wastes from field camps, except for human wastes (faeces, urine and grey water) will be returned to the stations for safe disposal. The human and domestic liquid wastes are to be disposed of in Port Foster below the low water mark.
- The Station Leader and/or the Station Environment Officer will brief field parties on environmental management in the field, the location of protected areas, and the provisions of the ASMA Management Plan.
- No uncooked poultry products will be used by field parties.
- All field parties will be equipped with VHF radios.

7. Protected Areas

- Three terrestrial sub-sites of ASPA No. 140 (Site B - Crater Lake, Site C - Unnamed hill, southern end of Fumarole Bay, and Site D - Fumarole Bay), are located close to the Facilities Zone. Station personnel will be made aware of the location of, and restrictions on access to, all protected areas on Deception Island. Information about these protected areas, including a map showing their location, will be prominently displayed at both stations.

8. Flora and fauna

- Any activity involving the taking of, or harmful interference with, native flora or fauna (as defined in Annex II to the Protocol) is prohibited unless authorised by a permit issued by the appropriate authority.
- An appropriate precautionary approach distance, no closer than 10 meters, is to be maintained from birds or seals present in the Facility Zone.
- Staff and visitors are to walk slowly and carefully when near wildlife, in particular avoiding birds which are nesting, moulting, crèching or returning from foraging trips. Give 'right of way' to wildlife at all times.
- Birds are not to be fed on waste food scraps from the stations. Food wastes will be secured to prevent scavenging by birds.

- All reasonable precautions will be taken to avoid the introduction of micro-organisms and any other non-native species, or species from other Antarctic sites. Recommended measures aimed at minimising the unintentional introduction of non-native species are found in Appendix 11 of the Deception Island management plan.
- The introduction of herbicides, pesticides or other harmful substances is prohibited.
- At the end of each summer season, a report on activities involving the taking of, or harmful interference with, native flora and fauna will be forwarded to the appropriate national authorities.

9. Tourist visits to the Facilities Zone

- Any visits to Decepción Station (Argentina) or Gabriel de Castilla Station (Spain) may only be undertaken at the discretion of the respective Station Leader. Contact can be made via VHF Marine Channel 16. Visits will only be allowed if they do not interfere with scientific or logistical work.
- Visits are to be undertaken in line with Recommendation XVIII-1, Measure 15 (2009) “Landing of Persons from Passenger vessels”, Resolution 7 (2009) “General Principles of Antarctic Tourism”, Resolution 7 (2009) “General Principles of Antarctic Tourism” and Resolution 3 (2011) “General Guidelines for Visitors to Antarctic).
- Station Leaders will co-ordinate visits to stations with Expedition Leaders.
- Visitors will be informed about the principles of this Code of Conduct, as well as the ASMA Management Plan.
- The station leader will appoint a guide (English speaking, when appropriate and possible), to escort visitors around the station, in order to ensure compliance with the measures included in this Code of Conduct.
- The national authorities operating Decepción or Gabriel de Castilla Stations will inform Antarctic Treaty Secretariat, COMNAP and IAATO in case of a clear risk of volcanic eruption. The stations shall notify any ships in the area of any immediate danger.

10. Co-operation and sharing of resources

- Both stations will co-ordinate and periodically conduct joint emergency evacuation, oil spill response and fire-fighting exercises.

