Miscellaneous No. 6 (2007)

The Antarctic Treaty

Measures adopted at
the Twenty-eighth Consultative Meeting
held at Stockholm 6 – 17 June 2005

Presented to Parliament
by the Secretary of State for Foreign and Commonwealth Affairs
by Command of Her Majesty
July 2007

Cm 7166 £22.50

MEASURES ADOPTED AT THE TWENTY-EIGHTH CONSULTATIVE MEETING HELD AT STOCKHOLM 6 - 17 JUNE 2005

The Measures[1] adopted at the Twenty-eighth 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, is available on the website of the Antarctic Treaty Secretariat at www.ats.aq.

The approval procedures set out in Article 6 (1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty[2] apply to Measures 2, 3 and 4 (2005), and the approval procedures set out in Article 8(2) of Annex V to the Protocol apply to Measure 5 (2005).

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

[2] Treaty Series No. 15 (2006) Cm 6855

The texts of the Antarctic Treaty together with the texts of the Recommendations of the first three Consultative Meetings (Canberra 1961, Buenos Aires 1962 and Brussels 1964) have been published in Treaty Series No. 97 (1961) Cmnd. 1535 and Miscellaneous No. 23 (1965) Cmnd. 2822. The Final Act of the Eleventh Special Consultative Meeting and the text of the Environmental Protocol to the Antarctic Treaty have been published in Miscellaneous Series No. 6 (1992) and Treaty Series No. 6 (1999) Cm 4256.

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 and the Twenty-seventh Consultative Meetings were also published as Command Papers. No Command Papers were published for the Twentieth to Twenty-fifth Consultative Meetings.

The Command Paper is not accompanied by an Explanatory Memorandum.

Measure 1 (2005) is not included and will be published at a later date.

MEASURES ADOPTED AT THE XXVIII[th] Consultative Meeting held at Stockholm 6-17 June 2005

Note: The above page numbers have been reproduced from the original Final Report of the meeting

Measure 2 (2005)

Antarctic Specially Protected Areas: Designations and Management Plans

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 and approval of Management Plans for those Areas;

Recalling

- Recommendation IV-1 (1966), which designated Taylor Rookery as Specially Protected Area ("SPA") No. 1;
- Recommendation IV-2 (1966), which designated Rookery Islands as SPA No. 2;
- Recommendation IV-3 (1966), which designated Ardery Island and Odbert Island as SPA No. 3;
- Recommendation IV-11 (1966), which designated Cape Shirreff as SPA No. 11;
- Recommendation XIII-8 (1985), which designated Potter Peninsula as Site of Special Scientific Interest ("SSSI") No. 13 and Harmony Point as SSSI No. 14;
- Recommendation XV-7 (1989), which redesignated SPA No. 11 (Cape Shirreff) as SSSI No. 32;
- Recommendation XVI-9 (1991), which designated Forlidas Pond and Davis Valley Ponds as SPA No. 23;
- Measure 3 (1995), which designated Pointe-Géologie Archipelago as SPA No. 24;
- Measure 2 (1997), which designated the Cape Evans site containing Historical Monuments 16 and 17 as SPA No. 25;
- Measure 1 (1998), which designated the Cape Royds site, containing Historical Monument 15, as SPA No. 27, Hut Point, containing Historical Monument No. 18, as SPA No. 28, and Cape Adare, containing Historical Monument No. 22, as SPA No. 29;
- Recommendation XVII-2 (1992) and Measure 3 (1997), which contained revised descriptions and management plans for SPA No. 1, 2 and 3, SSSI No. 13 and SSSI No. 14;

- Resolution 7 (1995), Resolution 3 (1996) and Measure 2 (2000) which extended the dates of expiry of SSSI No. 13, 14 and 32;
- Decision 1 (2002) which renamed and renumbered these Areas and Sites as Antarctic Specially Protected Areas;

Noting that the Committee for Environmental Protection has advised that two areas, namely Dakshin Gangotri Glacier, Dronning Maud Land and Scullin and Murray Monoliths, Mac. Robertson Land be designated as new Antarctic Specially Protected Areas, and has endorsed the Management Plans annexed to this Measure;

Recognising that these areas support outstanding environmental, scientific, historic, aesthetic or wilderness values, or ongoing or planned scientific research, and would benefit from special protection;

Desiring to approve Management Plans for these areas, and to replace the Management Plans for Antarctic Specially Protected Areas No. 101, 102, 103, 119, 120, 132, 133, 149, 155, 157, 158, and 159 with revised and updated Management Plans;

Noting that ASPA No. 149 contains marine areas and that the Commission for the Conservation of Antarctic Marine Living Resources approved the revised Management Plan for this Area at its 23rd meeting;

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:

That:

1. the following be designated as Antarctic Specially Protected Areas:

   (a) Antarctic Specially Protected Area No. 163: Dakshin Gangotri Glacier, Dronning Maud Land; and

   (b) Antarctic Specially Protected Area No. 164: Scullin and Murray Monoliths, Mac. Robertson Land, East Antarctica;

2. the Management Plans for the following Areas, which are annexed to this Measure, be approved:

   (a) Antarctic Specially Protected Area No. 101: Taylor Rookery, Mac. Robertson Land, East Antarctica;

   (b) Antarctic Specially Protected Area No. 102: Rookery Islands, Mac. Robertson Land, East Antarctica;

   (c) Antarctic Specially Protected Area No. 103: Ardery Island and Odbert Island, Budd Coast, Wilkes Land, East Antarctica;

(d) Antarctic Specially Protected Area No. 119: Davis Valley and Forlidas Pond, Dufek Massif;

(e) Antarctic Specially Protected Area No. 120: Pointe-Géologie, Terre Adélie;

(f) Antarctic Specially Protected Area No. 132: Potter Peninsula;

(g) Antarctic Specially Protected Area No. 133: Harmony Point;

(h) Antarctic Specially Protected Area No. 149: Cape Shirreff and San Telmo Island, Livingston Island, South Shetland Islands;

(i) Antarctic Specially Protected Area No. 155: Cape Evans, Ross Island;

(j) Antarctic Specially Protected Area No. 157: Backdoor Bay, Cape Royds, Ross Island;

(k) Antarctic Specially Protected Area No. 158: Hut Point, Ross Island;

(l) Antarctic Specially Protected Area No. 159: Cape Adare;

(m) Antarctic Specially Protected Area No. 163: Dakshin Gangotri Glacier, Dronning Maud Land; and

(n) Antarctic Specially Protected Area No. 164: Scullin and Murray Monoliths, Mac. Robertson Land, East Antarctica;

3. all prior management plans for Antarctic Specially Protected Areas No. 101, 102, 103, 119, 120, 132, 133, 149, 155, 157, 158, and 159 shall cease to be effective, or, if any such plans have not yet become effective, they are hereby withdrawn.

II. Measures

Management Plan for Antarctic Specially Protected Area No. 101

TAYLOR ROOKERY, MAC. ROBERTSON LAND

Introduction

Taylor Rookery (67°26'S; 60°50'E, Map A) was originally designated as Specially Protected Area No. 1, in accordance with the Agreed Measures for the Conservation of Antarctic Fauna and Flora, through Recommendation IV-I (1966), after a proposal by Australia. The Area was originally designated on the grounds that Taylor Rookery contains a colony of Emperor Penguins (*Aptenodytes forsteri*), which is the largest of two known colonies of this species located entirely on land. A revised description and management plan for the Area was adopted by Recommendation XVII-2 (1992) to accord with the revised format for Area Descriptions and Management Plans of Article 5 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, adopted under Recommendation XVI-10 (1991). In accordance with Resolution XX-5 (1996) the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 101.

This revised Management Plan reaffirms the scientific values of the original designation.

1. Description of Values to be Protected

Taylor Rookery contains the largest Emperor penguin colony (Map B) known on land; almost all other emperor penguin colonies are located on sea ice. The number of breeding pairs at the colony has ranged from 2462 in 1989 to 3307 in 1990 and has averaged approximately 3000 over 15 years from 1988 to 2002. The rookery is important because of long-term monitoring of the population of the penguins (since 1954). The colony is ideal for counting since it is surrounded by small rocky hills which make it possible to observe every bird without entering the breeding area. A photographic census program has been carried out annually since 1988, and it is believed that this method has resulted in almost complete accuracy of counting.

2. Aims and Objectives

Management at Taylor Rookery aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance;
- allow research on the ecosystem and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- gather data on the population status of the emperor penguin colony on a regular basis;
- allow visits for management purposes in support of the aims of the management plan.

3. Management Activities

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

- 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;
- information on the location of the Area (stating special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, at adjacent operational research/field stations and will be provided to ships visiting the vicinity;
- markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required;
- abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the values of the Area;
- visits shall be made to the Area as necessary (not less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure that management activities are adequate; and
- the Management Plan shall be reviewed at least every five years and updated as required.

4. Period of Designation

Designated for an indefinite period.

5. Maps

The following maps are enclosed for illustrating the Area and the proposed plan:

- Map A: East Antarctica, Mac. Robertson Land, Location of Antarctic Specially Protected Area No. 101, Taylor Rookery. The inset map indicates the location in relation to the Antarctic continent.

  .Map Specifications: Projection: Lambert Conical Conformal; Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level
- Map B: Antarctic Specially Protected Area No. 101, Taylor Rookery, showing Emperor Penguin Colony.

  Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level
- Map C: Antarctic Specially Protected Area No. 101, Taylor Rookery, showing Area in greater detail with landing and camping sites.

  Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level

6. Description of the Area

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

Taylor Rookery Antarctic Specially Protected Area consists of the whole of the northernmost rock exposure on the east side of Taylor Glacier, Mac. Robertson Land (67°26'S; 60°50'E). The rookery is located on a low lying rock outcrop in the south-west corner of a bay formed by Taylor Glacier to the

west, the polar ice cap to the south and the islands of the Colbeck Archipelago to the east. The Area is surrounded by sea ice to the north and east. The area is some 90 kilometres west of Mawson station.

There is ice-free terrain adjacent to the glacier on the western boundary and to the south the rock rises steeply to meet the ice of the plateau. The rock itself forms a horseshoe around a central flat area of exposed rock and moraine. This area is covered with snow in winter and is occupied by the emperor penguins. The compressed snow melts in summer to form a shallow lake and stream which exits to the north-east. The sides of the horseshoe are rounded ridges of rock which are bare and smoothed by ice. Otherwise the terrain is rough and dissected with cracks and fissures. The average height of the ridges is about 30 metres.

The area also has a raised beach which is typical of several found along the coast of Mac. Robertson Land. The beach is composed of locally derived pebbles, cobbles and boulders between 1 cm and 1 m across. It slopes upwards from the shoreline to a well defined platform several metres broad and 3 to 6 m above sea level. The Area is readily defined by its natural features.

Climate

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

Geology and Soils

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

Vegetation

The flora of the Taylor Rookery consists of at least ten species of lichen (Table 1) and an unknown number of terrestrial and freshwater algae. No mosses have been recorded from the Area. The flora is comparable with the twenty six species of lichen and three species of moss, 20 of which are found on nearby Chapman Ridge and 16 from Cape Bruce on the western side of Taylor Glacier. The rock types are not conducive to colonization by lichens. Most of the lichens occurring at Taylor Rookery grow on the higher outcrops at the southern end where weathering is least.

LICHENS

Pseudephebe minuscula	*Lecidea phillipsiana*
Buellia frigida	*Physcia caesia*
Caloplaca citrina	*Xanthoria elegans*
Candelariella flava	*Xanthoria mawsonii*
Rhizoplaca melanophthalma	*Lecanora expectans*

Table 1. Plants recorded from Taylor Rookery.

Birds

The breeding site is a north-facing amphitheatre formed by the tongue of the Taylor Glacier to the west and rocky hills to the east. The penguins breed mainly on a saucer shaped depression of rock and gravel to the south of the headland, and to a lesser extent on the surface of a frozen melt lake at the northern side. Both areas are level and for most of the breeding season are covered with compressed snow on which the birds huddle to incubate during winter.

First hatchlings have been observed from mid July which suggests mid May as the onset of laying. Fledglings depart the colony from mid December to mid January and leave during the day when the weather is the warmest and the katabatic wind has subsided. Adult birds and fledglings head in a N-NE direction towards a polynya about 62 km from the colony. This ice edge reduces to approximately 25 km by mid January. The polynya appears to be a permanent feature of the Mawson Coast.

The size of the adult population appears to have remained relatively stable during the counting period. Numbers of adults ranged from 2462 in 1989 to 3307 in 1990 and averaged 3019 ± 267 over the 15 years from 1988 to 2000, with a very slight downward trend. During 2001 and 2002 the number of incubating birds appears to have recovered (Figure 1).

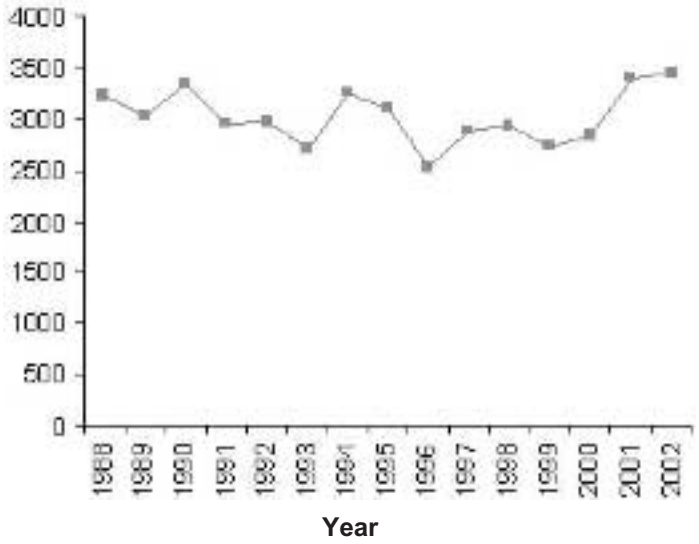

Figure 1. Numbers of breeding pairs of Emperor penguins at Taylor Glacier, 1988-2002.
Vertical axis shows number of breeding pairs of birds. Horizontal axis shows bird count year.

6(ii) Special Zones within the Area

There are no special zones within the Area.

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

There are no known structures within the Area. A four-berth refuge is located in the Colbeck Archipelago, approximately 5 kilometres to the north-east of the Area (see Map B). Mawson station (67°36' S and 62°53' E) is approximately 90 kilometres to the east.

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

ASPA No. 102 Rookery Islands, Mac. Robertson Land, East Antarctica, (67°36'36.7" S and 62°32'06.7" E) is located approximately 80 kilometres east of Taylor Rookery and 10 kilometres west of Mawson station.

7. Permit Conditions

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

- it is issued only for compelling scientific reasons that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or for essential management purposes consistent with plan objectives;
- the actions permitted will not jeopardise the values of the Area;
- the actions permitted are in accordance with the management plan;
- the Permit, or an authorised copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- permits shall be issued for a finite period; and
- the appropriate authority should be notified of any activities or measures undertaken that were not included in the authorised Permit.

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

Whenever possible, access should be from sea ice to the east of Colbeck Archipelago, to avoid disturbance to the birds by crossing their pathways from the rookery to the sea (see Map B). Persons in the vicinity of the Area should also be aware of the penguins' pathways and take care to minimise disturbance.

Travel to the Area may be by oversnow vehicle, which is generally only possible during the period 1 May to 25 December, or by helicopter. Vehicle entry to the Area is prohibited. Oversnow vehicles used for transport to the Area are to be left outside the Area, to the east, and entry must be by foot. The approach route for vehicles is marked on Map B.

The following conditions apply to the use of helicopters:

- helicopters are to approach the Area from the east over the sea ice and, where sea ice conditions permit, land outside the Area, with access being by foot (see Map B);
- overflight of the rookery is prohibited;

- when landing outside the Area, helicopters should not land, take off or fly within 500 metres of the rookery;
- if landing inside the Area is essential due to sea ice conditions, helicopters should land in the north-east of the Area at the point marked "H", where a headland to the south obscures the colony from view (see Map B);
- helicopters approaching to land in the Area must fly as low as possible over the sea ice to avoid disturbing the colony; and
- helicopters are not to be refuelled within the Area.

There are no marked pedestrian routes within the Area. Unless disturbance is authorised by permit, pedestrians should keep well away from the penguins. Movement in and around the Area should avoid crossing the access routes used by the birds.

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

The penguins are particularly sensitive to disturbance during the following periods:

- from mid-May to mid-July, when they are incubating eggs; and
- from mid-July to mid-December, when adults are feeding chicks, and the chicks fledge.

Penguins are known to be present at the rookery during every month except February, when no recorded human visits to the rookery have been made. Restrictions therefore apply year-round.

The emperor penguin colony is ideal for counting. Normally the best vantage point for viewing and photographing the penguins is a rocky headland which runs adjacent to Taylor Glacier, on the western side of the rookery. The ideal time for a census is from 22 June to 5 July, since during this time only incubating males are present, each representing one breeding pair. An ongoing photographic census program has been carried out by the Australian Antarctic program since 1988.

Other activities which may be conducted in the Area:

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

7(iii) Installation, modification or removal of structures

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

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

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

7(iv) Location of field camps

A four-berth refuge is located in the Colbeck Archipelago, approximately 5 kilometres to the north-east of the Area (see Map B).

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

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.
- No living animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions.
- No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in a Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel is not to be stored in the Area unless required for essential purposes connected with the activity for which the Permit has been granted. All such fuel shall be removed at the conclusion of the permitted activity. Permanent fuel depots are not permitted.
- All material introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so as to minimise the risk of environment impacts.

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

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

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

Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs.

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

7(viii) Disposal of waste

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

II. Measures

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

- Permits may be granted to enter the Area to carry out biological monitoring and Area inspection activities, which may involve the collection of samples for analysis or review; the erection or maintenance of scientific equipment and structures, and signposts; or for other protective measures.
- Any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Data Directory System through the appropriate National Authority.
- Ornithological research shall be limited to activities that are non-invasive and non-disruptive to the breeding birds present within the Area. Surveys, including aerial photographs for the purposes of population census, shall have a high priority.
- Visitors shall take special precautions against the introduction of alien organisms to the Area. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora or fauna at other Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area, visitors shall thoroughly clean footwear and any equipment to be used in the Area, particularly sampling equipment and markers.

7(x) Requirements for reports

Visit reports shall provide detailed information on all census data; locations of any new colonies or nests not previously recorded, as texts and maps; a brief summary of research findings; copies of all photographs taken of the ASPA; and comments indicating measures taken to ensure compliance with permit conditions.

The report may make recommendations relevant to the management of the Area, in particular as to whether the values for which the ASPA was designated are being adequately protected and whether management measures are effective.

The report should be submitted as soon as practicable after the visit to the ASPA has been completed, but no later than six months after the visit has occurred. A copy of the report should be made available to the permit issuing authority and the Australian Antarctic Division (if different) for the purposes of reviewing the management plan in accordance with the Antarctic Treaty system requirements. Reports should include a completed SCAR Visit Report, or such information as required by national laws. The permitting authority should maintain a record of the report for an indefinite period and shall make this available to SCAR, CCAMLR, COMNAP, and to interested parties upon request.

7(xi) Emergency provision

Exceptions to restrictions outlined in the management plan are in an emergency as specified in Article 11 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol).

8. Supporting Documentation

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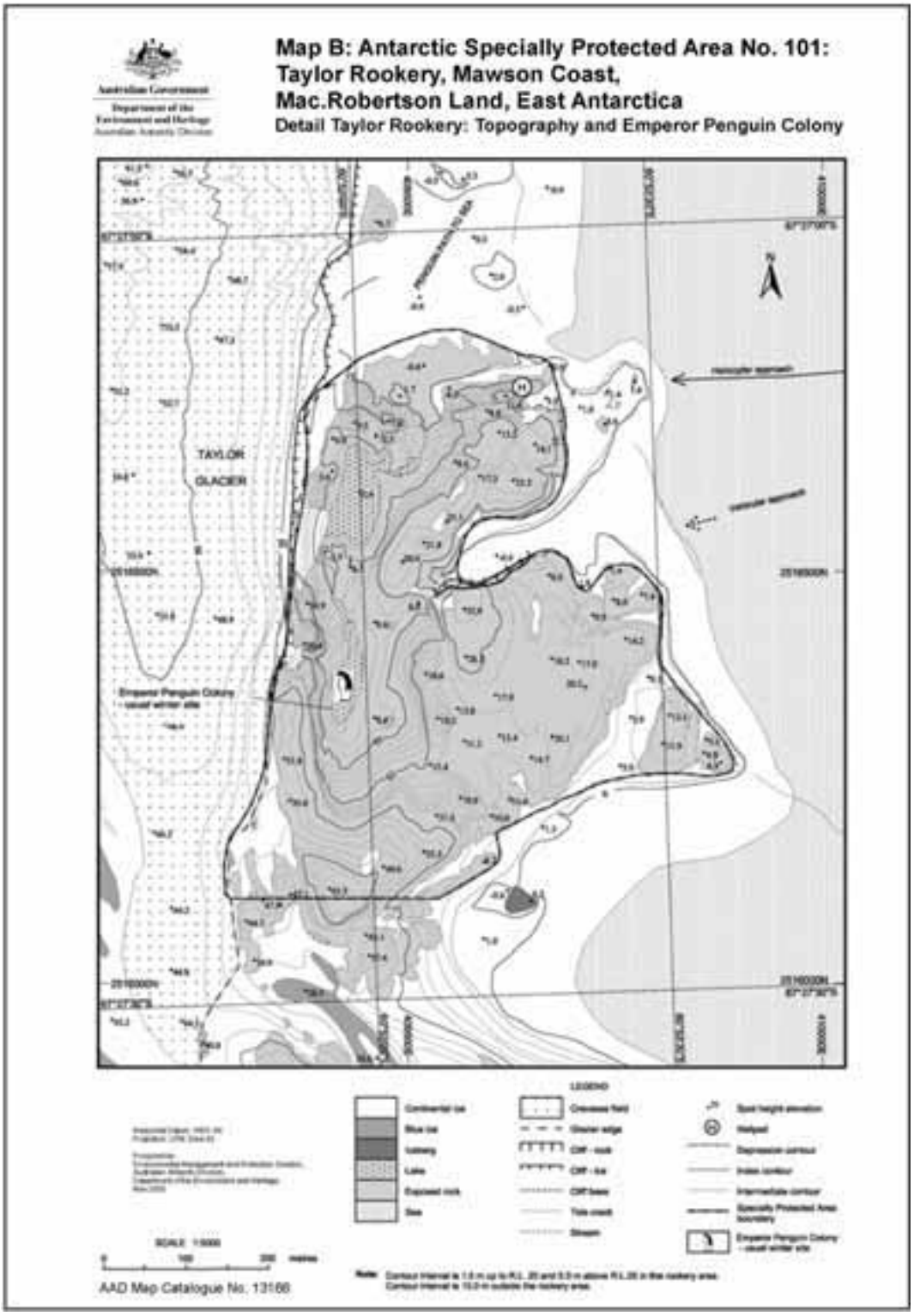
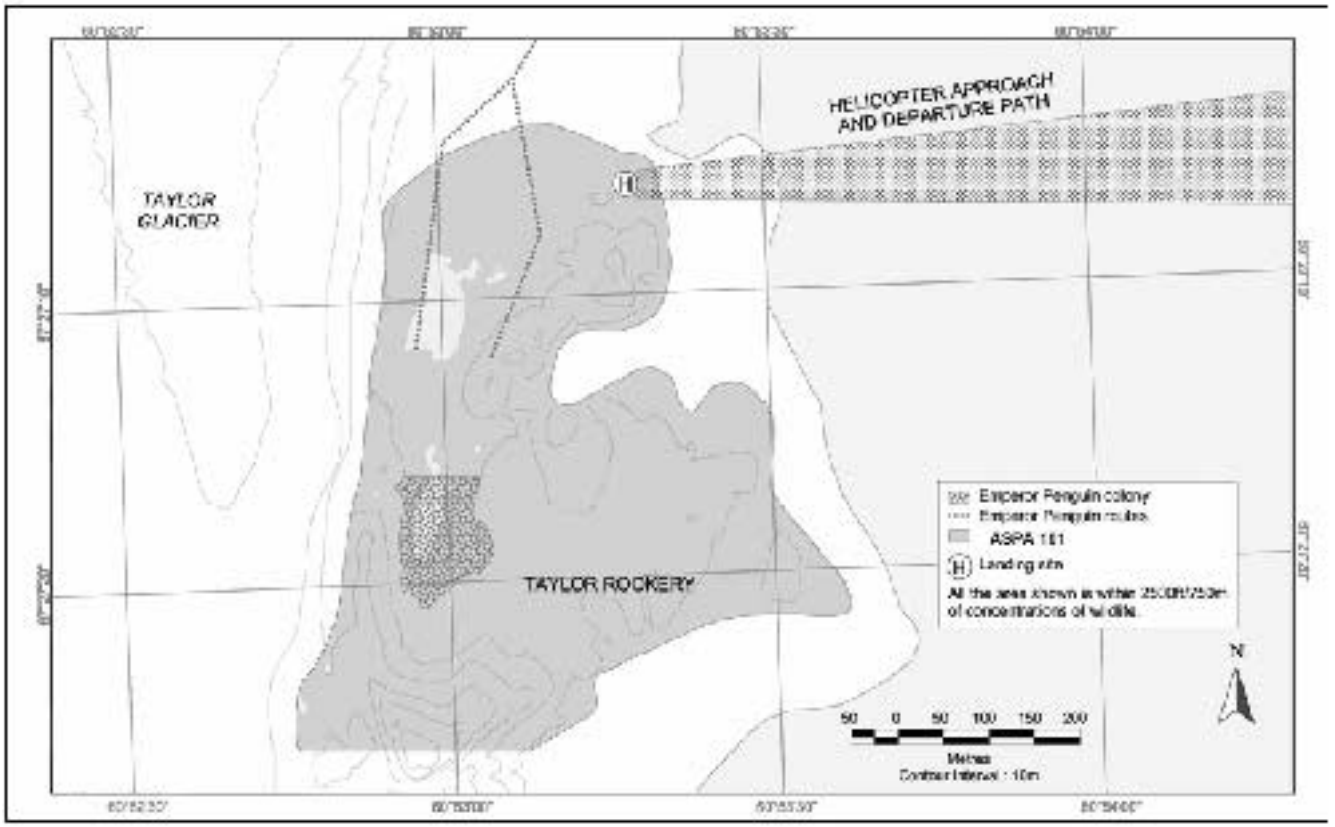
Map A: Antarctic Specially Protected Area No 10´ Taylor Rookery;
Mawson Coast. Mac.Robertson Land. East Antarctica.


Map B: Antarctic Specially Protected Area No. 101:
Taylor Rookery, Mawson Coast,
Mac.Robertson Land, East Antarctica
Detail Taylor Rookery: Topography and Emperor Penguin Colony
TAYLOR
GLACIER
Emperor Penguin Colony
- usual winter site
LEGEND
AAD Map Catalogue No. 13166

Map C: Antarctic Specially Protected Area No 101, Taylor Rookery, Mawson Coast, Mac.Robertson Land, East Antarctica
Helicopter Approach and Landing Site



II. Measures

Management Plan for Antarctic Specially Protected Area No. 102

ROOKERY ISLANDS, HOLME BAY, MAC ROBERTSON LAND

Introduction

The Rookery Islands (67°36'36.7" S, 62°32'06.7" E, Map A) were originally designated as Specially Protected Area No. 2, in accordance with the Agreed Measures for the Conservation of Antarctic Fauna and Flora, through Recommendation IV-II (1966), after a proposal by Australia.

The Area was originally designated on the grounds that the Rookery Islands contain breeding colonies of all six bird species resident in the Mawson area, two of which, the southern giant petrel (*Macronectes giganteus*) and the Cape petrel (*Daption capensis*), occur nowhere else in the region, and that it is of scientific importance to safeguard this unusual assemblage of six species and to preserve a sample of the habitat.

A revised description and management plan for the Area was adopted by Recommendation XVII-2 (1992) to accord with the revised format for Area Descriptions and Management Plans of Article 5 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, adopted under Recommendation XVI-10 (1991). In accordance with Resolution XX-5 (1996) the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 102.

This revised Management Plan reaffirms the scientific values of the original designation.

1. Description of Values to be Protected

The Rookery Islands are a group of small islands and rocks in the western part of Holme Bay, lying to the north of the Masson and David Ranges in Mac. Robertson Land, East Antarctica, at 67°36'36.7" S and 62°32'06.7" E.

The Rookery Islands contain breeding colonies of six bird species resident in the Mawson area: Adélie penguin (*Pygoscelis adeliae*), Cape petrel (*Daption capense*), snow petrel (*Pagodroma nivea*), southern giant petrel (*Macronectes giganteus*), Wilson's storm petrel (*Oceanites oceanicus*) and the Antarctic skua (*Catharacta maccormicki*). The southern giant petrel breeds nowhere else in the region. The designation of the Area aims to safeguard this unusual association of six species and ensure the preservation of a representative offshore island habitat (Map B).

The Rookery Islands provide a representative sample of the offshore island habitats occurring along the coast of Mac. Robertson land.

The southern giant petrel (*Macronectes giganteus*) has a world population of approximately 62,000 individuals and is inferred to have sustained a population reduction of at least 20% over the last 60 years. The species is in continued rapid decline. Giganteus Island in the Rookery Islands group is one of only four known breeding localities of southern giant petrels around the coastline of continental Antarctica. The other three continental breeding colonies are located near the Australian stations of Casey (66°13'S 110°11'E), (Frazier Islands) and Davis (68º35'S, 77º58'E) (Hawker Island), and near the French station Dumont d'Urville (66º40'S, 140º01'E) in Terre Adélie. The current population for continental Antarctica is estimated at approximately 290 pairs, comprised of 3 pairs on Giganteus

Island, 25 pairs on Hawker Island, 16 pairs at Pointe Géologie archipelago (Terre Adélie) and 248 pairs on the Frazier Islands. Southern giant petrels on the Antarctic continent comprise less than 1% of the global breeding population.

Southern giant petrels are widespread in more northerly latitudes, breeding on islands to the north-west of the Antarctic Peninsula and on islands of the Scotia Ridge. However, it is important that it should be protected at the southern limit of its breeding range.

2. Aims and Objectives

Management of the Rookery Islands aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research on the ecosystem and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- minimise human disturbance to southern giant petrels on Giganteus Island to assist stabilisation and recovery of the population;
- conserve Giganteus Island as a reference area for future comparative studies with other breeding populations of southern giant petrels;
- preserve the Giganteus Island, henceforth, as a highly restricted area by limiting human visitation to the island during the southern giant petrel breeding season;
- gather data on the population status of the bird species on a regular basis; and on a restricted basis for southern giant petrels; and
- allow visits for management purposes in support of the aims of the management plan.

3. Management Activities

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

- information on the location of the Area (stating special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, at adjacent operational research/field stations and will be provided to ships visiting the vicinity;
- markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required;
- abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the values of the Area;
- the Area shall be visited as necessary, and no less than once every five years to assess whether it continues to serve the purposes for which it was designated and to ensure that management activities are adequate;
- one research visit shall be allowed to Giganteus Island in each 5 year period, to enable census and monitoring of breeding populations. These visits are to be conducted by two people, one of whom should be a bird biologist associated with an approved national program(s) or who has had previous field experience with southern giant petrels;

- clothing, particularly footwear, and field equipment shall be appropriately cleaned before entering the Area; and
- the Management Plan shall be reviewed at least every five years.

4. Period of Designation

Designation is for an indefinite period.

5. Maps

- Map A: East Antartica, Mac. Robertson Land, showing the location of the Rookery Islands Antarctic Specially Protected Area No 102, and protected areas within the region. The inset map indicates the location in relation to the Antarctic continent.

  Map specifications: Projection: UTM Zone 49; Horizontal Datum: WGS84
- Map B: East Antartica, Mac. Robertson Land, Rookery Islands Antarctic Specially Protected Area No 102. Distribution of nesting seabirds on the Rookery Islands

  Map Specifications: Projection: UTM Zone 49; Horizontal Datum: WGS84
- Map C: East Antartica, Mac. Robertson Land, Rookery Islands Antarctic Specially Protected Area No 102. Distribution of nesting seabirds on Giganteus Island.

  Map Specifications: Projection: UTM Zone 49; Horizontal Datum: WGS84

6. Description of the Area

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

The Rookery Islands are a small group of approximately 75 small islands and rocks in the south-west part of Holme Bay, Mac. Robertson Land, about 10 km to the west of the Australian station Mawson. The Area comprises the rocks and islands lying within a rectangle enclosed by following coordinates:

1	62°28’01"E	67°33’45"S
2	62°34’37"E	67°33’47"S
3	62°28’02"E	67°38’10"S
4	62°34’39"E	67°38’11"S

The general location of the Area is latitude 67°37’00.1"S, longitude 62°33’00.0"E, this is the midpoint of the area and is approximately 10 kilometres from Mawson station. There are no boundary markers delimiting the site.

Rookery Islands range in size from small rocks which barely remain above water at high tide to the larger members of the group which include Giganteus Island (approximately 400 m long, 400 m wide and 30 m high) and Rookery Island, the highest of the group, with an altitude of 62 m, and of similar area, but slightly more elongate. Raised beaches are evident on Giganteus Island.

II. Measures

Geology and soils

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

Climate

Limited data exist for the meteorology of the Area. Conditions are probably similar to those of the Mawson station area where the mean monthly temperature ranges from +0.1°C in January to -18.8°C in August, with extreme temperatures ranging from +10.6°C to -36.0°C. The mean annual wind speed is 10.9 m per second with frequent prolonged periods of strong south-easterly katabatic winds from the ice cap at mean speeds over 25 m per second and gusts often exceeding 50 m per second. Mean wind speed decreases seaward with distance from the icecap, but is unlikely to be much lower at the Rookery Islands which lie quite close to the coast. Other general characteristics of the coastal Antarctic climate to which these islands are likely to be subjected are high cloudiness throughout the year, very low absolute humidity, low precipitation and frequent periods of intensified winds, drifting snow and low visibility associated with the passage of major low pressure systems.

Vegetation

No mosses or lichens have been located on any of the Rookery Islands. There are some terrestrial algae but no taxonomic identifications made. Most of the smaller islands and rocks are covered with sea spray in winter and are sometimes scoured by rafted sea ice in winter and spring. It is considered unlikely that species of moss or lichen could become established.

Inland waters

There are no freshwater bodies on the Rookery Islands.

Birds

Six species of birds breed on the Rookery Islands: Adelie penguin (*Pygoscelis adeliae)*, Cape petrel (*Dation capensis*), snow petrel (*Pagodroma nivea*), southern giant petrel (*Macronectes giganteus*), Wilson's storm petrel (*Oceanites oceanicus*) and the south polar skua (*Catharacta maccormicki*).

The giant petrels nest on Giganteus Island (Map C) but the colony is marginal and in danger of extinction. A total of 16 incubating birds were recorded in 1958 and 13 in 1967. However, only two nests were present in 1972, 4 in 1973, 2 in 1977, 1 in 1981, and 2 in 1982. There were 3 pairs in 2001. The nests of shallow mounds of stones are built on broad gravel patches on the raised beaches. The area has many old nests and several appear to be rebuilt each year but there is no evidence that they contained eggs.

Cape petrels bred on Rookery Island, a small island known as Pintado Island and located 300 m north-west of Giganteus Island, and on another small island just to the south of Pintado Island. The number of breeding pairs on each island is very small with 7 nests on Rookery Island, 12 nests on Pintado Island in 1958. No counts of nests with eggs have been made since 1958, although the numbers of adults present recorded subsequently are 69 in 1977, 48 in 1981, and 28 in 1982.

Snow petrels nest on Giganteus Island and are believed to breed on Rookery Island. The Wilson's storm petrel is frequently seen flying around the islands and is thought to breed on a number of the larger islands in the group, although no nests have been recorded.

Adelie penguins breed on 13 of the islands. The largest populations occur on Giganteus Island, where 4850 pairs were counted in December 1971, and on Rookery Island. A total of 33,000 adults were present on 10 of the islands on 17 December 1972. The number of nests was not determined.

The Cape petrel is also a rare breeding species in these islands although it is not rare in the region. Larger breeding colonies occur along the rock outcrops near Forbes Glacier 8 km to the west, and on Scullen and Murray Monoliths 100 km to the east.

6(ii) Restricted Zones within the Area

Giganteus Island is a restricted zone to afford high level of protection to southern giant petrels. Entry is restricted and may only be permitted under conditions contained elsewhere in this management plan.

6(iii) Location of Structures within the Area

There are no structures within or adjacent to the Area and none are to be erected.

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

Antarctic Specially Protected Area No. 101 Taylor Rookery, Mac. Robertson Land, East Antarctica, (67°26'S; 60°50'E) is located approximately 80 kilometres to the west.

7. Permit Conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority. Entry to Giganteus Island is not permitted at any time unless in accordance with conditions outlined below. National Antarctic Programs operating in the region shall consult with each other to ensure that the frequency of visits does not exceed that permitted in the Management Plan. Conditions for issuing a Permit to enter the Area are that:

- it is issued only for compelling scientific reasons that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- the actions permitted will not jeopardise the values of the Area;
- any management activities are in support of the objectives of the management plan;
- the actions permitted are in accordance with the management plan;
- the Permit, or an authorised copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- permits shall be issued for a stated period;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

Additional conditions in relation to Giganteus Island Restricted Zone:

a. Permits to enter may be issued for the non-breeding period for southern giant petrels, specifically from 1 May to 30 September.

b. During any 5 year period, only one Permit may be issued for the southern giant petrel breeding period (1 October to 30 April), for the purpose of conducting a southern giant petrel census. The Permit issuing authority is to refer to the provision under the fifth dot point of section 3 of this management plan when issuing a Permit.

c. Censuses are to be conducted from outside the southern giant petrel colony wherever practicable. In most cases there are vantage points from where the nesting birds may be counted.

d. The maximum time to be spent on Giganteus Island is 6 hours in total; however this may comprise several visits to the islands.

e. Only the two persons named in the Permit may be ashore within the Area at any time. The vehicle operator and others should remain at the shoreline.