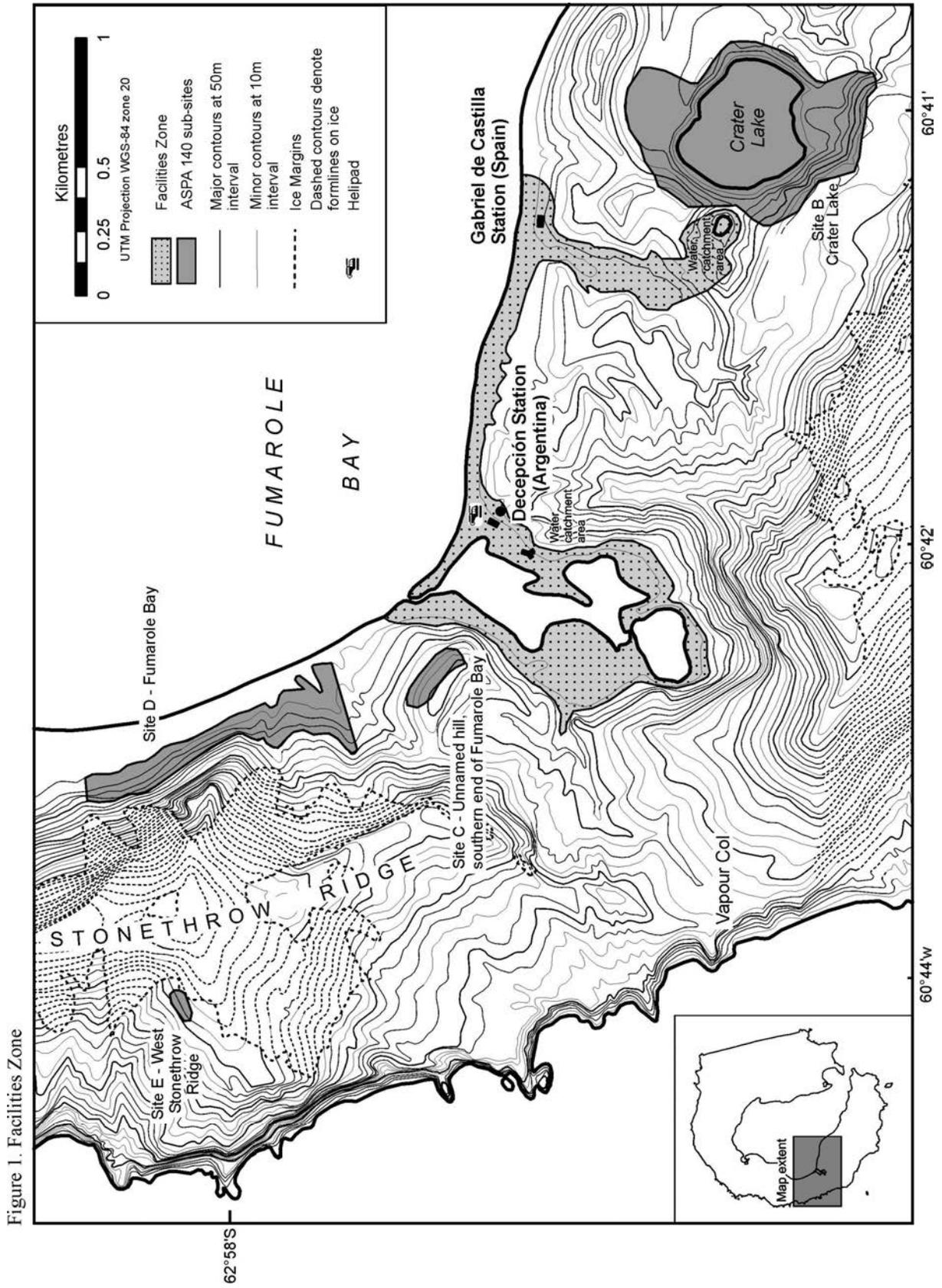


Figure 2. Argentinian Antarctic Base Decepción



Figure 3. Spanish Antarctic Base Gabriel de Castilla



Code of Conduct for Visitors to Deception Island

1. Introduction

This code of conduct has been produced for commercial tour operators (IAATO and non-IAATO affiliated), private expeditions and National Antarctic Programme staff when undertaking recreational visits to Deception Island.

There are four sites on Deception Island which may generally be visited: Whalers Bay, Baily Head, Pendulum Cove, and Telefon Bay (east). Stancomb Cove, in Telefon Bay, is also used as an anchorage for yachts. Visits to Decepción Station (Argentina) and Gabriel de Castilla Station (Spain) are only permitted by prior agreement with the respective Station Leaders. Tourist or recreational visits to other sites on the island are discouraged.

2. General Guidelines

The following general guidelines apply to all the above sites visited on Deception Island:

- Visits are to be undertaken in line with the Management Plan for Deception Island ASMA 4, the general guidelines for visitors to the Antarctic (Resolution 3 (2011) and with Recommendation XVIII-1.
- All visits must be planned and conducted taking into account the significant risk to human life posed by the threat of volcanic eruption.
- Expedition Leaders of cruise ships and Masters of national programme support vessels are encouraged to exchange itineraries in order to avoid two ships unintentionally converging on a site simultaneously.
- Vessels approaching or departing from Port Foster must announce over VHF Marine Channel 16 the intended time and direction of passage through Neptunes Bellows.
- For commercial cruise operators, no more than 100 passengers may be ashore at a site at any time, accompanied by a minimum of one member of the expedition staff for every 20 passengers.
- Do not walk on vegetation such as moss or lichen. The flora of Deception Island is of exceptional scientific importance. Walking on the alga *Prasiola crispa* (associated with penguin colonies) is permissible as it will not cause it any adverse disturbance.

- Maintain an appropriate distance from birds or seals which is safe and does not cause them disturbance. As a general rule, maintain a distance of 5 metres. Where practicable, keep at least 15 metres away from fur seals.
- In order to prevent biological introductions, carefully wash boots and clean clothes, bags, tripods and walking sticks before landing.
- Do not leave any litter.
- Do not take biological or geological souvenirs or disturb artefacts.
- Do not write or draw graffiti on any man-made structure or natural surface.
- Scientific equipment is routinely deployed during the austral summer by National Antarctic Programmes at a number of locations on Deception Island. The Spanish Antarctic Programme deploy equipment for important and necessary seismic monitoring. Such equipment is highly sensitive to disturbance. At least 20 metres must be maintained from seismic monitoring equipment, which will be marked with a red flag. This distance is under examination - any revisions will be provided as necessary.
- Do not touch or disturb other types of scientific instruments or markers (e.g. wooden stakes marking botanical plots).
- Do not touch or disturb field depots or other equipment stored by National Antarctic Programmes.