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

Within the Area travel may be by oversnow vehicles (depending on sea ice conditions). Visitors must ensure that vehicles are taken no closer than 250 metres from concentrations of birds. Vehicles are prohibited on the islands, and must be left at the shoreline. Movement on the islands is by foot only.

Access to Giganteus Island is prohibited except for the purpose of monitoring the southern giant petrels or for activities which may be conducted without threat to their population status. As the breeding colony is close to the point of local extinction and the birds are easily disturbed, the number of persons granted entry for this purpose must be strictly limited and include an experienced ornithologist.

Persons shall not approach closer than is necessary to obtain census data or biological data from any nesting southern giant petrels, and in no case closer than 20m.

As aircraft may provide the only viable access to the islands, and as the islands are small in size, aircraft may land within 500 metres of breeding colonies except those of southern giant petrels on Giganteus Island, where landing during the southern giant petrel season is prohibited. Overflight of the islands is prohibited except where essential for scientific purposes. Such overflight is to be at an altitude of no less than 610 metres. Permission to land an aircraft may be granted for essential scientific purposes only if it can be demonstrated that disturbance will be minimal.

Aircraft may be used subject to the following conditions which apply to Giganteus Island:

- aircraft operations within 2500ft (750m) horizontally and vertically of the islands for single engine aircraft and 5000ft (1500m) horizontally and vertically for double-engine aircraft, are prohibited during the breeding season for Southern Giant Petrels (1 October to 30 April).
- aircraft (including helicopter) overflights for aerial photography within the distances specified above are allowed at intervals of 5 years, consistent with guidelines to reduce disturbance.
- No refuelling is permitted within the Area.

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

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

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

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

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

7(iv) Location of field camps

- Camping is prohibited in the Rookery Islands ASPA except in an emergency.

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.
- No living animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions.
- No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in a Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel is not to be stored in the Area unless required for essential purposes connected with the activity for which the Permit has been granted. Permanent fuel depots are not permitted.
- All material introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of introduction to the environment is minimized.

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

- Taking of, or harmful interference with, native flora and fauna is prohibited, except in accordance with a Permit. Where taking or harmful interference with animals is involved this should, as a minimum standard, be in accordance with the *SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.*
- Disturbance of southern giant petrels should be avoided at all times.

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

- Material may only be collected or removed from the Area as authorised in a Permit and should be limited to the minimum necessary to meet scientific or management needs.
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material *in situ*. If such material is found the appropriate Authority must be notified.

7(viii) Disposal of waste

- No wastes, including human wastes, are to be deposited or left in the Area.

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

- Permits may be granted to enter the Area to carry out biological monitoring and Area inspection activities, which may involve the collection of samples for analysis or review; the erection or maintenance of scientific equipment and structures, and signposts; or for other protective measures.
- Any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Data Directory System through the appropriate national authority.
- Ornithological research shall be limited to activities that are non-invasive and non-disruptive to the breeding seabirds present within the Area. Surveys, including aerial photographs for the purposes of population census, shall have a high priority.
- To help maintain the ecological and scientific values of the Area, visitors shall take special precautions against introductions of non-indigenous organisms. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora and fauna at other Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area.
- A census of southern giant petrels on Giganteus Island should be conducted in each 5 year period. Censuses of other species may be undertaken during this visit provided no additional disturbance is caused to the southern giant petrels.
- The maximum length of time to be spent at Giganteus Island to conduct a bird census is 6 hours in total.
- Novel GPS data shall be obtained for specific sites of long-term monitoring for lodgement with the Antarctic Data Directory System through the appropriate national authority.
- On Giganteus Island, to reduce disturbance to wildlife, noise levels including verbal communication is to be kept to a minimum. The use of motor-driven tools and any other activity likely to generate noise and thereby cause disturbance to nesting birds is prohibited within the Area during the breeding period for southern giant petrels (1 October to 30 April).

7(x) Requirements for reports

Parties should ensure that the principal Permit Holder for each permit issued submits to the appropriate national authority a report on activities undertaken. Such reports should include, as appropriate, the

information identified in the Visit Report form suggested by SCAR. Parties should maintain a record of such activities and, in the Annual Exchange of Information, and should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan.

Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be considered in any review of the Management Plan and in organising the use of the Area. A copy of the report should be forwarded to the Party responsible for development of the Management Plan (Australia) to assist in management of the Area, and the monitoring of bird populations. Visit reports should provide detailed information on census data, locations of any new colonies or nests not previously recorded, a brief summary of research findings and copies of photographs taken of the Area.

7(xi) Emergency provision

Exceptions to restrictions outlined in the management plan are in emergency as specified in Article 11 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol).

8. Supporting Documentation

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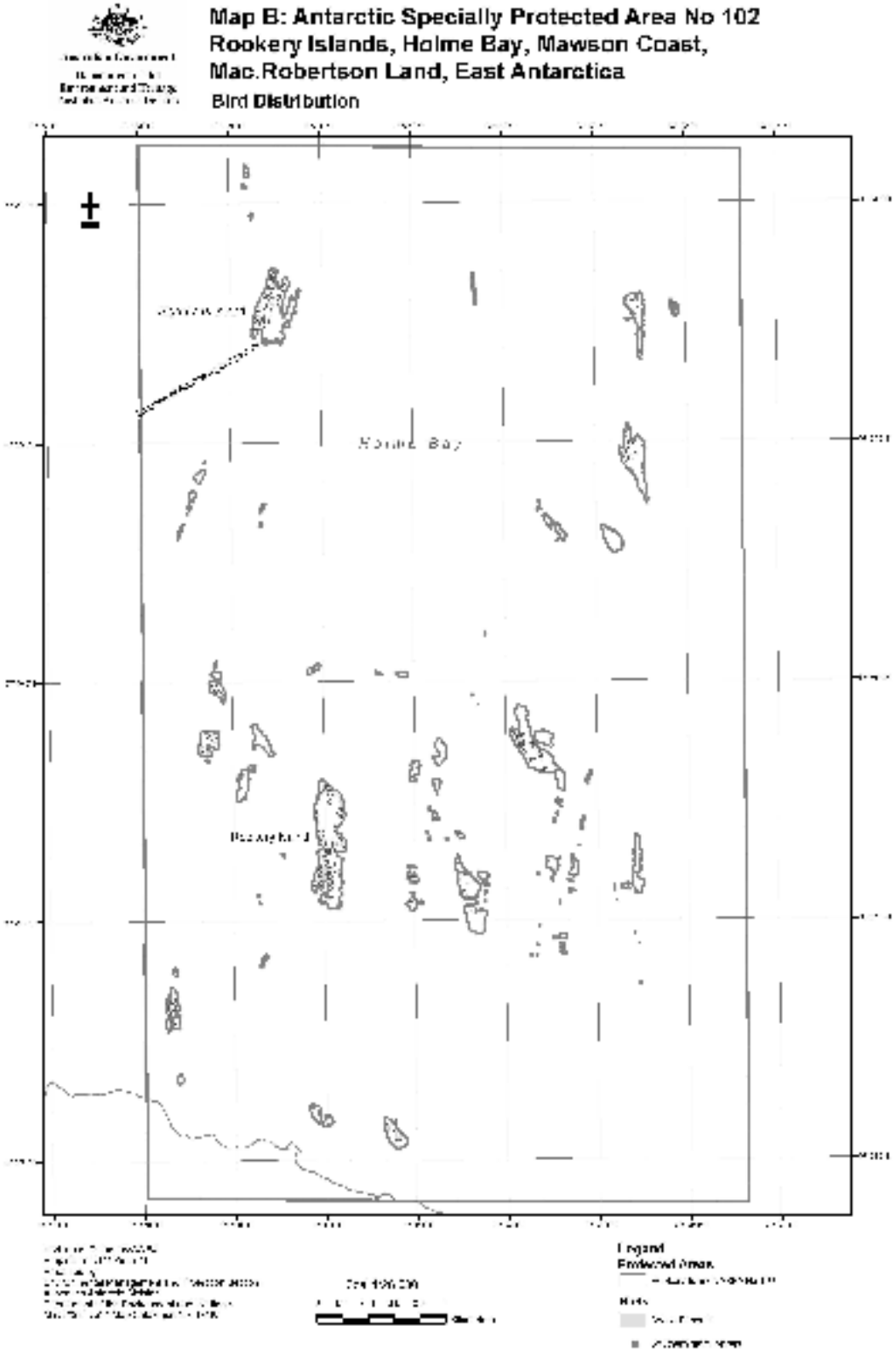
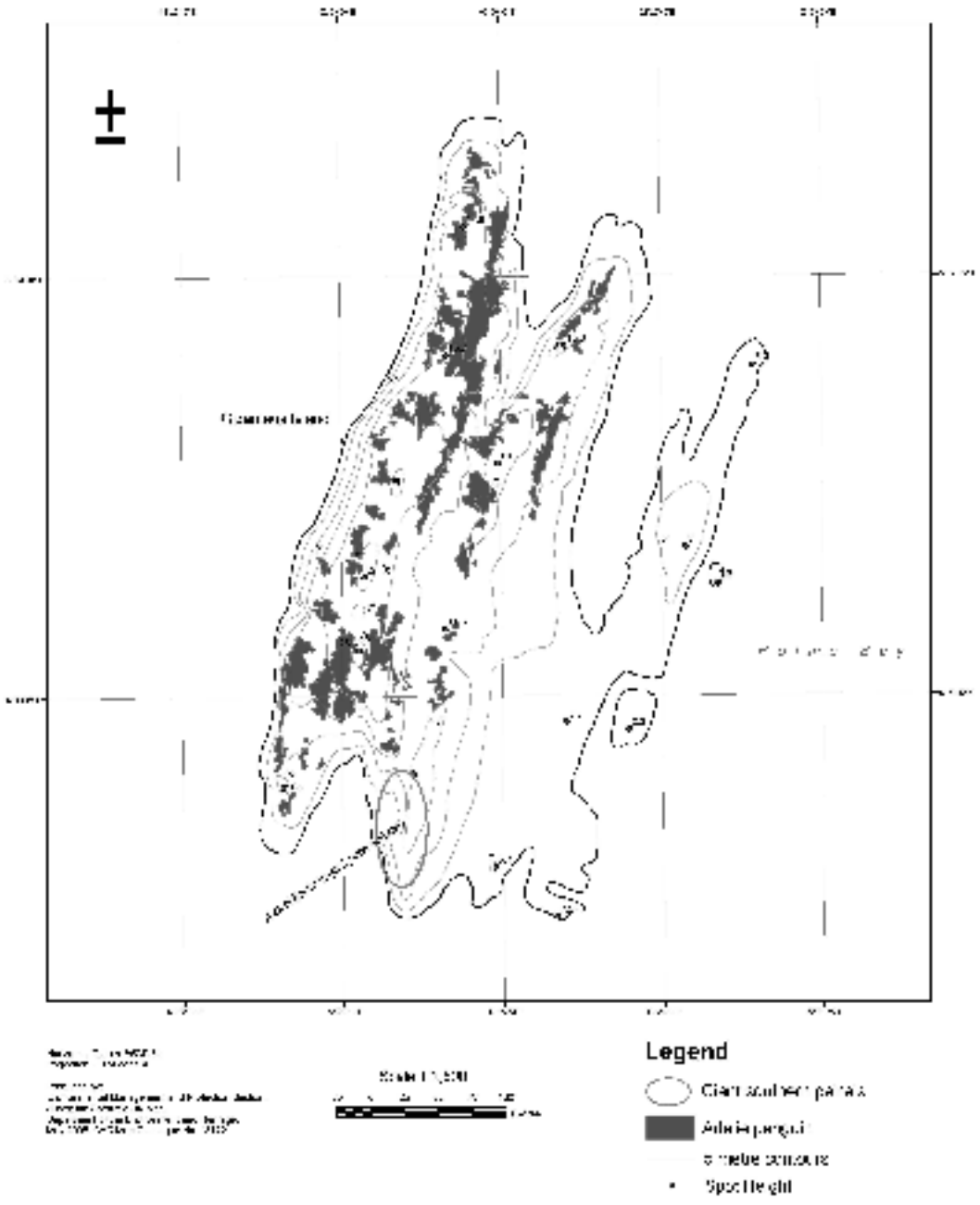
Map A: Antarctic Specially Protected Area No '02, Rookery Islands.
Holme Bay, Mawson Coast, Mac.Robertson Land, East Antarctica.


Map B: Antarctic Specially Protected Area No 102
Rookery Islands, Holme Bay, Mawson Coast,
Mac.Robertson Land, East Antarctica
Bird Distribution
Holme Bay
Legend
Protected Areas

Map C: Antarctic Specially Protected Area No. 102: Rookery Islands, Holme Bay, Mawson Coast, Mac.Robertson Land, East Antarctica

Gigantbone Island: Topography and Southern Giant Petrel and Penguin Distribution.



II. Measures

Management Plan for Antarctic Specially Protected Area No. 103

ARDERY ISLAND AND ODBERT ISLAND, BUDD COAST

Introduction

Ardery Island and Odbert Island (66°22'S, 110°28'E and 66°22'S, 110°33'E, Map A) were originally designated as Specially Protected Area (SPA) No. 3 in accordance with the Agreed Measures for the Conservation of Antarctic Fauna and Flora, through Recommendation IV-III (1966), after a proposal by Australia.

The Area was designated on the grounds that the islands support several breeding species of petrel and provide an example of their habitat and that of the Antarctic Petrel (*Thalassoica antarctica*) and the Southern Fulmar (*Fulmarus glacialoides*), both of particular scientific interest.

A revised description and management plan for the Area was adopted by Recommendation XVII-2 (1992) to accord with the format for Area Descriptions and Management Plans of Article 5 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, adopted under Recommendation XVI-10 (1991). In accordance with Resolution XX-5 (1996) the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 103.

This revised Management Plan reaffirms the scientific values of the original designation.

1. Description of Values to be Protected

Ardery Island and Odbert Island (Map B and C) support several breeding species of petrel. There is no other readily accessible place in eastern Antarctica where the four genera of fulmarine petrels (*Thalassoica antarctica, Fulmarus glacialoides, Daption capense* and *Pagodroma nivea*) breed in the same place in sufficient numbers to allow comparative study. Study of these four genera at one location is of high ecological importance in understanding and monitoring the Southern Ocean ecosystem.

It is believed that Ardery Island is unique insofar as it is the only area in the Antarctic which harbours two different subspecies of snow petrels. Studies on morphological or ecological differences between these two subspecies are not possible anywhere else. In addition both islands have breeding populations of Wilson's storm petrels (*Oceanites oceanicus*) and Antarctic skuas (*Catharacta maccormicki*) and Odbert Island supports breeding populations of Adélie penguins (*Pygoscelis adeliae*).

2. Aims and Objectives

Management of the Ardery Island and Odbert Islands ASPA aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance;
- allow scientific research on the ecosystem and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;

- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- gather data on the population status of the bird species on a regular basis;
- allow visits for management purposes in support of the aims of the management plan.

3. Management Activities

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

- signs illustrating the location and boundary of the Area, with clear statements of entry restrictions, shall be placed at appropriate locations on the boundary of the Area to help avoid inadvertent entry;
- information on the location of the Area (stating special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, at the adjacent Casey station and will be provided to ships visiting the vicinity;
- markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required;
- abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the values of the Area;
- the Area shall be visited as necessary, and no less than once every five years, to assess whether it continues to serve the purposes for which it was designated, and to ensure that management activities are adequate; and
- the Management Plan shall be reviewed at least every five years.

4. Period of Designation

Designation is for an indefinite period.

5. Maps

- Map A: East Antarctica, Wilks Land, Location of Antarctic Specially Protected Area Ardery Island and Odbert Island, ASPA No 103. The inset map indicates the location in relation to the Antarctic continent.

  Map Specifications: Projection: Lambert Conical Conformal; Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level
- Map B: Antarctic Specially Protected Area, Ardery Island and Odbert Island, ASPA No 103, showing species distribution at Ardery Island.

  Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level
- Map C: Antarctic Specially Protected Area, Ardery Island and Odbert Island, ASPA No 103, showing species distribution at Odbert Island.

  Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level
- Map D: Antarctic Specially Protected Area, Ardery Island and Odbert Island, ASPA No 103, showing air and sea approach for Ardery Island and Odbert Island.

Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level

6. Description of the Area

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

Ardery island (66°22'S, 110°28'E) and Odbert island (66°22'S, 110°33'E) are among the southernmost of the Windmill Islands, lying in the south of Vincennes Bay, off the Budd Coast of Wilkes Land, Eastern Antarctica.

Topography

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

Odbert Island is approximately 2.5 km long and 0.5 km wide. It has a rocky coast which rises steeply from the sea to a plateau. The highest point is 100 m altitude. The plateau is dissected by a series of valleys which run to the south from the high flat rim on the northern side. These valleys are snow covered in winter. The hill tops remain essentially ice and snow free. In some years, the island remains joined to Robinson Ridge on the mainland by sea ice.

Ardery Island is a steep ice free island approximately 1 km long and 0.5 km wide, with an east-west orientation. The highest point is 113 m above sea level.

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

Geology

The Windmill Islands region represent one of the eastern most outcrops of a Mesoproterozoic low-pressure granulite facies terrain that extends west to the Bunger Hills and further to the Archaean complexes in Princess Elizabeth Land, to minor exposures in the east in the Dumont d'Urville area and in Commonwealth Bay. The total outcrop areas do not exceed more than a few square kilometres. The Mesoproterozoic outcrop of the Windmill Islands and the Archaean complexes of Princess Elizabeth Land are two of the few major areas in East Antarctica that can be directly correlated with an Australian equivalent in a Gondwana reconstruction. The Mesoproterozoic facies terrain comprise a series of migmatitic metapelites and metapsammites interlayered with mafic to ultramafic and felsic sequences with rare calc-silicates, large partial melt bodies (Windmill Island supacrustals), undeformed granite, charnockite, gabbro, pegmatite, aplites and cut by easterly-trending late dolerite dykes.

Ardery Island and Odbert Island are part of the southern gradation of a metamorphic grade transition which separates the northern part of the Windmill Islands region from the southern part. The metamorphic grade ranges from amphibolite facies, sillimanite-biotite orthoclase in the north at Clark Peninsula, through biotite-cordierite-almandine granulite, to hornblende-orthopyroxene granulite at Browning Peninsula in the south.

Ardery Island and Odbert Island together with Robinson Ridge, Holl Island, Peterson Island and the Browning Peninsula are similar geologically and are composed of Ardery charnockite. Charnockites are of granitic composition but were formed under anhydrous conditions. The Ardery Charnockite of

Ardery Island and Odbert Island intrudes the Windmill metamorphics and consists of a modal assemblage of quartz + plagioclase + microline + orthopyroxene + biotite + clinopyroxene hornblende with opaques and minor zircon and apatite. An isotopic age of about 1200 million years for the Ardery charnockite has been established. The charnockite is prone to deep weathering and crumbles readily because of its mineral assemblage, whereas the metamorphic sequences of the northerly parts of the region have a much more stable mineral assemblage and crystalline structure. This difference has a significant influence on the distribution of vegetation in the Windmill Islands region with the northern rock types providing a more suitable substrate for slow growing lichens.

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

Glaciation

The Windmill Islands region was glaciated during the Late Pleistocene. The southern region of the Windmill Islands was deglaciated by 8000 corr. yr B.P., and the northern region, including Bailey Peninsula deglaciated by 5500 corr. yr B.P. Isostatic uplift has occurred at a rate of between 0.5 and 0.6 m/100 yr, with the upper mean marine limit, featured as ice-pushed ridges, being observed at nearby Robinson Ridge at approximately 28.5 metres.

Meteorology

The climate of the Windmill Islands region is frigid-Antarctic. Conditions at Ardery Island and Odbert Island are probably similar to those of the Casey station area approximately 12 km to the north. Meteorological data for the period 1957 to 1983 from Casey station (altitude 32 m) on Bailey Peninsula show mean temperatures for the warmest and coldest months of 0.3 and -14.9°C, respectively, with extreme temperatures ranging from 9.2 to -41°C. Mean annual temperature for the period was – 9.3°C.

The climate is dry with a mean annual snowfall of 195 mm year-1 (rainfall equivalent), precipitation as rain has been recorded in the summer. However, within the last decade the mean annual temperature has decreased to –9.1°C and the mean annual snowfall has increased to 230 mm year-1 (rainfall equivalent).

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

Biological Features

Terrestrial

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

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

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

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

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

Lakes

Cold monomictic lakes and ponds occur throughout the Windmill Islands region in bedrock depressions and are usually ice-free during January and February. Nutrient rich lakes are found near the coast in close proximity to penguin colonies or abandoned colonies. Sterile lakes are located further inland and are fed by meltwater and local precipitation. On Ardery Island and Odbert Island there are a number of small tarns which are frozen in winter and filled with melt water in summer. Many of the tarns are ephemeral, drying out towards the end of summer. Other tarns located below snow banks are fed continuously by melt water.

Birds and Seals

Odbert island supports breeding populations of Adélie penguins (*Pygoscelis adeliae*), Cape petrels (*Daption capensis*), snow petrels (*Pagodroma nivea*), Southern fulmars (*Fulmarus glacialoides*), Wilson's storm petrels *(Oceanites oceanicus*), and south polar skuas (*Catharacta maccormicki*). Ardery island supports a similar population of the same species except for Adélie penguins. The Giant petrel *(Macronectes giganteus*) which breed on the Frazier Islands approximately 23 km to the north-west is the only species breeding in the Windmill Islands which does not breed in either Ardery Island and Odbert Island.

No seals are found on Ardery Island and Odbert Island although Weddell seals (*Leptonychotes weddellii*) are frequently observed on the sea ice around them. The main pupping area is about 3 km to the south-east between Herring Island and the Antarctic mainland. In this area disturbance of the sea ice caused by movement of the Peterson Glacier ensures open water and easy access to food. About 100 pups are born annually in the region. Elephant seals (*Mirounga leonina*) haul out a little

farther to the south on Petersen Island and on the Browning Peninsula. The numbers of these seals, which are mostly mature males, have been increasing with up to 100 seen annually. A few females have been observed.

Adélie Penguin *(Pygoscelis adeliae)*

Two large colonies of Adélie Penguins are present on Odbert Island. In 1985 an estimate of between 5,000 and 10,000 breeding pairs was made for the two colonies on the Island. Eggs start to be laid before the middle of November, the first chicks hatch around mid-December, and juveniles commence leaving the colony in early February. Although Adélie Penguins regularly come ashore on Ardery Island, none nest there.

Southern Fulmar *(Fulmarus glacialoides)*

The total population of Southern Fulmars in the Area is estimated at about 5000 breeding pairs. There are approximately 3000 occupied Southern Fulmar sites on Ardery Island, the largest colonies being located on the northern cliffs and around the eastern tip of the island. On Odbert Island most of the 2000 sites are concentrated in two large colonies on Haun Bluff and in the central north.

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

Antarctic Petrel *(Thalassoica antarctica)*

On Ardery Island about 275 apparently occupied Antarctic Petrel nest sites have been located. The largest colony, on Northern Plateau, contains at least 150 sites in the main area and some 25 sites in smaller groups around. On Odbert Island 34 nests are located in a small area off the central northern cliffs. The total population has been estimated at just over 300 breeding pairs.

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

Cape Petrel *(Daption capense)*

Approximately 600 Cape Petrel occupied sites have been located on Ardery Island, mostly in small colonies on the northern cliffs. Scattered nests are present on both sides of Snowie Mountain. There are approximately 100 to 200 nesting sites on Odbert Island mostly located around the Fulmar colonies. The total population of the Cape Petrel in the Area is estimated at about 750 breeding pairs.

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

Snow Petrel *(Pagodroma nivea)*

The total population of Snow Petrels in the Area is estimated at over 1,100 breeding pairs. An estimated 1000 Snow petrel nesting sites were located on Ardery Island in 1990, mostly on the slopes of Snowie Mountain. Snow Petrels appear to be less abundant on Odbert Island than on Ardery with an estimate of between 100 and 1000 nesting sites. In 2003 an estimate of 752 active nests was made for Ardery Island and 824 for Odbert Island.

The Snow Petrels breed in crevices or in holes between loose rocks. Although the level of protection of nests varies considerably, these specific requirements prevent colonial nesting in many cases. Isolated nests may be found anywhere, and within colonies of other species. Suitable Snow Petrel habitat also harbours colonies of Wilson's Storm Petrels. Egg laying varies between concentrations of nests, with laying occurring within the first three weeks of December, and chicks hatching from the middle of January onwards. All are fledged in the first two weeks of March.

Wilson's Storm Petrel *(Oceanites oceanicus)*

Wilson's Storm Petrels are widely distributed, and nest in all suitable rocky areas within the Area. An estimated 1000 nesting sites have been documented for Ardery Island. The population for Odbert Island has been estimated at between 1000 and 2000 pairs, at a lower density than that of Ardery island because of the general spread of suitable rock nesting areas.

Wilson's Storm Petrels breed in deep, narrow holes. First eggs are usually observed commencing the third week of December.

South Polar Skua *(Catharacta maccormicki)*

In 1984/85, ten pairs of South Polar Skua bred on Ardery Island and possibly three more pairs held territories. A similar number was present in 1986/87, although only seven pairs produced eggs. Odbert Island probably had between 10 and 20 pairs. The distribution of South Polar Skua nests on Ardery Island reflects their dependence on petrels. Most pairs have observation points close to petrel nests, from which they can observe their food territory on the bird cliffs. On Odbert Island most nests were near the penguin rookeries.

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

Non-breeding bird species

Emperor Penguins (*Aptenodytes forsteri*) do not breed in the Casey area but straggling birds have been observed near Casey station and even far inland. A Chinstrap Penguin (*Pygoscelis antarctica*) was observed in January 1987 in the Adélie Penguin rookery on Whitney Point, north of Casey. Southern Giant Petrels (*Macronectes giganteus*), both adults and immatures, are regular visitors to Ardery Island. In favourable winds they fly along the bird cliffs in search of food. The species breeds on the Frazier Islands, 23 kilometres to the north-east. An emaciated juvenile Blue Petrel (*Halobaena caerulea*) arrived at Casey in March 1987. In November 1984 an adult Dominican Gull (*Larus dominicanus*) was observed in the Casey area. Groups of terns, possibly Arctic Tern (*Sterna paradisea*), have been observed in the Casey area in 1984/85 and in 1986/87, when a few groups of up to 100 birds were seen and heard high in the air in March.

6(ii) Restricted Zones within the Area

There are no restricted zones within the Area.

6(iii) Location of Structures within the Area

There are no permanent structures within the Area and none are to be erected.

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

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

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

7. Permit conditions

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

- it is issued only for compelling scientific reasons that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- the actions permitted will not jeopardise the values of the Area;
- any management activities are in support of the objectives of the management plan;
- the actions permitted are in accordance with the management plan;
- the Permit, or an authorised copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- permits shall be issued for a stated period; and
- 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

Travel to the island should be by foot, over-snow vehicle or boat where possible. Over-snow vehicles used to visit the islands must be left at the shoreline and movement within the area should be by foot.

Defined landing sites for access by sea and helicopter to Ardery and Odbert Islands are shown on Map D. On Ardery Island the preferred boat landing site is at Robertson Landing where there are three rock anchors present to tie down a boat or other equipment. All three boat landing sites marked for Ardery Island on Map D are within 200 metres of colonies of birds, however they represent the only safe landing sites on the island and landings must be undertaken carefully so as to avoid

disturbance to the birds. There are no defined pedestrian routes within the Area, however pedestrians should avoid disturbance of the birds at all times.

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

- overflight of the islands should be avoided at all times, except where it is considered essential for scientific purposes. In these instances, overflight must be at an altitude or horizontal distance of no less than 500 metres;
- during the breeding season of penguins and petrels, defined here as the period from 1 November to 1 April, helicopter movement to the islands should be kept to a minimum;
- refuelling is not to take place within the Area;
- only personnel who are required to carry out work in the Area should leave the helicopter;
- the approach to Ardery Island should be at a high altitude and from a southern direction as the lowest densities of birds are on the southern cliffs (see Maps B and D);
- the approach to Odbert Island should preferably be from the south, avoiding cliff areas because of the nesting petrels (see Map C).

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

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

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

7(iii) Installation, modification or removal of structures

- No permanent structures are to be erected in the Area.
- Any structures erected or installed within the Area are to be specified in a Permit.
- Scientific markers and equipment must be secured and maintained in good condition, clearly identifying the permitting country, name of principal investigator and year of installation. All such items should be made of materials that pose minimum risk of contamination of the Area.
- A condition of the Permit shall be the removal of equipment associated with scientific research before the Permit for that research expires. Details of markers and equipment left *in situ* (GPS locations, description, tags, etc. and expected "use by date") should be reported to the permitting Authority.
- When permitted, the installation of a field hut on Ardery Island must take place before 1 November when the breeding season commences, and removal after 1 April when fledglings have departed. Installation and removal should be by over-snow transport unless sea-ice conditions prevent this.

7(iv) Location of field camps

- Camping is prohibited on Odbert Island except in emergencies.

- If required for field work, a hut may be erected on Ardery Island at the point specified on Map B. There are 8 solid rock anchors available at this location. There is a refuge hut "Robinson Ridge Hut", on the mainland, located on Robinson Ridge (66°22.4'S 110°35.2'E), approximately 800 m west of Odbert Island.

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.
- No living animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions.
- No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in a Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel is not to be stored in the Area unless required for essential purposes connected with the activity for which the Permit has been granted. Permanent fuel depots are not permitted.
- All material introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that the risk of their introduction to the environment is minimized.

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

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

7(vii) Collection or removal of anything not brought into the Area by the Permit Holder

- Material may only be collected or removed from the Area as authorised in a Permit and should be limited to the minimum necessary to meet scientific or management needs.
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material *in situ*. Hif such material is found the appropriate Authority must be notified.

7(viii) Disposal of waste

- No wastes, including human wastes, are to be deposited or left in the Area.

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

- Permits may be granted to enter the Area to carry out biological monitoring and Area inspection activities, which may involve the collection of samples for analysis or review; the

erection or maintenance of scientific equipment, structures and signposts; or for other protective measures.

- Any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Data Directory System through the appropriate National Authority.
- Ornithological research shall be limited to activities that are non-invasive and non-disruptive to the breeding seabirds present within the ASPA. Surveys, including aerial photographs for the purposes of population census, shall have a high priority.
- To help maintain the ecological and scientific values of the Area, visitors shall take special precautions against introductions. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora and fauna at other Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area, visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area.

7(x) Requirement for reports

- Parties should ensure that the principal Permit Holder for each Permit submits to the appropriate national authority a report on activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form suggested by SCAR.
- Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Plan of Management.
- Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be considered in any review of the Plan of Management and in organising the use of the Area. A copy of the report should be forwarded to the National Party responsible for development of the Management Plan (Australia) to assist in management of the Area, and monitoring of bird populations. Additionally, visit reports should provide detailed information on census data, locations of any new colonies or nests not previously recorded, a brief summary of research findings and copies of photographs taken of the Area.

7(xi) Emergency provision

Exceptions to restrictions outlined in the Management Plan are permitted in cases of emergency as specified in Article 11 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty (the Madrid Protocol).

8. Supporting documentation

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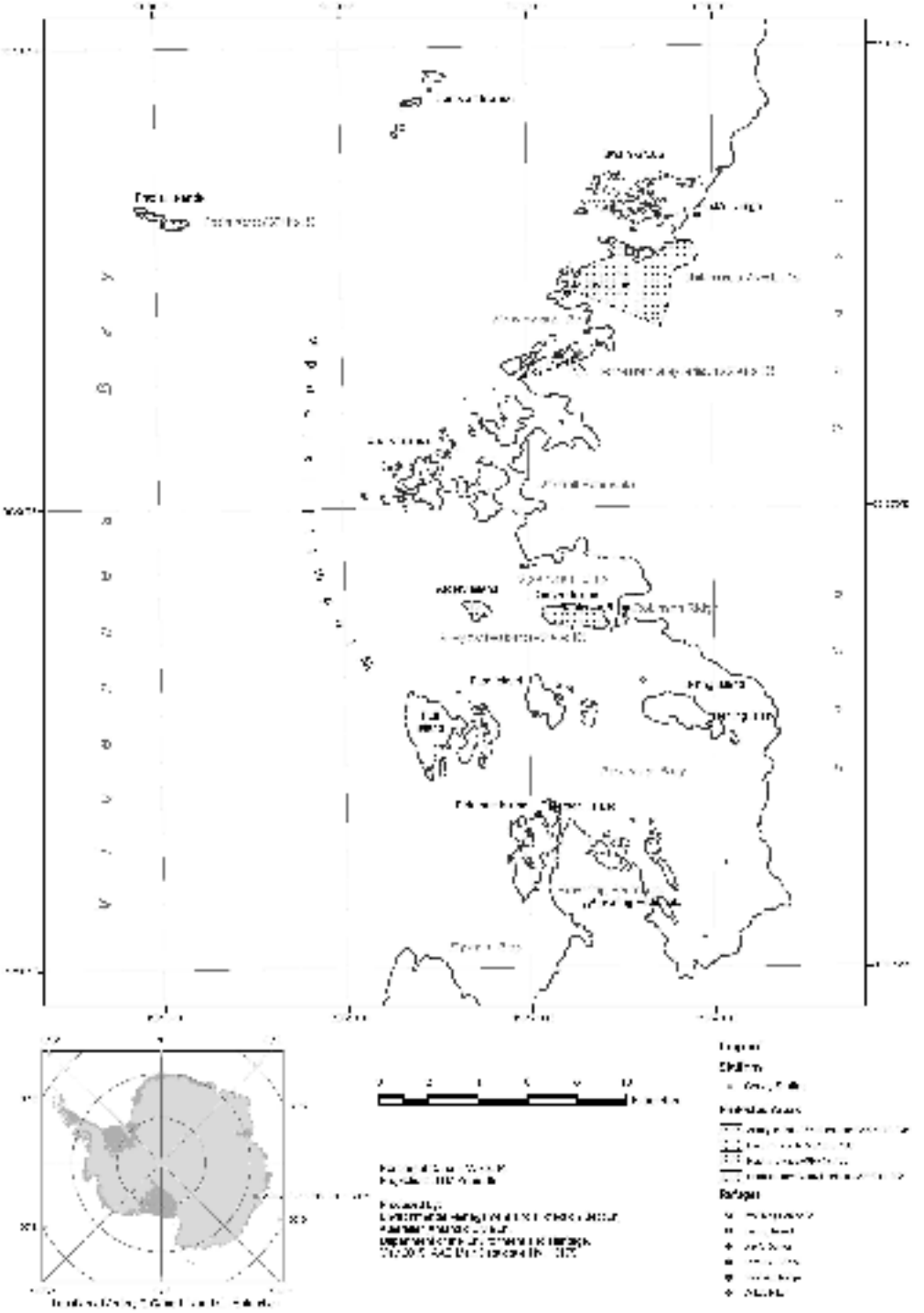
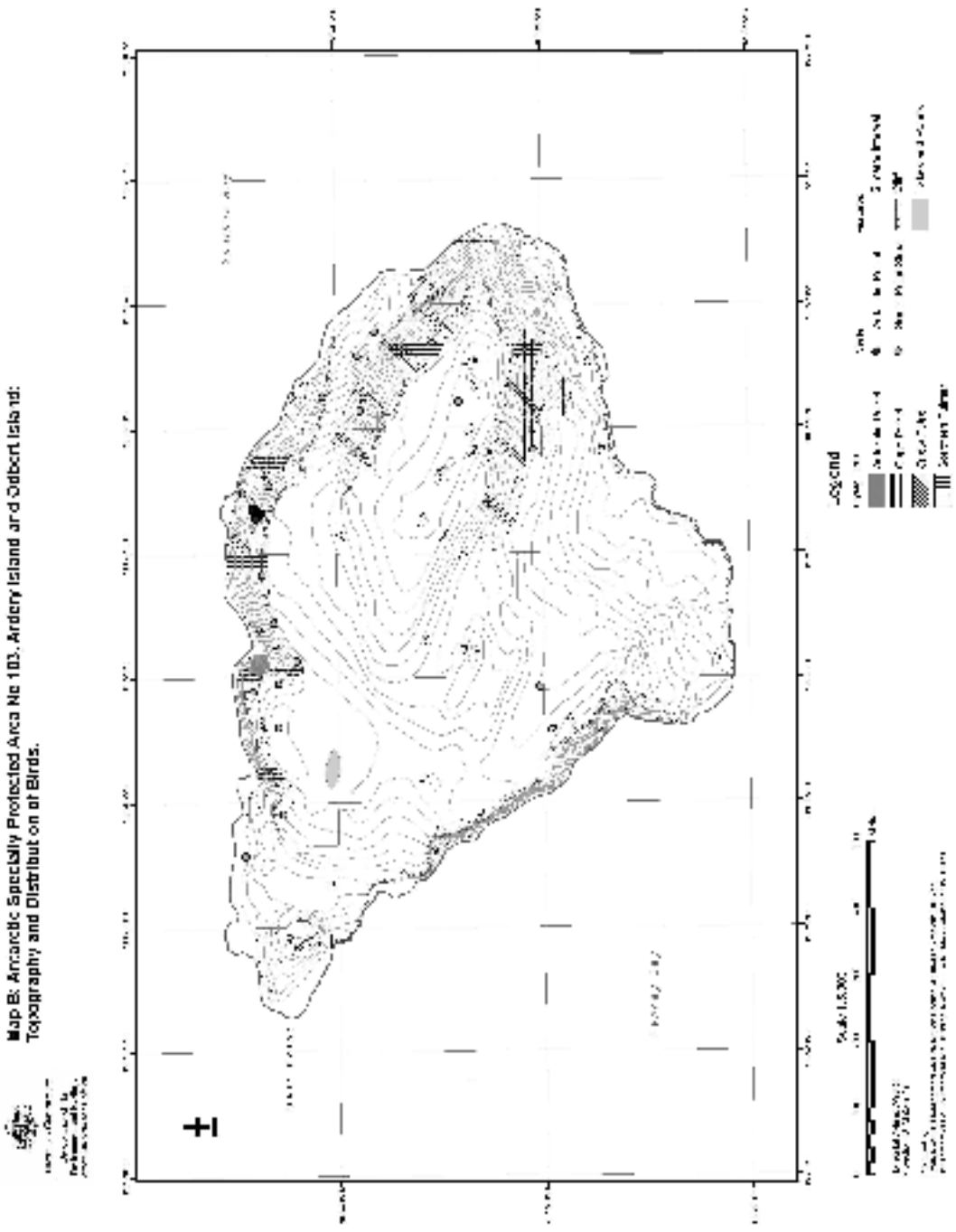
Map A: Antarctic Specially Protected Area No. 103: Ardery Island and Odbert Island. Windmill Islands, Budd Coast, Wilkes Land, East Antarctica

Location of Protected Areas Wilkes Land. Inset map shows location in East Antarctica.