3. Site Specific Guidelines

3.1 Whalers Bay (latitude 62°59'S, longitude 60°34'W)

Whalers Bay is the most visited site on Deception Island, and one of the most visited sites in the Antarctic. It is a small bay immediately to the east after passing into Port Foster through Neptunes Bellows. It was named by the French explorer Jean-Baptiste Charcot because of the whaling activity that took place there. The site includes the remains of the Norwegian Hektor Whaling Station, the site of the cemetery and the abandoned British 'Base B', as well as the whaling remains along the length of the beach, some of which pre-date the whaling station. Appendix 3, Conservation Strategy for Whalers Bay Historic Site and Monument No. 71, contains further information about Whalers Bay.

- Visits to Whalers Bay must be undertaken in line with Visitor Site Guide for Whalers Bay (Appendix 8).

3.2 Pendulum Cove (latitude 62°56'S, longitude 60°36'W)

Pendulum Cove (see figure 1) is a small cove on the north east side of Port Foster. It was named by Henry Foster of the British Royal Naval vessel HMS Chanticleer who, in 1828, undertook magnetic observations there using pendulums. The gently sloping ash and cinder beach leads to the remains of the abandoned Presidente Pedro Aguirre Cerda

Station (Chile), Historic Site and Monument No. 76, which was destroyed by a volcanic eruption in 1967. Thermal springs along the shallow shoreline of Pendulum Cove offer visitors the opportunity to 'bathe' in warm water.

Visits to Pendulum Cove must be undertaken in line with Visitor Site Guide for Pendulum Cove (Appendix 10).

3.3 Baily Head (latitude 62°58'S, longitude 60°30'W)

Baily Head (see figure 2) is a rocky headland exposed to the Bransfield Strait on the south east coast of Deception Island. It was named after Francis Baily, the English astronomer who reported on Foster's magnetic observations at Pendulum Cove. The site comprises the southern end of a long linear beach which runs along most of the eastern side of Deception Island, and a narrow valley that rises steeply inland to a semi-circular ridgeline, giving the impression of a natural 'amphitheatre'. It is bounded to the north by a large glacier and to the south by the cliffs of Baily Head. A substantial melt-stream runs through the centre of the valley during the austral summer.

Within this unnamed valley, and to the south of it, is one of the largest colonies of chinstrap penguins (*Pygoscelis antarctica*) in Antarctica - although recent studies indicate a significant reduction in the population here. Brown skuas (*Catharacta antarctica lonnbergi*), cape petrels (*Daption capensis*) and snowy sheathbills (*Chionis alba*) also nest at Baily Head. Antarctic fur seals (*Arctocephalus gazella*) haul out along the beach in large numbers during the austral summer.

Visits to Baily Head must be undertaken in line with Visitor Site Guide for Baily Head (Appendix 9).

3.4 Telefon Bay (east) (latitude 62°56'S, longitude 60°40'W)

Telefon Bay (see figure 3) was named after the whaling vessel Telefon which was moored in the bay for repairs in 1909 by Adolfus Amandus Andresen, founder of the company Sociedad Ballenera de Magallanes. At the easternmost end of Telefon Bay a gently sloping beach leads to a shallow valley which rises sharply to the rim of an unnamed volcanic crater.

Visits to Telefon Bay must be undertaken in line with Visitor Site Guide for Telefon Bay (Appendix 7).

3.5 Decepción Station (Argentina) and Gabriel de Castilla Station (Spain)

Visits to Decepción Station (Argentina) and Gabriel de Castilla Station (Spain) may only be undertaken with the prior agreement of the appropriate Station Leader. Visits to the stations must be undertaken in line with the Code of Conduct for the Deception Island Facilities Zone (Appendix 4).

Appendix 6: Volcanic Alert and Escape

Alert Scheme and Escape Strategy for volcanic eruptions on Deception Island

The volcanism in Deception Island

Within the area that encompasses the South Shetland Island, Antarctic Peninsula and Bransfield Sea, only Deception Island has experienced recent eruptive processes (i.e. in 1842, 1967, 1969 and 1970, with other non-verified events in 1912 and 1917).

Between 1967 and 1970, the intense volcanic activity in Deception Island caused the destruction of the scientific stations of Chile, in Pendulum Cove, and the United Kingdom, in Whalers Bay. The intense volcanic activity changed the island's morphology; a small island was created in Port Foster which, with time, was joined to the rest of Deception Island in the Telefon Bay area. The great amount of ejected volcanic ash, rock and debris covered some of the surrounding islands, which can still be observed at Johnson Glacier on Livingston Island.

An immediate consequence of the volcanic activity in 1967-1970, was the temporary end of scientific activity on the island, with only a limited number of studies looking at the post eruptive period taking place

At present, the only evidence of surface volcanic activity on Deception Island is the presence of areas where there is significant seismic activity, due to the tectonic expansion of the Bransfield rift and local volcanic activity that generates, when measured during the summer field season, an average of 1000 low energy surface quakes (magnitudes lower than 2 on the Richter Scale).