Map B: Antarctic Specially Protected Area No 103, Ardery Island and Odbert Island:
Topography and Distribut on of Birds.
Legend

Map C: Antarctic Specially Protected Area No. 103, Ardery Island and Odbert Island:
Odbert Island, Topography and Distribution of Birds.
Legend
Scale 1:10,000

Map D: Antarctic Specially Protected Area No. 103, Ardery Island and Odbert Island: Aircraft Operations and Approach.

II. Measures

Management Plan for Antarctic Specially Protected Area No. 119

DAVIS VALLEY AND FORLIDAS POND, DUFEK MASSIF

1. Description of Values to be Protected

Forlidas Pond (82°27'28"S, 51°16'48"W) and several ponds along the northern ice margin of the Davis Valley (82°27'30"S, 51°05'W), in the Dufek Massif, Pensacola Mountains, were originally designated as a Specially Protected Area through Recommendation XVI-9 (1991, SPA No. 23) after a proposal by the United States of America. The Area was designated on the grounds that it "contains some of the most southerly freshwater ponds known in Antarctica containing plant life" which "should be protected as examples of unique near-pristine freshwater ecosystems and their catchments". The original Area comprised two sections approximately 500 m apart with a combined total area of around 6 km^2. It included Forlidas Pond and the meltwater ponds along the ice margin at the northern limit of the Davis Valley. The site has been rarely visited and until recently there has been little information available on the ecosystems within the Area.

This Management Plan reaffirms the original reason for designation of the Area, recognizing the ponds and their associated plant life as pristine examples of a southerly freshwater habitat. However, following a field visit made in December 2003 (Hodgson and Convey, 2004) the values identified for special protection and the boundaries for the Area have been expanded as described below.

The Davis Valley and the adjacent ice-free valleys is one of the most southerly 'dry valley' systems in Antarctica and, as of May 2005, is the most southerly protected area in Antarctica. While occupying an area of only 53 km^2, which is less than 1% of the area of the McMurdo Dry Valleys, the Area nevertheless contains the largest ice-free valley system found south of 80°S in the 90ºW-0º-90ºE half of Antarctica. Moreover, it is the only area known in this part of Antarctica where the geomorphology preserves such a detailed record of past glacial history. Some ice-free areas around the Weddell Sea region have scattered erratics and sometimes moraines, but the assemblage of drift limits, moraines, and abundant quartz-bearing erratics in the Davis Valley and associated valleys is unique and rare. The location of the Dufek Massif close to the junction between the western and the eastern Antarctic ice sheets also makes this site particularly valuable for the collection of data that can be used to constrain parameters such as the past thickness and dynamics of this sector of the Antarctic ice sheet. Such data are potentially extremely valuable for understanding the response of the Antarctic ice sheet to climate change. The Area therefore has exceptional and unique scientific value for the interpretation of past glacial events and climate in this part of Antarctica and it is important that this value is maintained.

The terrestrial ecology of the Area is impoverished but is also highly unusual, with lake and meltwater stream environments and their associated biota being rare this far south in Antarctica. As such, they provide unique opportunities for the scientific study of biological communities near the extreme limit of the occurrence of these environments. Vegetation appears to be limited to cyanobacterial mats and a very sparse occurrence of small crustose lichens. The cyanobacterial mat growth in the terrestrial locations is surprisingly extensive, and represents the best examples of this community type known this far south. The cyanobacterial community appears to survive in at least three distinct environments:

- in the permanent water bodies;
- in exposed terrestrial locations, particularly at the boundaries of sorted polygons; and
- in a series of former or seasonally dry pond beds on ice-free ground in the Davis Valley.

No arthropods or nematodes have thus far been detected in samples taken from within the Area, and the invertebrate fauna in the Area is unusually sparse. This characteristic distinguishes the Area from more northerly ice-free valley systems such as those at the Ablation Valley – Ganymede Heights (ASPA No. 147), Alexander Island, or at the McMurdo Dry Valleys (ASMA No. 2), where such communities are present. Rotifers and tardigrades have been extracted from samples taken within the Area, with the greatest numbers occurring within the former pond beds in the Davis Valley, although their diversity and abundance is also extremely limited compared with more northerly Antarctic sites (Hodgson and Convey, 2004). Further analyses of the samples obtained and identification of all taxa present are in progress, and are expected to make an important contribution to the understanding of biogeographical relationships between the different regions of Antarctica.

The Area is extremely isolated and difficult to access, and as a result has been visited by only a small number of people. Reports indicate that small field parties visited the Area in December 1957, in the 1965-66 and 1973-74 austral summer seasons, in December 1978 and in December 2003. The total number of people having visited probably numbers less than 50, with visits generally limited to a period of a few weeks or days. No structures or installations have been built within the Area, and as far as is known all equipment brought into the Area has subsequently been removed. While Hodgson and Convey (2004) reported evidence of a very limited number of human footprints and several old soil pit excavations, the Area has been exposed to few opportunities for direct human impact. The Area is believed to be one of the most pristine ice-free valley systems in Antarctica, and is therefore considered to possess outstanding potential as a reference area for microbiological studies, and it is important that these values receive long-term protection.

The site possesses outstanding wilderness and aesthetic values. The dry and weathered brown valleys of the Area are surrounded by extensive ice-fields, the margins of which fringe the valleys with dry based glacial ice of a deep blue hue. This abrupt and dramatic blue-ice margin stands in stark contrast to the stony and barren ice-free landscape of the valleys, and aesthetically is extremely striking in appearance. One of the original explorers of this area in 1957 recalled “the excitement we felt at being the first people to view and enter this magnificently scenic, pristine area.” (Behrendt, 1998: 354). Further examples of descriptions of the Area by visitors are: “[the blue ice] was towering over us ~ 150 feet – a large wave of blue. It was like being in a tidal wave that was held in suspension as we walked under it…” (Reynolds, field notes, 1978), and “I still cannot find adequate superlatives to describe the features, whether large or small, biologic or physical… [Of the] many settings that stretch the imagination…in my experience none match the northern side of the Dufek Massif, with Davis Valley as its crown jewel.” (Reynolds, pers. comm., 2000); “the most unusual [landscape] I have ever seen on any of the seven continents.” (Boyer, pers. comm., 2000); “Probably the single most remarkable environment I’ve been, either in Antarctica or elsewhere” (Convey, pers. comm., 2004). Burt (2004) described the region simply as “inspiringly awesome”.

The boundaries of the Area have been revised to include the entire ice-free region centered on the Davis Valley, including the adjacent valleys and Forlidas Pond. In general, the margins of the surrounding ice sheets form the new boundary of the Area, resulting in special protection of the region as an integrated ice-free unit that more closely approximates the valley catchments. The full catchments of the surrounding glaciers that flow into these valleys extend considerable distances from the ice-free area and do not possess many of the values related to the purpose of special protection, and are therefore excluded from the Area.

2. Aims and Objectives

Management at Forlidas Pond and Davis Valley ponds aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance and sampling in the Area;
- preserve the ecosystem as an area largely undisturbed by human activities;
- preserve the almost pristine ecosystem for its potential as a biological reference area;
- allow scientific research on the natural ecosystem and physical environment within the Area provided it is for compelling reasons which cannot be served elsewhere;
- minimize the possibility of introduction of alien plants, animals and microbes to the Area; and
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management Activities

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

- 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 necessary.
- Visits shall be made as necessary to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.

4. Period of Designation

Designated for an indefinite period of time.

5. Maps

- Map 1: Davis Valley and Forlidas Pond, ASPA No. 119, Dufek Massif, Pensacola Mountains: Location Map.

  Map Specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 82°S; 2nd83°S; Central Meridian: 51°W; Latitude of Origin: 81°S; Spheroid: WGS84.

  Inset: the location of the Pensacola Mountains and Map 1 in Antarctica.
- Map 2: Davis Valley and Forlidas Pond, ASPA No. 119: Topographic map and protected area boundary.

  Map Specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 82°S; 2nd 83°S; Central Meridian: 51°W; Latitude of Origin: 81°S; Spheroid: WGS84; Vertical datum: WGS84. EGM96 MSL height differential –21 m. Contour interval 25 m. Topographic data generated by digital orthophoto and photogrammetric techniques from USGS aerial photography (TMA400, TMA908, TMA909 (1958) and TMA1498 (1964)) by the Mapping and Geographic Information Centre, British Antarctic Survey (Cziferszky *et al*. 2004). Accuracy estimates: horizontal: ±1 m; vertical: ±2 m, declining towards the south away from available ground control points. Area beyond orthophoto coverage northwest of Forlidas Pond is mapped from a georectified Terra ASTER satellite image acquired 9 November 2002. Elevation data are unavailable in this region and it is therefore of reduced spatial accuracy.

6. Description of the Area

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

General description

Davis Valley (82°28’30"S, 51°05’W) and Forlidas Pond (82°27’28"S, 51°16’48"W) are situated in the north-eastern Dufek Massif, Pensacola Mountains, part of the Transantarctic Mountain range. The Dufek Massif is situated approximately mid-way between the Support Force Glacier and the Foundation Ice Stream, two of the major glaciers draining northwards from the Polar Plateau into the Ronne and Filchner Ice Shelves. Approximately 60 km to the southeast is the Forrestal Range (also part of the Pensacola Mountains), which is separated from the Dufek Massif by the Sallee Snowfield. The Ford Ice Piedmont separates the Dufek Massif from the Ronne and Filchner Ice Shelves, about 50 km to the northwest and 70 km to the northeast respectively.

The Davis Valley is approximately five kilometers wide and seven kilometers long, with its northern extent defined by the blue ice lobes that form part of the southern margin of the Ford Ice Piedmont. It is bounded in the east by Wujek Ridge and Mount Pavlovskogo (1074 m), flanked on the outer side by a glacier draining north from the Sallee Snowfield to the Ford Ice Piedmont. The western extent of the valley is defined by Clemons Spur, Angels Peak (964 m) and Forlidas Ridge. The Edge Glacier extends approximately 4 km into the Davis Valley from the Sallee Snowfield. The southern Davis Valley is dominated by Mount Beljakova (1240 m), on the northwestern margin of the Sallee Snowfield. Several smaller valleys exist in the west of the Area, adjacent to the prominent Preslik Spur and Forlidas Ridge. Almost 75% of the region enclosed by the large surrounding ice fields is ice-free, comprising 39 km^2 of ice-free ground in total, with the remainder of the area covered by the Edge Glacier, other permanent bodies of snow / ice and several small ponds.

Forlidas Pond occupies a small unnamed dry valley separated from the Davis Valley by a tributary ridge extending north from Forlidas Ridge. Other ponds within the Area occur at various locations along the blue ice margin of the Ford Ice Piedmont, at the snout of the Edge Glacier, and at the foot of an ice lobe in the west below Angels Peak.

Boundary

The Area comprises all of the Davis Valley and the immediately adjacent ice-free valleys, including several of the valley glaciers within these catchments. The boundary predominantly follows the margins of the surrounding ice fields of the Ford Ice Piedmont and Sallee Snowfield, which enclose the ice-free area that is considered to be of outstanding value. The northern boundary extends parallel to and 500 m north from the southern margin of the Ford Ice Piedmont in the Davis Valley and in the adjacent valley containing Forlidas Pond. This is in order to provide an additional buffer of protection around the freshwater bodies of value along this glacier margin. The eastern boundary follows the ice margin east of Wujek Ridge from the Ford Ice Piedmont to Mount Pavlovskogo. The southeastern boundary extends from Mount Pavlovskogo across the Sallee Snowfield and the upper slopes of the Edge Glacier, following areas of outcrop where they exist, and again across the Sallee Snowfield to Mount Beljakova. The southern and western boundaries of the Area follow the margins of the permanent ice. The boundary encompasses a total area of 57.2 km^2.

Boundary markers have not been installed in the Area because of its remoteness, the limited opportunities for visits and the practical difficulties of maintenance. Moreover, the margins of the permanent ice fields are generally sharply defined and form a visually obvious boundary around most of the Area.

Meteorology

Several estimates of mean annual surface air temperature have been made in the Dufek Massif region from measurements taken in ice bores or crevasses at around 10 m depth. A measurement of –24.96°C was obtained 32 km due north of Forlidas Pond on the Ford Ice Piedmont in December 1957 (Pit 12, Map 1) (Aughenbaugh *et al*., 1958). Another estimate of -9°C was made in December 1978 in the Enchanted Valley (Map 1), measured in a crevasse at 8 m depth (Boyer, pers. comm., 2000).

Detailed meteorological data for the Area itself are limited to records collected over two weeks in 2003. Hodgson and Convey (2004) measured temperature and relative humidity over snow and rock surfaces at their sampling sites within the Area from 3-15 December 2003, with data recorded at 30-minute intervals. Temperatures over snow ranged from a maximum of +12.8ºC to a minimum of – 14.5ºC, with an average over the period of –0.56ºC. Temperatures over rock ranged from a maximum of +16.0ºC to a minimum of –8.6ºC, with an average over the period of +0.93ºC (data over rock were only recorded from 3-11 December 2003). Relative humidity recorded over snow ranged from a maximum of 80.4% to a minimum of 10.8%, with an average over the period of 42.6%. Over rock surfaces (from 3-11 December 2003), relative humidity ranged from a maximum of 80.9% to a minimum of 5.6%, with an average over the period of 38.7%.

Data on windspeeds and directions within the Area are not available. While the ice-free area possesses many features related to wind erosion, there is some evidence to suggest that windspeeds in the locality are currently not especially high. For example, ice and snow surfaces were observed as largely free of wind-blown debris, and terrestrial cyanobacterial mats exist in-tact in exposed locations in the dry valleys (Hodgson and Convey, 2004). No precipitation data are available, although the bare ice and rock surfaces and low average relative humidity recorded by Hodgson and Convey (2004) attest to a dry environment of low precipitation.

Geology, geomorphology and Soils

The Dufek Massif is characterized by layered bands of cumulate rock belonging to the Dufek intrusion, thought to be one of the largest layered gabbro intrusions in the world (Behrendt *et al*., 1974; 1980; Ferris *et al.*, 1998). This is exposed in the Davis Valley as the light- to medium-gray, medium-grained Aughenbaugh gabbro, which is the lowest exposed part of the Middle Jurassic Dufek intrusion (Ford *et al.*, 1978).

The Davis Valley primarily consists of minimally weathered talus and glacial till of both local and exotic origin. In particular there appears to be an abundance of erratics of Dover Sandstone, one of several metasedimentary layers disrupted by the Dufek intrusion. An extensive glacial geomorphological record is evident, showing at least three major glacial and two major interglacial events (Boyer, 1979). Features include overlapping valley-glacier moraines, ice sheet moraines, lake shorelines, lateral glacial channels, ice eroded surfaces, well-developed patterned ground and erratics. The complex glacial, glaciofluvial and lacustrine history provides evidence for very old sub-polar or temperate-type valley glaciation, a former ice sheet level as much as 400 m higher than today, and the multiple advance and retreat of local alpine ice since the last major ice advance (Boyer, 1979; Hodgson and Convey, 2004). Measurements made of the geomorphology and samples taken by Hodgson and Convey (2004) will be used to establish a glacial chronology for the region and to constrain past ice sheet thickness. This research aims to establish how the chronology in this region correlates with that for other parts of Antarctica, and in particular whether it matches that for the McMurdo Dry Valleys (million-year time-scales) or whether the record is entirely Late Quaternary (millennial time-scales). As such, the site is considered to be extremely important for climate and ice-sheet history research, since it is the only site known where such an extensive and well-developed suite of geomorphological features is present in this part of Antarctica and this far south.

Soils are not well-developed in the Area and generally lack a significant organic component. Parker *et al*. (1982) collected a soil that was light brown in color, resulting from gravel weathering predominantly to muscovite. The soil comprised sand (81%) with silt (14%) and clay (5%), a composition different from other sites in the Pensacola Mountains where the clay proportions of six samples ranges from 0.4% to 1.6%. The soil sample from the Davis Valley had a pH of 6.4 (Parker, *et al*., 1982).

Lakes, ponds and streams

Forlidas Pond is a perennially frozen, shallow, round lake that was estimated to be approximately 100 m in diameter in 1957 (Behrendt, 1998). In December 2003 the lake was measured by Hodgson and Convey (2004) as 90.3 m in diameter from shoreline to shoreline on a transect azimuth of 306º (magnetic). At this time it was frozen almost completely to its base, with a thin layer of hypersaline slush at the lake bottom, and a freshwater meltwater moat that was partly ice free and partly covered by 10-15 cm of ice (Hodgson and Convey, 2004). Depth was measured as between 1.63 to 1.83 m, and average conductivity and temperature was 142.02 mS cm-1 and -7.67ºC respectively. The salinity of the bottom-water in Forlidas Pond is thus around four times greater than seawater. Hodgson and Convey (2004) data report a remnant pro-glacial lake near the margin of the Ford Ice Piedmont, 900 m from Forlidas Pond. Their data also show evidence of a series of former shorelines up to 144 m from and 17 m higher than the present level of Forlidas Pond. Boyer (pers. comm., 2000) reported that a second pond was visible in this valley in 1978 from the vantage of Forlidas Ridge, which probably refers to an ephemeral meltwater pond that occurs where the valley meets the Ford Ice Piedmont.