Higher magnitude tectonic-volcanic earthquakes, measuring between 3 and 4 on the Richter Scale, were recorded during two particularly active seismic-volcanic periods (1991-92 and 1998-99). During these periods, seismic events were felt, recorded and described by scientific groups on Gabriel de Castilla Station.

Between 31 December 1991 and 25 January 1992, the island experienced an important increase in seismic activity with up to 900 earthquakes recorded, four of which were directly felt by personnel on the island. These activities were interpreted as a reactivation process, probably due to a small intrusion located in Fumarole Bay.

After the periods of increased volcanic activity in 1994-95 and 1995-96, on 3 January 1999, a further important period of seismic-volcanic activity commenced with two earthquakes of magnitude 2.9 (January 11) and 3.4 (January 20) . These seismic-volcanic activities were located between Fumarole Bay and Whalers Bay. They included volcano-tectonics quakes that liberated a significant amount of energy, the like of which had never been recorded previously..

Following this period of more intense seismic activity, the multi-disciplinary geophysical and geodetic studies were increased within the island. Activities included:

resurveying of the geodetic net, establishing a new seismometer display, sampling of gases in the fumaroles and maintaining geomagnetic, gravimetric and bathymetric data records. An important geophysical study was performed that produced a tomography model of speed and attenuation in wave propagation, including a model to explain the relationship between the seismic activity recorded and dynamics of the volcano.

At present, volcanic activity on Deception Island could be considered typical of an andesitic volcano model (basaltic), with an effusive eruptive mechanism of surseyane type, with low magmatic volume and activity, mainly concentrated in Fumarole Bay, Telefon Bay, Pendulum Cove and Whalers Bay.

Present surface volcanic activity on Deception Island is related to important geothermal anomaly areas where a great number of zones with significant low energy (less than magnitude 2) surface seismic-volcanic activities are recorded.

Alert System

Every year, for approximately four months in the austral summer, Spanish and Argentinean scientists record continuously the volcanic activity on the island (typically between the end of November and the beginning of March). These periods are also coincident with the maximum human presence in the island.

The instruments deployed on Deception Island include a local network of seismometers and seismic array, telemetric seismographs, thermometric stations and a geodetic net maintained and recorded by Gabriel de Castilla Station. Geochemical data is collected and equipment maintained by Decepción Station.

Captains of ships entering Port Foster, and pilots of aircraft or helicopters, overflying the island, must pay attention to the volcanic activity bulletin broadcasts from Gabriel de Castilla (Spain) and Decepción (Argentina) Stations on VHF Channel 16 Marine.

To communicate this information it is considered useful to use a traffic light system that describes in a simple and accessible way, the present volcanic risk of the Deception Island volcano (Table 1).

Table I

Alert system for volcanic eruptions in Deception Island as recommended by AVCEI (International Association of Volcanology and Chemistry of the Earth's Interior)

Colour Code	Alert State	Description	Operative Actions
GREEN	No eruption expected	Normal volcanic parameters recorded. This is the normal island status	Control
YELLOW	Some anomalies in the volcanic system. A volcanic crisis could arise at some point in the future	There are small but significant anomalies in the volcanic parameters recorded	Control. Increase volcanic parameters recordings. Verify the parameters
ORANGE	Increased probability of volcanic eruption	Significant increase in volcanic parameters anomalies recorded. New changes in volcanic parameters appears	Increase readiness to respond. Start preparing the evacuation plan. Recommend restricting access to the island. Recommend temporary evacuation of the island including ships and helicopters
RED	High probability of an imminent volcanic eruption	High probability of volcanic eruption confirmed with a significant change in the number of volcanic parameters anomalies	Personnel on the island to move to emergency camps or evacuate the island entirely depending on the location of the eruption. Forbid ships and helicopters to enter the island..

Note: The recording and evaluation of the volcanic risk should be on-going, at least during the time the bases are operating. Volcanologists must update the state of the traffic lights system, according to the variability of volcanic parameters recorded.

Escape strategy in case of a volcanic eruption on Deception Island

The present evacuation strategy is based in the assumption that future eruptions will be similar to the ones in 1967-1970 and that the volcanic activity will have a geographically limited impact in the island.

A sudden slump of the whole caldera could result in a most serious event with lethal effects for all personnel on the island. Evacuation under this scenario is unlikely to be possible. The likelihood of such event is probably low and would likely be preceded by many warning events such as an increase in surface altitude and and increase in

earthquake frequency and intensity for several days or weeks before the event. Nevertheless, an event could arise suddenly, without any warning signs.

If an orange state of alert is declared all ships should leave Port Foster immediately after taking on board all crew and passengers that are ashore.

Captains and Masters of ships must take extreme caution when crossing Neptune Bellows taking into account the possibility of strong currents, Ravn rock in the middle of the narrow strait and any material that may have fallen from the steep cliffs on either side of the channel.

If an eruption is considered likely, some precautionary actions could be taken.

Firstly, ships should be advised not to access Port Foster in order to reduce future evacuation problems.. These measures would be temporary.

Although the island is small, it may be large enough to have areas where small groups may be relatively safe during a volcanic event. When considering recent eruptions on Deception Island, locations at distances from 7 to 10 kilometres from the centre of volcanic activity could be relatively safe.

It should be noted that evacuating all personnel from existing research stations could be more problematic, and have worse consequences, than moving personnel to selected emergency camps during a volcanic event. Timely use of previously assessed emergency camp locations could reduce the risk associated with a fast and full evacuation of personnel from the island during a volcanic event.

Consequently it is important to have selected locations a priori for emergency camps, taking into consideration the different possible locations of volcanic eruptions and other processes. As a general rule different options should therefore be considered before initiating an evacuation.

Evacuation routes

During a volcanic event all interior coastal areas may be considered dangerous, because of the fall of pyroclasts, rocks and other materials and the possibility of high, fast and irregular waves produced by seiches in Port Foster, that could put in danger ships sailing or anchoring in the island's lagoon.

Before evacuation it should be understood, that evacuation routes may be over difficult terrain and that the descent to the beaches on the outer coastline of the island may be steep and difficult to follow.

In addition, because of the substantial difficulties associated with crossing glaciers (broken and slippery surfaces, sudden lahars possible), it is advisable to avoid these areas, unless the support of specialists guides and adequate equipment is provided. However, it is recognised that such support may not always be available under emergency conditions.

Evacuation in helicopters may be the best solution, taken into account that external beaches are steep and narrow, with large boulders and are adjacent to deep waters with large waves that are often present even under good weather conditions. Some beaches (for example near Punta de la Descubierta) have submerged rocks which may be dangerous for small boats.

If the weather is good it could be possible to try helicopter evacuation from some locations around Port Foster, although helicopters working in any evacuation must avoid flying through volcanic clouds, because the fall of pyroclasts and ash could damage their engines.

These factors increase the danger of evacuation from Port Foster beaches, and it should be considered likely that evacuations may only be possible from external beaches or from some specific areas that could allow safe helicopters operation

To estimate the likely difficulties that could be encountered by evacuating personnel, most of the recommended evacuation routes were trialled previously by experienced personnel. The general conclusion of these surveys was that only three of the island's external beaches are available during bad weather: north side of Kendall Terrace, Macaroni Point and Baily Head. All of the other beaches identified were rocky and with access available only with helicopters. The route toward Punta de la Descubierta could be used, but only when the tide is very low.

As a result of these studies the main available evacuation routes are:

- From the facilities zone (Gabriel de Castilla, Decepcion Stations) toward Descubierta Point (1)
- From the facilities zone towards Entrance Point (the proposed route would entail evacuation from the beach) (2)
- From the facilities zone towards Entrance Point (helicopter extraction) (2)
- From Whalers Bay towards Baily Head (3)
- From the facilities zone towards Kendall Terrace (through the Pass at 168 m altitude above Telefon Bay) (4)
- From the facilities zone towards Kendall Terrace (through the Pass at 158 m altitude near Obsidians) (5)
- From the facilities zone towards Escondido Lake beach to Kendall Terrace (6)

Table 2 includes details of the evacuation routes, including distance, height gain and estimated journey time.