A series of small meltwater ponds occurs along the blue-ice margin of the northern Davis Valley. Two were observed at 82º 27.4'S, 50º 58'W and 82º 27.5'S, 51º 02'W in 1978, although their exact size, depth and other physical characteristics are unknown (Boyer, pers. comm. 2000). Two further ponds were described and mapped in this vicinity in December 2003, located at 82º 27.5'S, 51º 05.5'W and 82º 27.55' S, 51º 07' W (Map 2) (Hodgson and Convey, 2004). A pro-glacial pond was also observed in 1978 at the margin of the ice sheet in the west of the Area below Angels Peak (Map 1: 82º29.6'S, 51º14'W), although its physical characteristics are unknown (Boyer, pers. comm., 2000). The pro-glacial lake at the snout of the Edge Glacier is the largest within the Area, but it differs from the others in that, apart from at the margins where moats form seasonally, it is permanently frozen to the bottom. Cyanobacterial mat development in this lake is therefore limited to the perimeter and adjacent shoreline.

Little information exists on streams within the Area. Dry stream channels and water erosion features are evident within the ice-free area, although only small glacial melt streams on the Edge Glacier have thus far been reported as flowing in December (Hodgson and Convey, 2004). The apparent lack of melt streams may be because all visits to date have been made in the month of December, possibly before streams become more active. The presence of sizeable lake moats, the temperatures recorded by Hodgson and Convey (2004), as well as the biological and the geomorphological evidence, suggest that it is probable that at least some streams become active later in the season from melting snow, although perhaps not on an annual basis.

Biology

Visible biota is extremely limited within the Area, and vegetation appears to be restricted to cyanobacterial mats, found both in lakes and in patches on the surface of ice-free ground, and a very sparse occurrence of small crustose lichens. Previous anecdotal reports of the possible occurrence of mosses within the Area could not be substantiated by Hodgson and Convey (2004), and it is probable that the rich cyanobacterial mat growth was earlier mistaken for bryophytes by non-specialists. Neuburg *et al.* (1959) observed yellow and black lichens growing sparsely in sheltered places in the Davis Valley, while Hodgson and Convey (2004) observed several lichen forms growing deep within the crevices of boulders, although species observed have not yet been identified.

The cyanobacterial community appears to survive in at least three distinct environments:

a. in the permanent water bodies, particularly at the bottom and moat of Forlidas Pond and at the bottom and edges of the shallow ponds near the northern ice margin in the Davis Valley, which are extensively covered by a red-brown cyanobacterial mat. Cyanobacterial mat growth is also evident in the moat and seasonally wetted perimeter of the proglacial lake at the snout of the Edge Glacier;
b. in exposed terrestrial locations, particularly at the edge of larger rocks forming the boundary of sorted polygons, where a foliose mid-brown form has developed to depths of at least 10-15 cm;
c. in a series of former dry pond beds in the Davis Valley, which have extensive areas of almost continuous cyanobacterial mat on the former pool floors (two of up to c. 50 m in diameter). These depressions tend to accumulate winter snow which later ablates, providing a protected and moist environment where the cyanobacterial community can grow in relatively greater abundance than elsewhere.

Of the cyanobacterial community growing in permanent water bodies, Neuburg *et al.* (1959) identified cyanobacteria growing on the bottom of Forlidas Pond as *Phormidium incrustatum* and *P. retzii*. Hodgson and Convey (2004) characterized the mat at Forlidas Pond as red-brown in color, and noted that sheets of mat regularly become detached from the bottom and gradually move up through the ice, both here and at other ponds. Sometimes meltwater forms around the fragments within the ice as they move upwards, also carrying faunal (tardigrade, rotifer) communities with them. The aquatic cyanobacterial mats in the permanent ponds were actively photosynthesising, as evidenced by gas bubbles trapped against the lower ice surfaces. On reaching the surface, mat material is blown into moats or onto the local shoreline, or further afield. Cyanobacterial mats have formed and survive on the shoreline above the lake ice level, and may become flooded as lake water levels vary over the season and meltwater seeps into the ponds. Fossil examples of this type of mat were also found buried under boulders and flat stones between the present and previous (higher) shorelines of several of the ponds (Hodgson and Convey, 2004).

The second form of cyanobacterial community was particularly well-developed at a proglacial lake bed and in the mid-valley floor in the valley containing Forlidas Pond, and in Davis Valley near a large snow gully (path of the ephemeral meltwater stream) descending into the lake at the snout of the Edge Glacier (Hodgson and Convey, 2004). Nearly all of these mats observed were dry, although those near to melting snow were damp and lower thalli were often deep green in color. Sporadic snow melt was considered the most likely main source of water for these mats, at least in Forlidas Valley.

The third growth form of cyanobacterial mat occurs in the Davis Valley in a series of at least four former or dry pond beds between the Ford Ice Piedmont margin and the most recent retreat moraine crossing the valley, and a further pond bed is present on top of a large moraine on the eastern side of the valley. Extensive areas of dried cyanobacterial mat occur on the former pool beds, with two being almost continuous and of up to c. 50 m in diameter. The growth form also occurs in many of the adjacent small gullies between polygons or other cryoturbation features, which often have the appearance of temporary drainage features. Extractions from samples taken from within these areas were found to yield the greatest numbers of rotifers and tardigrades of any taken within the Area, showing these areas to be biologically productive, which necessitates a source of liquid water. In December 2003 very little snow was evident on the valley floor, prompting Hodgson and Convey (2004) to reason that the source of moisture may be from a considerable increase in melt later in the season flowing off the local ice sheet in the upper valley, or from local ice-cored moraines. Although this process was not occurring during their visit, footprints and shallow soil survey pits remaining from one of the previous parties (i.e. 25-46 years old) indicated that some ground was moist or

waterlogged at the time of the earlier visit. Seasonal inundation by liquid water would explain the extensiveness and integrity of this cyanobacterial community, and its apparent resilience to the potential ravages of polar winds, as well as the relative abundance of invertebrates extracted from samples taken from within these areas.

The invertebrate fauna within the Area is impoverished, with both the diversity and abundance of organisms being extremely limited compared to more northerly Antarctic sites (Hodgson and Convey, 2004). The invertebrate communities consist of rotifers and tardigrades, with a complete absence of nematodes or arthropods from samples taken, even from the most biologically productive sites within the Area. Extractions generated predominantly rotifers, with more limited number of tardigrades, and numbers for both were very low in comparison with similar extractions from other Antarctic locations. Surprisingly, the most productive sites for these organisms were not the aquatic environments of the permanent lakes, but the former pond beds in the Davis Valley as noted above. Research on the microbial biology of the Area is continuing, with samples collected being examined by a team of microbiologists, protozoologists and molecular biologists at the British Antarctic Survey (Hodgson and Convey, 2004). These studies are expected to provide an integrated overview of the microbial ecology of this site near the extreme limit of terrestrial habitats in the world.

Viable yeast species have been recorded in the soil, along with the algae *Oscillatoria* sp., *Trebouxia* sp. and *Heterococcus* sp. (Parker *et al.*, 1982). Chasmoendolithic microorganisms have been recorded in rocks in the Dufek Massif (Friedmann, 1977), although Hodgson and Convey (2004) found no evidence of their presence within the Area and noted that rock-types most favorable for the occurrence of endolithic organisms are not widespread.

Human activities and impact

There have been few visits to the Area and human impacts are believed to be minimal (Table 1). Because of its remoteness and the infrequency of visits, it is one of the few ice-free areas of Antarctica where the compiled record of past human activity at the site is almost complete. The almost pristine condition of the environment contributes to the extremely high value of the Area and is an important reason for its special protection.

The key characteristics of visits recorded to the Area are summarized in Table 1, which should be updated as required (see Section 7(x)). Past camps have generally been on the ice sheet outside of the Area. Previous parties removed all wastes from the Area, with the possible exception of small quantities of human wastes. In 2003 all wastes including all human wastes were removed, both from within the Area and from the party's adjacent campsite on the Ford Ice Piedmont (Map 2). Hodgson and Convey (2004) noted that in December 2003 the evidence of previous visits was limited to a number of footprints and several shallow soil excavations in the Davis Valley.

Table 1. Known visits to the Davis Valley and adjacent ice-free valleys within the Area.

Party	No. pers	Org	Purpose	Dates	Duration (days)	Locations visited	Camp	Transport
Aughenbaugh Behrendt Neuburg Thiel Walker	5	IGY (US)	Geology Geophysics	Dec 1957	?	FIP, DV, FP, FR	FIP west of FR	Sno-Cat traverse to FIP, thence on foot
Ford ?	?	USGS	Geology	Dec 1965 – Jan 1966	?	?	?	Numerous helicopter landings in Dufek Massif
Ford ?	?	USGS	Geology	Summer 1973-74	?	?	?	?
Ford ?	?	USGS	Geology	Summer 1976-77	?	?	?	?
Russian ?	?	?	Geology?	Summer 1976-77	?	?	?	?
Boyer Reynolds	2	USGS	Geology	12 Dec 1978	2	FIP, DV	EV	Toboggan from EV to ice margin, thence on foot
Ford Boyer Reynolds Carl?	4	USGS	Geology	14 Dec 1978	4	FIP, DV, FR, AP	EV	Toboggan from EV to ice margin, thence on foot
Hodgson Convey Burt	3	BAS (UK)	Biology Liminology Glacial geo-morphology	3-15 Dec 2003	13	FIP, DV, FP, FR, AP	FIP 1.9km north of FP	Twin Otter to FIP, thence on foot.
TOTALS	**?**				**?**			

Key:

FIP – Ford Ice Piedmont	DV – Davis Valley	FP – Forlidas Pond	FR – Forlidas Ridge	AP – Angels Peak
CS – Clemons Spur	PS – Preslik Spur	MB – Mt Beljakova	MP – Mt Pavlovskogo	EV – Enchanted Valley

6(ii) Restricted and managed zones within the Area

None.

6(iii) Structures within and near the Area

No structures, installations or caches are known to exist within the Area.

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

There are no other protected areas nearby, with the nearest being Ablation Valley – Ganymede Heights (ASPA No. 147), Alexander Island, which is approximately 1300 km to the north-west.

7. Permit conditions

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

- it is issued only for compelling scientific reasons that cannot be served elsewhere, or for essential management purposes consistent with plan objectives such as inspection or review;
- the actions permitted will not jeopardize the physical, ecological, scientific or aesthetic and wilderness values of the Area, nor the pristine value of the Area and its potential as a largely undisturbed biological reference site;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or a copy, shall be carried within the Area;
- a visit report shall be supplied to the authority, or authorities, named in the Permit;
- permits shall be issued for a stated period.

7(i) Access to and movement within the Area

- Landing of aircraft is prohibited within the Area and overflight below 100 m above ground level is prohibited.
- Vehicles are prohibited within the Area.
- Access into and movement within the Area shall be on foot.
- No special restrictions apply to the means of access, or air or land routes used, to move to and from the icefields surrounding the boundaries of the Area.
- Access into the Area should be at a practicable point close to sites of study to minimize the amount of the Area that needs to be traversed. The terrain and crevassing generally makes such access most practical from the Ford Ice Piedmont in the north.
- Pedestrian routes should avoid lakes, ponds, former pond beds, stream beds, areas of damp ground and areas of soft sediments or sedimentary features. Care should be exercised to avoid damage to any areas of cyanobacterial mat growth, in particular to the extensive areas found in former pond beds in Davis Valley.
- Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects.

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

- Research that will not jeopardize the scientific or ecosystem values of the Area, or its pristine value and potential as a reference site, and which cannot be served elsewhere;
- Essential management activities, including monitoring;
- The appropriate authority should be notified of any activities/measures undertaken that were not included in the authorized Permit.

7(iii) Installation, modification or removal of structures

- Structures shall not be erected within the Area except as specified in a Permit.
- Permanent structures are prohibited.
- All scientific equipment installed in the Area must be approved by Permit.

- Should equipment be intended to remain within the Area for a duration of more than one season it shall clearly be identified by country, name of the principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area.
- Removal of structures, equipment or markers for which the period specified in the Permit has expired shall be a condition of the Permit.

7(iv) Location of field camps

- Camping within the Area is prohibited.
- Suitable camp sites have been proven to the north and west of the Area on the Ford Ice Piedmont (Map 2), and also in the Enchanted Valley (Map 1).

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

- No living animals, plant material or microorganisms shall be deliberately introduced into the Area and the precautions listed in 7(ix) below shall be taken against accidental introductions.
- No herbicides or pesticides shall be brought into the Area.
- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel is not to be stored in the Area, unless specifically authorized by Permit for scientific or management purposes.
- Anything introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized.
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material *in situ*.
- The appropriate authority should be notified of any materials released and not removed that were not included in the authorized Permit.

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

- Taking or harmful interference with native flora or fauna is prohibited, except in accordance with a separate permit issued under Article 3 of Annex II to the Madrid Protocol by the appropriate national authority specifically for that purpose. Where animal taking or harmful interference is involved this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(vii) Collection or removal of anything not brought into the Area by the Permit Holder

- Material may be collected or removed from the Area only in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted if there is a reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, native flora or fauna that their distribution or abundance within the Area would be significantly affected.

- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorized, may be removed unless the impact of removal is likely to be greater than leaving the material *in situ*: if this is the case the appropriate authority should be notified.

7(viii) Disposal of waste

- All wastes, including water used for any human purpose and including all human wastes, shall be removed from the Area. Individuals or groups shall carry appropriate containers for human waste and gray water so that they may be safely transported and removed from the Area.

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

- Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, which may involve the collection of limited samples for analysis or review, or for protective measures.
- Any specific sites of long-term monitoring shall be appropriately marked.
- To help maintain the ecological and scientific values derived from the relatively low level of human impact at Davis Valley and Forlidas Pond, visitors shall take special precautions against introductions. Of concern are microbial, invertebrate or plant introductions sourced from other Antarctic sites, including stations, or from regions outside Antarctica. To minimize the risk of introductions, visitors shall thoroughly clean footwear and any equipment to be used in the area – particularly sampling equipment and markers – before entering the Area.
- To reduce the risk of microbial contamination, the exposed surfaces of footwear, sampling equipment and markers should be sterilized before use within the Area. Sterilization should be by an acceptable method, such as by washing in 70% ethanol solution in water or in a commercially available solution such as 'Virkon'.
- A comprehensive Code of Conduct and *Guidelines for Conduct of Scientific Research* have been developed for use within the McMurdo Dry Valleys (ASMA No. 2), much of which is relevant as guidance for activities within the dry valley system in this region. Visitors shall consult these guidelines and should apply them where appropriate to the conduct of scientific research and other activities within the Area.

7(x) Requirements for reports

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

8. Supporting Documentation

Aughenbaugh, N., Neuburg, H. and Walker P. (1958): Report 825-1-Part I, October 1958, USNC-IGY Antarctic Glaciological Data Field Work 1957 and 1958. *Ohio State University Research Foundation. Source: World Data Center for Glaciology at Boulder, Colorado.* (ftp://sidads.colorado.edu/pub/ DATASETS/AGDC/antarctic_10m_temps/ells-filchner_57.txt).

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Ferris, J., Johnson, A. and Storey, B. (1998): Form and extent of the Dufek intrusion, Antarctica, from newly compiled aeromagnetic data. *Earth and Planetary Science Letters 154: 185-202.*

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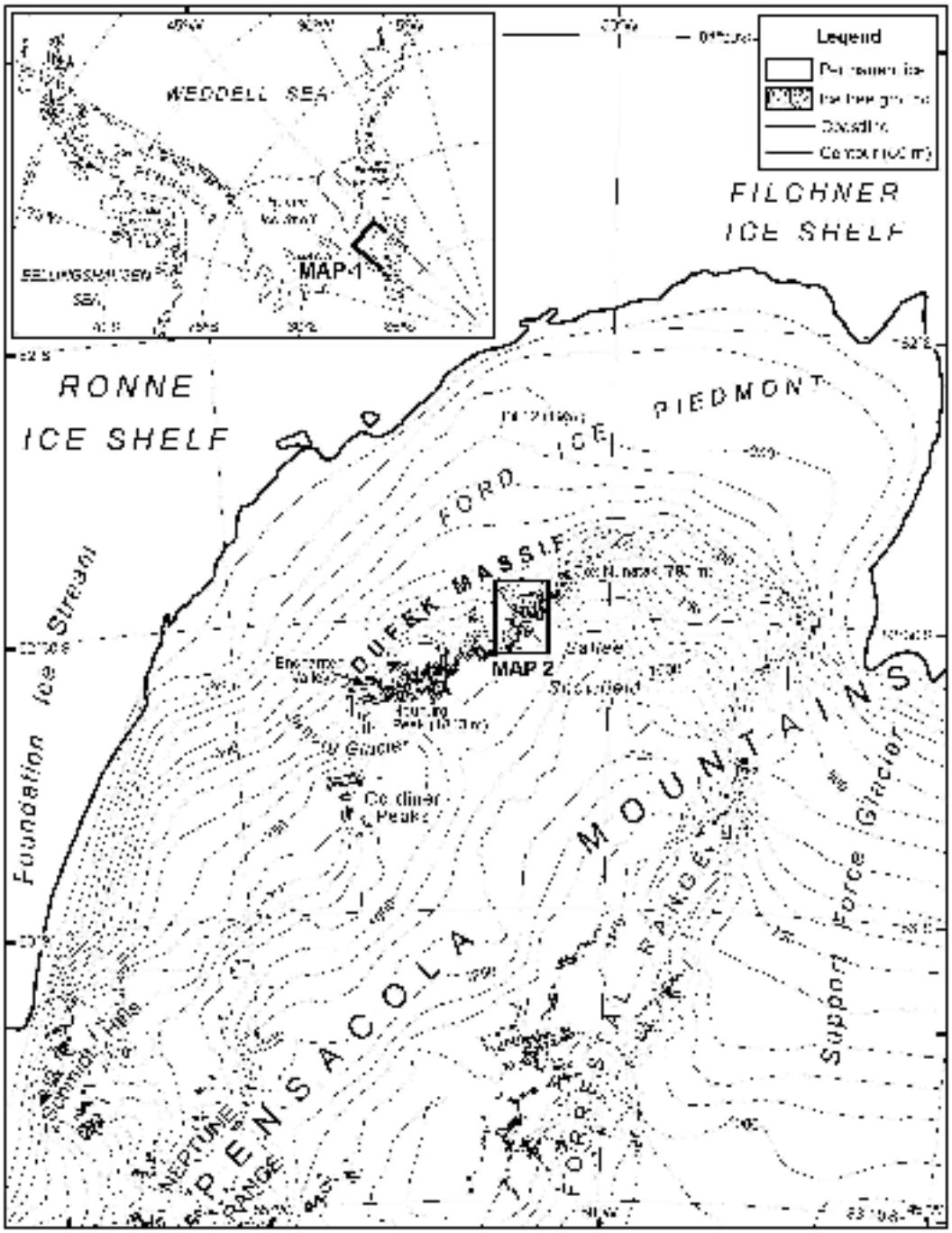
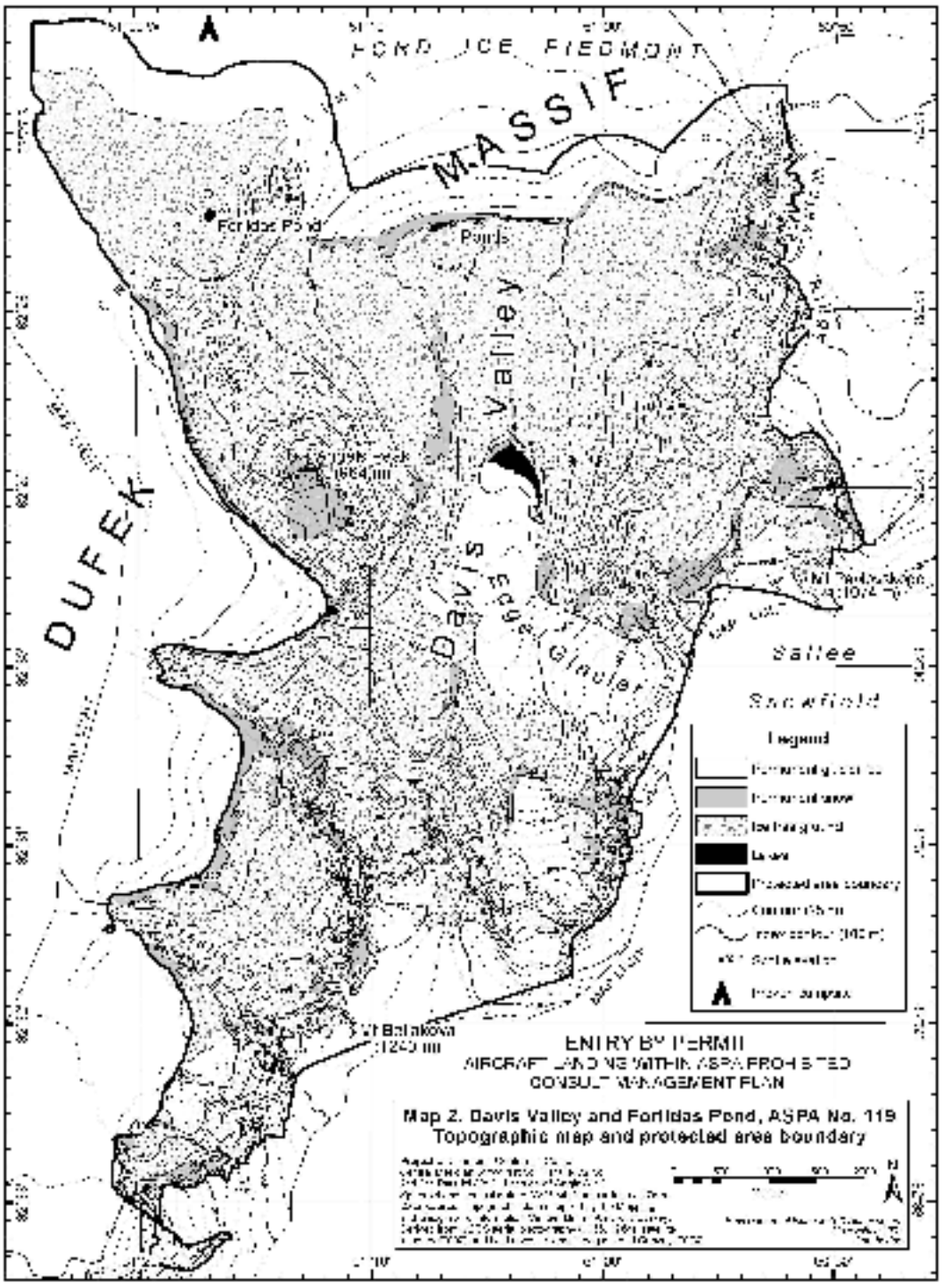
Parker, B.C., Boyer, S., Allnutt, F.C.T., Seaburg, K.G., Wharton, R.A. and Simmons, G.M. (1982): Soils from the Pensacola Mountains, Antarctica: physical, chemical and biological characteristics. *Soil Biology and Biochemistry 14: 265-271.*