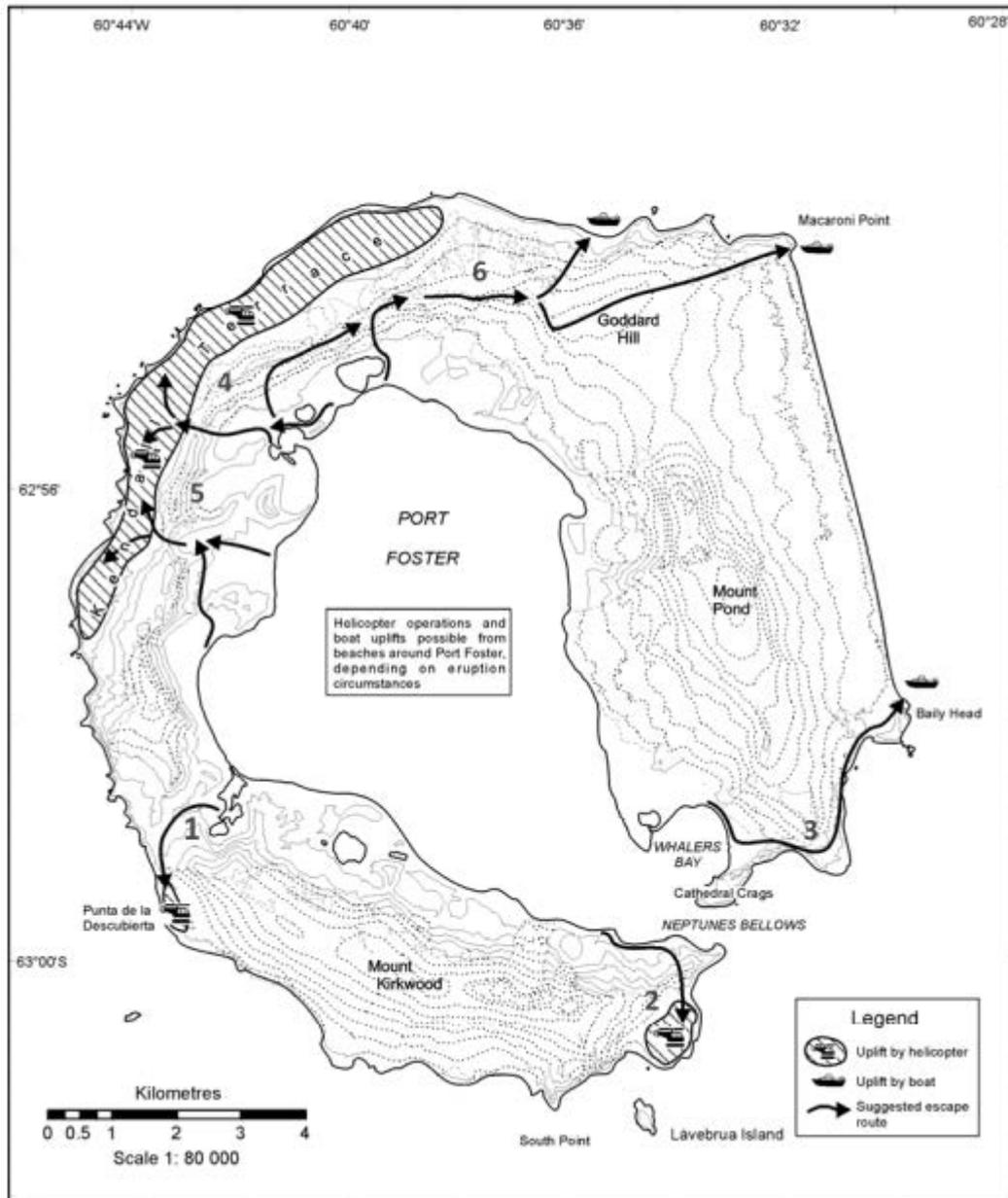
Table 2. Evacuation routes

Evacuation route	Total distances	Maximum altitude ⁹	Estimated time
•Facilities zone to Punta de la Descubierta (figure 2)	3920 m	130 m in Espolon	1 hours 11 minutes

⁹ The given altitudes refer to the highest point of the route.

• Facilities zone to Entrance Point (beach extraction area);	6800m	180 in Espolon	2 hours 9 minutes
• Facilities zone to Entrance Point (helicopter extraction area)	7237 m	172 m	2 hours
• Whalers Bay to Baily Head	3954 m	295 m in Collado crossing	1 hour 37 minutes
• Facilities zone to Kendall Terrace (by Collado crossing 168 of Telefon Bay)	9400 m	168 m in Collado	2 hours 31 minutes
• Facilities zone to Kendall Terrace (by Collado 158 in Obsidianas)	6400 m	169 m in Collado	1 hour 46 minutes
Lago Escondido to Kendall Terrace	5980 m	180 m Vaguada crossing	1 hour 30 minutes

Figure 1. Suggested escape routes on Deception Island during a volcanic crisis corresponding to no more than a code orange alert state.



Appendix 7: Visitor Site Guide: Telefon Bay

Current guidelines at http://www.ats.aq/siteguidelines/documents/Telefon_bay_e.pdf

Appendix 8: Visitor Site Guide: Whalers Bay

Current guidelines at http://www.ats.aq/siteguidelines/documents/Whalers_bay_e.pdf

Appendix 9: Visitor Site Guide: Baily Head

Current guidelines at http://www.ats.aq/siteguidelines/documents/baily_head_e.pdf

Appendix 10: Visitor Site Guide: Pendulum Cove

Guidelines submitted to CEP XV/ATCM XXXV for approval and adoption. Link to adopted guidelines will be updated as soon as available.

Appendix 11: Practical biosecurity measures

Guidelines to reduce the risk of non-native species introductions to Deception Island (Antarctic Specially Managed Area No. 4)

Introduction

Deception Island, South Shetland Islands (Antarctic Specially Managed Area No. 4) is exceptionally vulnerable to the impacts of introduced non-native species. The high level of human occupation and visitation means the likelihood of unintentional introduction of non-native species is high. The mild climate, relative to other areas of Antarctica, and the presence of geothermally-heated sites may make establishment of introduced marine and terrestrial species more likely than at other Antarctic locations. Deception Island has already been subject to non-native introductions: six species of non-native invertebrates have been recorded on the island and one introduced plant has also been found and subsequently eradicated.

Acknowledging:

- (i) the value of the Area's unique and isolated biological assemblies;
and
- (ii) the exceptional vulnerability of terrestrial and marine ecosystems within Deception Island to the potential impacts of non-native species due to the island's mild climate, geothermally-heated ground and high level of human presence;

the following guidelines aim to minimize the unintentional introduction of non-native species and material likely to carry such species (i.e. soils and untreated wood bark) to Deception Island, and describe appropriate monitoring and response activities.