Parker, B.C., Ford, A.B., Allnutt, T., Bishop, B. and Wendt, S. (1977): Baseline microbiological data for soils of the Dufek Massif. *Antarctic Journal of the United States 12 (5): 24-26.*



Map 1. Davis Valley and Forlidas Pond ASPA No. 119, Dufek Massif, Pensacola Mountains: Location map


POND ICE PIEDMONT
MASSIF
Forlidas Pond
Ponds
DUFEK
Davis Valley
Legend
ENTRY BY PERMIT
AIRCRAFT LAND NG WITHIN ASPA PROH BITED
CONSULT MANAGEMENT PLAN
Map 2. Davis Valley and Forlidas Pond, ASPA No. 119
Topographic map and protected area boundary

II. Measures

Management Plan for Antarctic Specially Protected Area No. 120

POINTE-GÉOLOGIE ARCHIPELAGO, TERRE ADÉLIE

Jean Rostand, Le Mauguen (former Alexis Carrel), Lamarck and Claude Bernard Islands, The Good Doctor's Nunatak and breeding site of Emperor Penguins

1. Description of Values to be Protected

In 1995, four islands, a nunatak and a breeding ground for emperor penguins were classified as an Antarctic Specially Protected Area (Measure 3 (1995), XIX ATCM, Seoul) because they were a representative example of terrestrial Antarctic ecosystems from a biological, geological and aesthetics perspective. A species of marine mammal, the Weddell seal (*Leptonychotes weddelli)* and various species of birds breed in the area: emperor penguin (*Aptenodytes forsteri*); Antarctic skua (*Catharacta maccormicki*); Adélie penguins (*Pygoscelis adeliae*); Wilson's petrel (*Oceanites oceanicus*); giant petrel *(Macronectes giganteus*); snow petrel (*Pagodrama nivea*), cape petrel (*Daption capense*).

Well-marked hills display asymmetrical transverse profiles with gently dipping northern slopes compared to the steeper southern ones. The terrain is affected by numerous cracks and fractures leading to very rough surfaces. The basement rocks consist mainly of sillimanite, cordierite and garnet-rich gneisses which are intruded by abundant dikes of pink anatexites. The lowest parts of the islands are covered by morainic boulders with a heterogenous granulometry (from a few cm to more than a m across).

Long-term research and monitoring programs of birds and marine mammals have been going on for a long time already (since 1952 or 1964 according to the species). A database implemented in 1981 is directed by the Centre d'Etudes Biologiques de Chize (CEBC-CNRS). Human scientific presence may be estimated at around 4 people for a few hours, twice a month in the protected area.

Among the approximately 30 emperor penguin breeding sites on record, this is the only one located adjacent to a permanent station. It is therefore a providential spot to study this species and its environment.

2. Aims and Objectives

Management of the Cape Géologie Specially Protected Area aims at:

- preventing disturbance in the area due to the proximity of the station;
- preventing disturbance in the area due to the growing number of cruising ships: although the 335 registered tourists visiting the Dumont d'Urville station over the past five years have caused no visible impact on the environment, especially on the avifauna, stringent protection measures must be taken;
- allowing research of a compelling scientific nature which cannot be carried out elsewhere;
- avoiding any major changes to the structure and composition of flora and fauna and the association of different species of vertebrates harbored in the area, which is one of the most representative for both faunistic and scientific interest on Adélie Coast;

- permit scientific research in the field of marine and terrestrial biology, i.e., ethology, ecology, physiology and biochemistry, especially projects related to demographic monitoring and impact assessment of surrounding human activities, including tourism;
- permit research in geology with particular attention to the scheduling of visits when thermo-mechanical sampling means are required.

3. Management Activities

The present management plan is kept under periodical review to ensure that the values of the Antarctic Specially Protected Area are wholly protected. Any activity carried out in the area undergoes an environmental impact assessment before being undertaken.

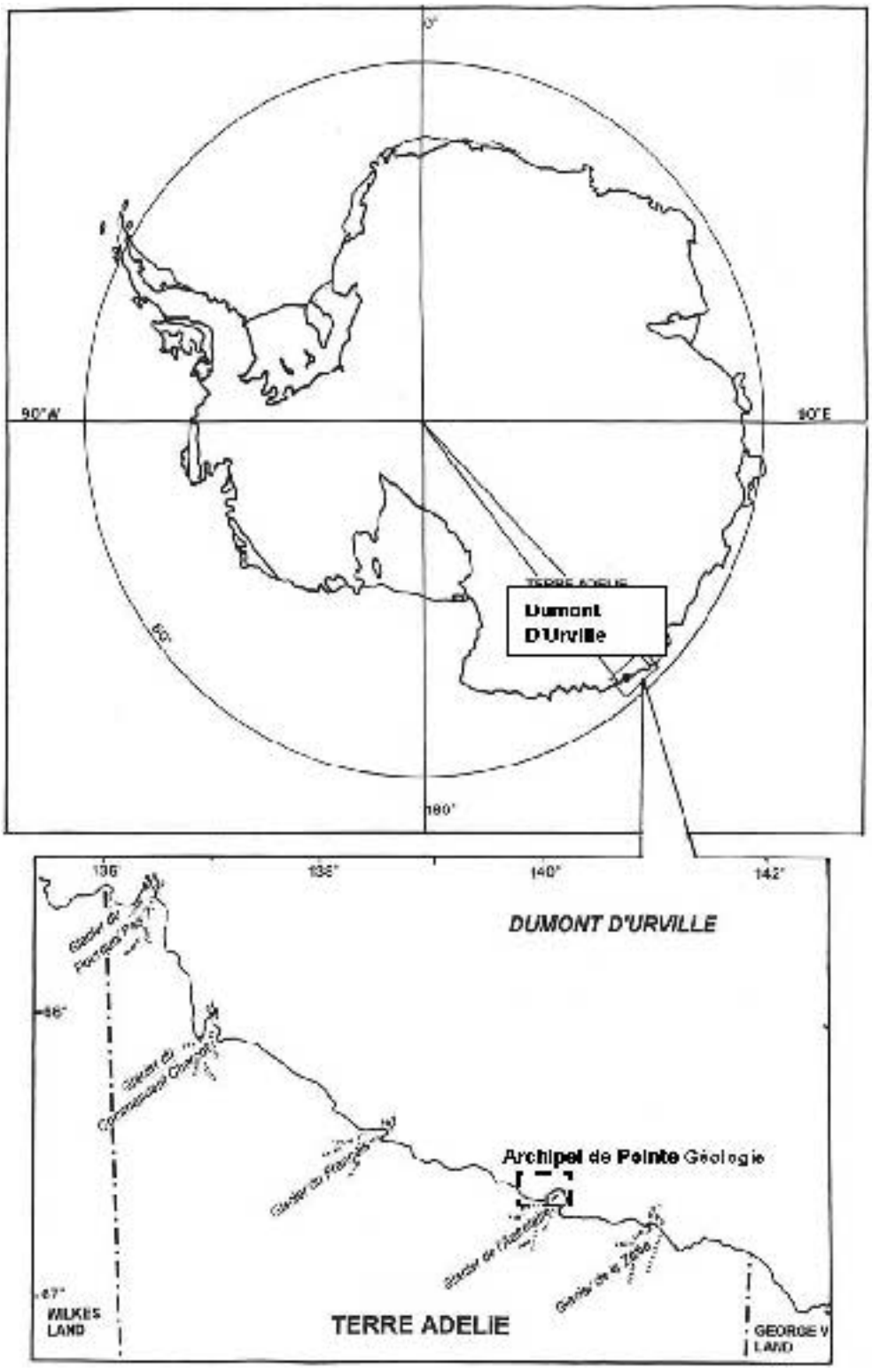
4. Period of Designation

The Area remains an Antarctic Specially Protected Area (ASPA) for an indefinite period.

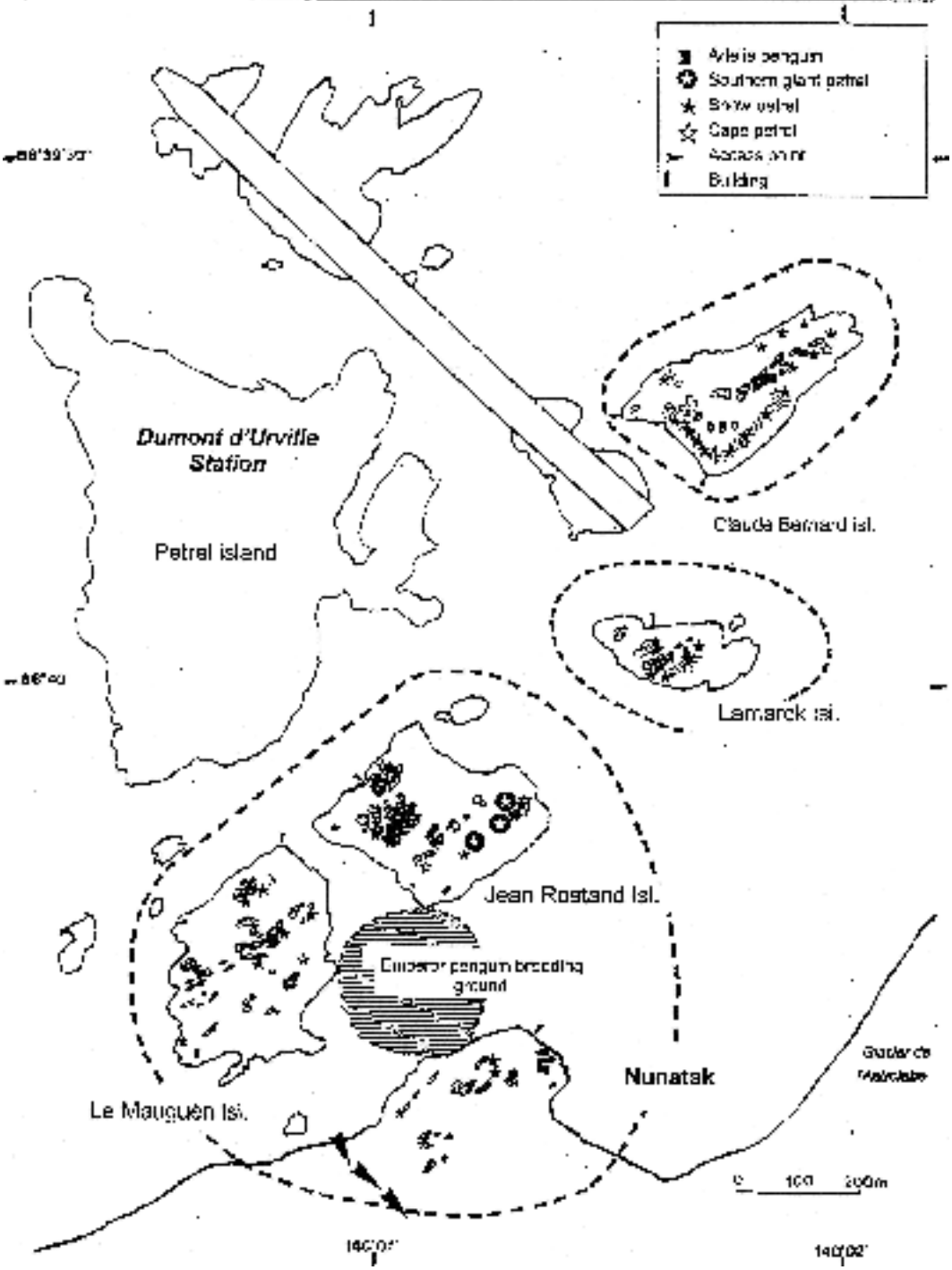
5. Maps

The Cape Geology Archipelago map shows the boundaries of the Antarctic Specially Protected Area inside the archipelago with dotted lines.

Chart 1. Location of terre Adélie in the Antarctic.



Map 2. Cape Geology Archipelago showing the Antarctic Specially Protected Area (dotted line) and the breeding sites of the birds. The South Polar skua and Wilson's Storm petrels' nests are not shown on the map (see Table 1). Access of land vehicles to the continent (Nunatak) is shown by means of arrows.



6. Description of the Area

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

The Jean Rostand, Le Mauguen (formerly Alexis Carrel), Lamarck and Claude Bernard islands, the 'Bon Docteur' Nunatak and the Emperor penguins breeding colony are located in the heart of the Cape Geology Archipelago, coastal area of Adélie Coast (66°39'30" - 66°40'30"S; 140°- 140°02'E).

Table 1. Annual breeding area of seabird couples on the Specially Protected Area (SPA). The population breeding within the SPA is being compared to that of the Cape Geology (PG) population (Micol & Jouventin, 2001. Long term population trends in seven Antarctic seabirds at Cape Geology (Terre Adélie). *Polar Biology* 24:175-185; Thomas, 1986. L'effectif des oiseaux nicheurs de l'archipel de Cape Geology (Terre Adélie) et son évolution au cours des trente dernières années. *L'oiseau RFO* 56:349-368, pour les pétrels de Wilson*).

Islands	Emperor penguin	Adelie penguin	South Polar skua	Snow petrel	Cape petrel	Wilson's storm petrel *	Southern giant petrel
C. Bernard	--	5033	5	169	248	178	--
Lamarck	--	1479	1	34	36	45	--
J. Rostand	--	6825	5	98	32	35	6
Le Mauguen (formerly Alexis Carrel)	--	4991	10	23	2	72	
Nunatak	--	2520	2	7	--	41	--
Emperor penguin	2740	--	--	--	--	--	--
TOTAL	2740	20848	23	331	318	371	6
% SPA/PG	100	58	62	38	70	31	75

Table 2. Presence of birds on breeding grounds.

	Emperor penguin	Adelie penguin	South Polar skua	Snow petrel	Cape petrel	Wilson's storm petrel *	Southern giant petrel
First arrival	March	October	October	September	October	November	July
First egg laying	May	November	November	November	November	December	October
Last departure	January	March	March	March	March	March	April

Table 3. Sensitivity to disturbance caused by human beings and status of the Cape Geology populations.

	Emperor penguin	Adelie penguin	South Polar skua	Snow petrel	Cape petrel	Wilson's storm petrel *	Southern giant petrel
Sensitivity to disturbance caused by human beings*	High	Medium	Medium	Medium	High	High	High
Status between 1952 and 1984	Diminishing	Stable	Stable	?	?	?	Diminishing
Status between 1984 and 2000	Stable	Increasing	Increasing	Stable	Stable	?	Stable

* Micol & Jouventin, 2001 (Table 1, refer.)

The area consists of the southernmost rock outcrops of Cape Geology Archipelago, between Petrel Island and the Western edge of Astrolabe Glacier. It is a very large ice-free ground on Adélie Coast.

As a whole, the surface of the rock outcrops does not exceed 2 km^2. The highest points are distributed along North-East-South-West ridges (C. Bernard Island: 47.6 m; J Rostand Island 36.39 m; Le Mauguen (formerly Alexis Carrel) Island: 28.24 m Nunatak: 28.50 m).

During the summer, only the Southern flanks of the islands are still covered by firns.

The area has clear natural boundary markers. However, markers will be set up in the Nunatak at a later stage.

No tracks or roads exist in the area.