Protection measures

AWARENESS

Programmes, operators and organisations active in Deception Island shall:

1. Educate personnel (including station personnel, scientists, contractors, landing ship crews, tour operator staff and tourists) about the potential risks to the environment through the introduction of non-native species.
1. Remind personnel that the introduction of non-sterile soil into the Antarctic Treaty area is prohibited as stipulated within the Protocol on Environmental Protection to the Antarctic Treaty. Similarly, that cultivated plants and their reproductive propagules may only be imported for controlled use and in accordance with a permit.
2. Remind personnel that, in accordance with the Protocol on Environmental Protection to the Antarctic Treaty, food waste must be incinerated or removed from the Antarctic Treaty area (Annex III) or disposed of at sea not less than 12 nautical miles from the nearest land or ice shelf (Annex IV).

OPERATIONAL PROCEDURES

Programmes, operators and organizations active in Deception Island shall furthermore:

4. Consider application of biosecurity guidelines concerning: (a) ships travelling to Deception Island, (b) stores supplying food and cargo to the island and (c) visitors' clothing and personal and scientific equipment. More specifically:
 - As far as is practicable, ensure that personnel entering and leaving the ASMA have clean footwear, for example, through boot cleaning procedures (preferably completed before departure for Antarctica as well as on entering and leaving the ASMA). Similar attention should be paid to clothes and other personal gear on which seeds and other non-native species propagules may be attached, such as bags, walking poles and camera tripods.
 - Reduce, to the maximum extent practical, the importation of untreated sand, aggregate and gravel to the ASMA.
 - Reduce, to the maximum extent practical, the importation of untreated wood to the ASMA.
 - Prohibit the importation of untreated wood to which bark is attached, as it is likely to contain many resilient non-native species such as micro-invertebrates, micro-algae, mosses, lichens and microorganisms.
 - Prevent food and food waste from being accessed by wildlife.
 - Prohibit the cultivation of plants for food, for example through hydroponics, within Deception Island station buildings.
 - Collect and incinerate or remove from the region any soil or biological material that is known not to have originated from within the ASMA.
 - Take particular care to reduce the risk of transfer of soils and biological material between spatially distinct geothermally-heated sites (e.g. ensure footwear is clean).
 - Take steps to reduce the risk of the biological contamination, or cross-contamination, of the island's fresh water bodies.
 - Implement measures to prevent intra-regional transfer of non-native species that are already present on Deception Island to other parts of Antarctica (e.g. by preventing transfer of Deception Island soils to other Antarctic locations).

The above guidance is based on advice provided in the CEP Non-native species manual, where two central resources are the COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species and the SCAR environmental code of conduct for terrestrial scientific field research in Antarctica.

RECORDING, MONITORING AND RESPONSE

Programmes, operators and organizations active in Deception Island shall furthermore:

5. Undertake monitoring for introduced species through terrestrial and marine biodiversity surveys, including the establishment of baseline survey data, ideally as part of a multi-national research programme.
6. Inform the Deception Island Management Group and other Parties, as appropriate, of the discovery of any non-native species within the ASMA. Inform SCAR of the discovery through the SCAR Aliens Species Database:
<http://data.aad.gov.au/aadc/biodiversity/index.cfm>.
7. Share new information concerning any non-native species found on the Island with the Deception Island Management Group and other Parties, as appropriate, with a view to co-ordinating a rapid management response (e.g. eradication or containment measures).
8. Undertake the response to an introduction as a priority, to prevent an increase in the species' distribution range and to make eradication simpler, cost effective and more likely to succeed¹⁰.
9. Assess regularly the efficacy of control or eradication programmes, including follow-up surveys.

COOPERATION & FUTURE PROTECTION

Programmes, operators and organizations active in Deception Island shall furthermore:

10. Consider the exceptional vulnerability of Deception Island to non-native species introductions in all Environmental Impact Assessments undertaken for activities occurring place within the ASMA.
11. Consider joint implementation of these guidelines through the Deception Island Management Group and other relevant Parties, as appropriate.
12. Commit to continuous improvement and revision of these guidelines.

¹⁰Note in this context the Guidance for visitors and environmental managers following the discovery of a suspected non-native species in the terrestrial and freshwater Antarctic environment referred to in the CEP Non-native species manual.

Antarctic Historic Sites and Monuments:

No 4 Pole of Inaccessibility Station building

No 7 Ivan Khmara's Stone

No 8 Anatoly Shcheglov's Monument

No 9 Buromsky Island Cemetery

No 10 Soviet Oasis Station Observatory

No 11 Vostok Station Tractor

No 37 O'Higgins Historic Site

The Representatives,

Recalling the requirements of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty that a list of current Historic Sites and Monuments be maintained, and that such sites shall not be damaged, removed or destroyed;

Recalling

- Recommendation VII-9 (1972), which annexed a revised and updated "List of Historic Sites and Monuments";
- Measure 3 (2003), which revised and updated the "List of Historic Sites and Monuments";

Desiring to change the description of several Historic Sites and Monuments;

Recommend to their Governments the following Measure for approval in accordance with Paragraph 2 of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

1. the description of Historic Site and Monument No 4 (Recommendation VII-9 (1972)) be changed to read as follows:

“No 4: Pole of Inaccessibility Station building

Station building to which a bust of V.I. Lenin is fixed, together with a plaque in memory of the conquest of the Pole of Inaccessibility by Soviet Antarctic explorers in 1958. As of 2007 the station building was covered by snow. The bust of Lenin is erected on the wooden stand mounted on the building roof at about 1.5 m high above the snow surface.”

Location: 82°06'42"S, 55°01'57"E Original

proposing Party: Russia

Party undertaking management: Russia.

2. the description of Historic Site and Monument No 7 (Recommendation VII-9 (1972)) be changed to read as follows: "No 7: Ivan

Khmara's Stone

Stone with inscribed plaque erected at Buromsky island in memory of Ivan Khmara, driver-mechanic, the member of the 1st Complex Antarctic Expedition of the USSR (1st Soviet Antarctic Expedition) who perished on fast ice in the performance of duties on 21.01.1956. Initially the stone was erected at Mabus Point, Mirny observatory. In 1974, 19th SAE, the stone was moved to Buromsky Island because of construction activity." Location:

66°32'04"S, 92°59'57"E

Original proposing Party: Russia

Party undertaking management: Russia

3. the description of Historic Site and Monument No 8 (Recommendation VII-9 (1972)) be changed to read as follows: "No 8:

Anatoly Shcheglov's Monument

Metal stele with plaque in memory of Anatoly Shcheglov, driver-mechanic who perished in the performance of duties, erected on sledge on the Mirny – Vostok route, at 2 km from Mirny station."

Location: 66°34'43"S, 92°58'23"E Original

proposing Party: Russia

Party undertaking management: Russia

4. the description of Historic Site and Monument No 9 (Recommendation VII-9 (1972)) be changed to read as follows: "No 9:

Buromsky Island Cemetery

Cemetery on Buromsky Island, near Mirny Observatory in which are buried citizens of the USSR (Russian Federation), Czechoslovakia, GDR and Switzerland (members of the Soviet and Russian Antarctic Expeditions) who perished in the performance of their duties."

Location: 66°32'04"S, 93°00'E Original

proposing Party: Russia

Party undertaking management: Russia

5. the description of Historic Site and Monument No 10 (Recommendation VII-9 (1972)) be changed to read as follows: "No 10:

Soviet Oasis Station Observatory

Magnetic observatory building at Dobrowolsky station (a part of the former Soviet station Oasis transferred to Poland) at Bunger Hills with a plaque in memory of the opening of Oasis station in 1956."

Location: 66°16'30"S, 100°45'03"E Original

proposing Party: Russia

Party undertaking management: Russia

6. the description of Historic Site and Monument No 11 (Recommendation VII-9 (1972)) be changed to read as follows:

"No 11: Vostok Station Tractor

Heavy tractor ATT 11 at Vostok station which participated in the first traverse to the Earth Geomagnetic Pole, with plaque in memory of the opening of the Station in 1957."

Location: 78°27'48" S, 106°50'06" E

Original proposing Party: Russia

Party undertaking management: Russia

7. the description of Historic Site and Monument No 37 (Recommendation VII-9 (1972)) be changed to read as follows:

"No 37: O'Higgins Historic Site located on Cape Legoupil, Antarctic Peninsula and comprising the following structures of historical value:

- "Capitán General Bernardo O'Higgins Riquelme" Bust, erected in 1948 opposite the Base known under the same name. General O'Higgins was the first ruler of Chile to recognise the importance of Antarctica. It has a symbolic meaning in the history of Antarctic exploration since it was during his government that the vessel Dragon landed on the coast of the Antarctic Peninsula in 1820. This monument is also representative of pre-IGY activities in Antarctica. (63°19'14.3" S / 57°53'53.9"W)

- Former “Capitán General Bernardo O’Higgins Riquelme” Antarctic Base, unveiled on 18th February, 1948 by the President of the Republic of Chile, Gabriel González Videla, the first President in the world to visit Antarctica. It is considered as a model pioneering base in the modern period of Antarctic exploration. (63°19’ S, 57°54’W)
- Plaque in memory of Lieutenants Oscar Inostroza Contreras and Sergio Ponce Torrealba, who perished in the Antarctic Continent for the sake of peace and science, on 12th August, 1957. (63°19’15.4” S / 57°53’52.9”W)
- Virgen del Carmen Grotto, located in the surroundings of the base, built approximately forty years ago. It has served as a place of spiritual withdrawal for the staff of the different Antarctic stations and expeditions. (63°19’15.9” S / 57°54’03.2”W)”

Location: 63°19’ S, 57°54’W

Original proposing Party: Chile

Party undertaking management: Chile



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