6(ii) Identification of restricted or prohibited zones

Access to any part of the area is prohibited unless authorized by a permit. Location of breeding colonies is shown on the map. Birds are present from October to March, except for the emperor penguins, which breed in winter (Table 2). Their sensitivity to human disturbance varies depending on the species (Table 3). The establishment of the Dumont d'Urville station has resulted in a drastic decrease of the populations of emperor penguins and southern giant petrels in the Cape Geology Archipelago. Conversely, the significant decrease of emperor penguins by the end of the 1970s seems to have been due to long weather anomalies between 1976 and 1982. Since 1995, the breeding areas of these two species have been protected and the populations are now stable (Table 3). No one, except Permit Holders, is allowed to approach or to disturb the emperor penguin colony in any manner during the breeding season, from April to mid-December when the chicks fledge.

The particularly sensitive emperor penguins are also to be protected beyond the boundaries of this breeding area since the colony is not always located on the same spot.

The South-Eastern part of Jean Rostand Island is designated as a restricted area in order to preserve the remaining breeding colony of southern giant petrels. Access to this restricted area is strictly prohibited during the breeding period, from August to February. Access is restricted to one ornithologist, holding a Permit, to the extent spelled out in the present paragraph, i.e. once a year when chicks are being banded, for the purposes of monitoring the population. The boundary of the restricted area is defined by the NE-SW ridge going through the 33.10 m and 36.39 m marks North West of the colony, marked on the floor with stakes. This condition shall hold for an indefinite period, but it may be subject to re-evaluation every time the Management Plan is reviewed.

6(iii) Location of structures in the Area

Prévost hut and a shelter are located on Rostand Island. There are no other buildings anywhere else in the Area.

7. Permit Conditions

- Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority.
- Permits may be granted to carry out various scientific research, site monitoring or inspection activities entailing sampling of biological material or animals in small quantities. For each single entry and length of stay, permits will authorize the scope of the tasks to be undertaken, their time-span and the maximum number of people commissioned to enter the Area.

7(i) Access to and movement within the Area

- No helicopters or terrestrial vehicles are authorized within the Area.
- No overflights over the Area, either by helicopters or other airplanes are authorized.
- Access to the Area is only permitted by foot or by zodiacs (in summer). However, very rare departures of terrestrial vehicles from the Nunatak are allowed, but only when sea-ice conditions hinder from proceeding otherwise and with special attention to the presence of birds in the Area.
- Access to the Area is restricted to ornithologists holding a Permit and to the 2 or 3 people who must accompany them for safety reasons.
- Access to and movement within the Area shall, in any case, be limited, in order to avoid unnecessary disturbance to birds, especially by crossing their pathways and to ensure that breeding areas or their access are not damaged or endangered.

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

- compelling scientific activities which cannot be conducted elsewhere and essential management activities provided special care is bestowed on both the emperor penguins and the southern giant petrels located in the restricted area (*see para 6.ii*);
- visitors granted access to the Area by a Permit shall ensure that their visit will cause no disturbances to the monitoring programs under way.

7(iii) Installation, modification or removal of structures

- No structures are to be erected or scientific equipment installed in the Area except for compelling scientific reasons or management activities as authorized by the competent authorities in the framework of the urbanistic and public domaniality regulations in force.

7(iv) The location of field camps

- Only safety tents should be erected when security reasons so require it provided all precautions have been taken in order to avoid damaging or disturbing the fauna.

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

- According to the provisions set forth in Annex II to the Madrid Protocol, no living animals or plant materials, poultry products, including dried eggs, shall be introduced into the Area.
- No chemicals shall be brought into the Area, except chemicals which may be introduced for a compelling scientific purpose as specified in the Permit. Any chemical introduced shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted
- Fuel, food and other materials are not to be stored in the Area, unless required for compelling purposes connected with the activity for which the Permit has been granted. Such materials are to be removed when no longer required. Permanent storage is not permitted.

7(vi) The taking of or harmful interference with flora and fauna

- Taking of or harmful interference with native flora and fauna is prohibited except in accordance with a Permit. If an activity is determined as having less than a minor or transitory impact, it should be carried out in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica, as a minimum standard.

7(vii) The collection or removal of anything not brought into the Area by the Permit Holder

- Collection or removal of anything not brought into the Area by a Permit Holder is prohibited unless otherwise specified in the Permit for scientific or management purposes.
- Debris of manmade origin may be removed from the Area and dead or pathological specimens of fauna or flora may be removed for laboratory examination.

7(viii) Disposal of waste

- All waste produced, except for waste water, must be removed from the Area.

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

- Visits to the Area shall be restricted to scientific and management objectives only.

7(x) Requirements for reports of visits to the Area

- Parties should ensure that the principal Holder of each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form suggested by SCAR.
- Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit original or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be taken into consideration both when reviewing the Management Plan and when organizing the scientific manipulation of the Area.

Management Plan for Antarctic Specially Protected Area No. 132

POTTER PENINSULA, KING GEORGE ISLAND (ISLA 25 DE MAYO), SOUTH SHETLAND ISLANDS

1. Description of Values to be Protected

This area was originally designated as Site of Special Scientific Interest No. 13 in Antarctic Treaty Consultative Meeting (ATCM) Recommendation XIII-8 after a proposal by Argentina, because of its diverse and extensive vegetation and fauna, which constitutes a representative sample of the Antarctic ecosystem.

During the XXI Antarctic Treaty Consultative Meeting (Christchurch, 1997), a revised Management Plan was adopted for the Area, following the format established by Annex V to the Madrid Protocol and according to Measure 3 (1997). During the XXV Antarctic Treaty Consultative Meeting (Warsaw, 2002) and once the Annex entered into force, the *Site of Special Scientific Interest* No. 13 became, by virtue of Measure 1 (2002), *Antarctic Specially Protected Area* No. 132.

The original goals for designating this Area are still relevant. The coastal areas host important bird colonies, marine mammal breeding areas and diverse vegetal species. Scientific research programs on the breeding ecology of elephant seals and birds have are being carried out in the area since 1982. These include the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) *Ecosystem Monitoring Program*, as well as basic research that must be developed without interference from other activities. The anthropic disturbance could jeopardize the long term studies carried out there, especially during the breeding season.

2. Aims and Objectives

Management of ASPA No. 132 aims at:

- avoiding major changes in the structure and composition of the flora and fauna communities;
- preventing unnecessary human disturbance;
- permitting the development of the scientific research that cannot be carried out elsewhere, as well as the continuity of ongoing long term biological studies established in the Area; and
- permitting the development of any other scientific research provided it does not compromise the values for which the Area is being protected.

3. Management Activities

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

- the staff to be posted at Jubany Base will be specifically trained on the conditions of the Management Plan;

- the circulation will only take place on vegetation-free areas and taking a wide berth from the fauna, except when the scientific projects specifically mention otherwise and provided the corresponding harmful interference permits have been issued;
- collection of samples will be limited to the minimum required for the authorized scientific research plans;
- visits shall be made as necessary to ensure management and maintenance measures are adequate; and
- all markers, signs and structures erected within the Area for scientific or management purposes will be properly secured and maintained in good condition.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Maps 1 and 3 are attached at the end of the present Management Plan as annexes. Map 1 shows the location of Potter Peninsula (25 de Mayo/King George Island) in relation to the Antarctic Peninsula. Map 2 shows the location of the Potter Peninsula in relation to the 25 de Mayo/King George Island and Nelson Island. Map 3 shows the Protected Area in greater detail. Map 4 shows the distribution of bird and mammal concentrations in the ASPA.

6. Description of the Area

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

Geographical coordinates and boundaries

This Area is located on the east coast of Bahía Guardia Nacional / Maxwell Bay, southwest of King George (25 de Mayo/Rey Jorge) Island, between the southern tip of Mirounga Point (Northwest of Potter Peninsula) and the outcrop known as "Spur 7", on the northeastern border of Stranger Point. The area occupies all of the coastal strip up to the border of the cliff, which reaches heights of 15-50 m. This coastal strip has a variable width, stretching up to 500 m from the shore at low tide waterlevels. The area is mainly made of raised beaches, largely covered with mid-size pebbles, basaltic structures and lateral and terminal moraines. The shoreline is very irregular and it has a number of small bays shaped among rocky headlands.

Natural features

The area encompasses important scientific values due to the presence of groups of breeding elephant seals (*Hydrurga leptonyx*), and non-breeding groups of Antarctic fur seals (*Arctocephalus gazella*) and occasionally of Weddell seals (*Leptonychotes weddelli*), crabeater seals (*Lobodon carcinophagus*) and leopard seals. During the breeding season there are around 500 elephant seals around, and during the fledging season, between 200 and 600. The non-breeding groups of Antarctic fur seals can add up to 300 individuals, although that figure may vary considerably from one year to the next.

Also present are significant colonies of gentoo penguins (*Pygoscelis papua*) and Adélie penguins (*Pygoscelis adeliae*), each of them with an approximate population of 4,000 pairs. Penguin colonies are mainly distributed around Stranger Point, from the vicinity of Elefante refuge to Spur 7. Within the ASPA, the population of storm petrels (by large *Oceanites oceanicus* and, to a much lesser extent, the *Fregetta tropica*) reaches some 200 pairs. Antarctic terns (*Sterna vittata*), southern giant petrels (*Macronectes giganteus*) and skuas (*Catharacta sp.*) also breed in the area, although their populations are, in all cases, less than 100 pairs each. Southern giant petrels nesting sites concentrate on the western side of the ASPA. As some of the nesting sites around Potter peninsula change their position over time, population figures are estimations and may introduce some degree of inaccuracy, depending on the year considered.

Map 4 shows the distribution of mammal concentrations, penguin colonies and southern giant petrel nesting sites in the ASPA. Due to the above mentioned variability of nesting sites, the fact that some of them are widely scattered around the ASPA, and the scale of the map, the position of other bird colonies were not included in Map 4.

There is a relatively abundant development of vegetal communities in the Area, dominated by lichens, especially in the boulder area close to the beaches and mosses, on the flat surfaces of former beaches. The long term research and monitoring programs could be jeopardized by accidental anthropical disturbance, which might end up by destroying the vegetation and the soils, as well as the disturbance of nesting birds and breeding mammals.

6(ii) Restricted zones within the Area

None.

6(iii) Location of structures within the Area

There is a small Argentine refuge (called Elefante) located around 1,000 m northeast from Point Stranger, often used as a resting area by groups of scientists. The refuge occupies a surface of around 25 m² and its capacity has been calculated for 2.

Outside the Area there is also a small shelter (called Albatros), on the cliff overlooking the eastern shore, around 50 m high from the beach and less than one km E-SE from the Elefante Refuge. As far as Jubany Base facilities are concerned, they are located around 500 m from the access area to the ASPA, from the inner portion of Potter Cove.

Likewise, there are two signs, both of them on Mirounga Point, warning about the entrance to the Protected Area.

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

- ASPA No. 125, Fildes Peninsula, King George Island (25 de Mayo/Rey Jorge), South Shetland islands lies about 20km to the east.
- ASPA No. 128, Western Shore of Admiralty Bay, King George Island (25 de Mayo/Rey Jorge), South Shetland Islands lies about 10 km northeast.
- ASPA No. 133, Harmony Point, Nelson Island, lies about 30 km west-southwest.

7. Permit Conditions

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

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

- it is issued only for scientific purposes, in accordance with the objectives of the Management Plan that cannot be served elsewhere;
- the actions permitted will not jeopardize the natural ecological system in the Area;
- any management activities (inspection, maintenance or revision) are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or authorized copy, is carried by the main scientist authorized to enter the Area; and
- a report be supplied to the appropriate national authority mentioned in the Permit.

7(i) Access to and movements within the Area

- Any access to the Area will be possible with a Permit delivered by an appropriate national authority, and it will only be issued for activities in agreement with the present Management Plan.
- Access to the Area will preferably be on foot. Access to the area is possible from the northern tip, close to the Jubany base helipad, or behind the southern slope of the Three Brothers hill. Access to the Area by sea onto the beaches should be avoided when there is fauna present, especially during the breeding season.
- No vehicles whatsoever are allowed to circulate inside the Area, with the exception of those indispensable for maintaining the shelter. In such a case, access to the ASPA will be through a gentle slope close to the Albatros refuge, and vehicles should be driven avoiding vegetated areas and bird and mammal concentrations. As far as practicable, maintenance activities should be limited to non-breeding seasons.
- Operation of aircraft over the ASPA shall follow, as a minimum standard, the provisions contained in Resolution 2 (2004), "Guidelines for the operation of aircraft over bird colonies". As a general rule, no aircraft is allowed to fly over the ASPA below 610 m (2000 ft), except in cases of emergency or aeronavigational safety.
- If deemed necessary, and only based on scientific and conservation reasons, access to certain bird nesting sites and mammal colonies may include more restricted conditions between the end of October and the beginning of December. This period is considered particularly sensitive because it is concomitant with the egg-laying of the penguins and breast feeding of the elephant seals.
- Tourism or any other recreational activity is not permitted. Movements within the Area will be made without disturbing the fauna and flora, especially during the breeding season.

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

- scientific research which cannot be conducted elsewhere and which will not jeopardize the natural ecosystem of the Area.

- essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

- No additional structures are to be erected in the Area, or scientific equipment installed, except for essential scientific or management activities, and with a proper Permit.
- Any scientific equipment to be installed in the Area, as well as any research device, shall be approved in a Permit and clearly labelled, indicating the country, name of principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area or risk of disturbing the vegetation or the fauna.
- 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, an extension of the validity of the Permit shall be requested, authorizing those elements to remain there.

7(iv) Location of field camps

- The Parties using the Area will normally be accommodated at Jubany Base.
- When necessary for scientific reasons, the Elefante shelter (located inside the Area) may be used, or the Albatros shelter (outside the Area, though very close).
- Tents will be allowed only to store scientific instruments or equipment or if they are to be used as an observation post.

7(v) Restriction on material and organisms which may be brought into the Area

- No living animals or plant material shall be deliberately introduced into the Area.
- No uncooked poultry products shall be introduced into the Area.
- No herbicides or pesticides shall be brought into the Area. Any other chemicals, which shall be introduced with the corresponding Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. The purpose and type of chemicals shall be documented as well as possible for other scientists to be informed.
- 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.

7(vi) Taking 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 and its record shall, as a minimum standard, be lodged with the Antarctic Master Directory or, in Argentina, at the National Antarctic Data Center (Centro de Datos Nacionales Antárticos).
- Scientists who take samples of any kind will provide evidence that they are familiar with prior taking of samples in order to minimize the risk of a potential duplication.

7(vii) Collection or removal of anything not brought into the Area by the Permit Holder

- Any material of the Area may be collected and/or removed from the Area only according to 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(viii) 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 Elefante shelter awaiting removal. Such waste must be stowed away according to Annex III to the Madrid Protocol, labeled as trash and secured against accidental loss.

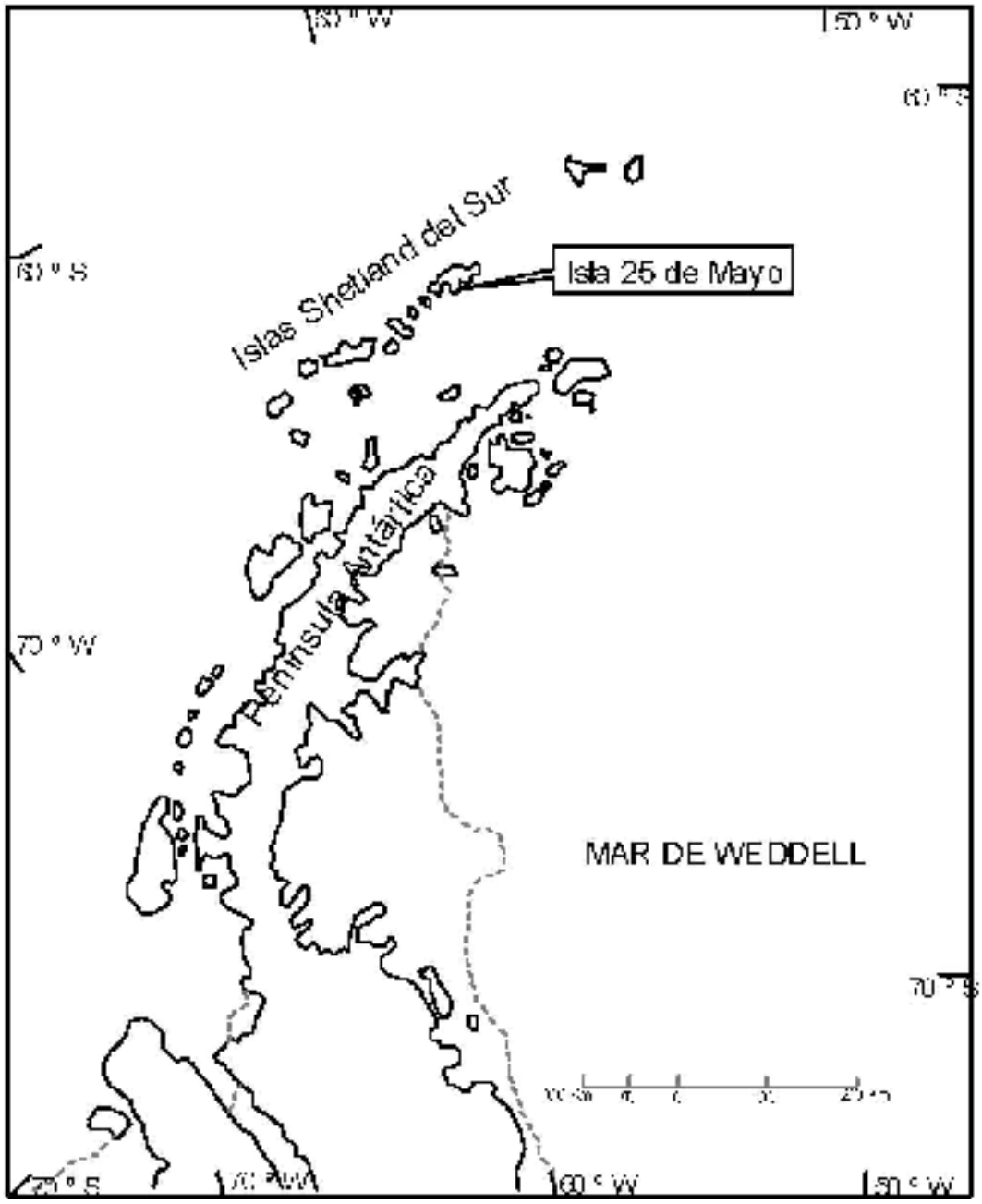
7(ix) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

- Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, including the collection of plant material and animals for scientific purposes, to erect or maintain notice boards and any other management measures.
- All scientific structures and instrumentation, including research markers, installed in the Area must be authorized in a permit and clearly identified by country, name of principal researcher and year of installation.
- Research markers and structures must be removed at or before the expiry of the Permit. If specific scientific projects cannot be concluded within the permitted time, applications must be made for an extension to leave the items *in situ*.
- When it is necessary for scientific purposes, signs can be installed at the locations where experiments are being carried out.

7(x) Requirements for reports

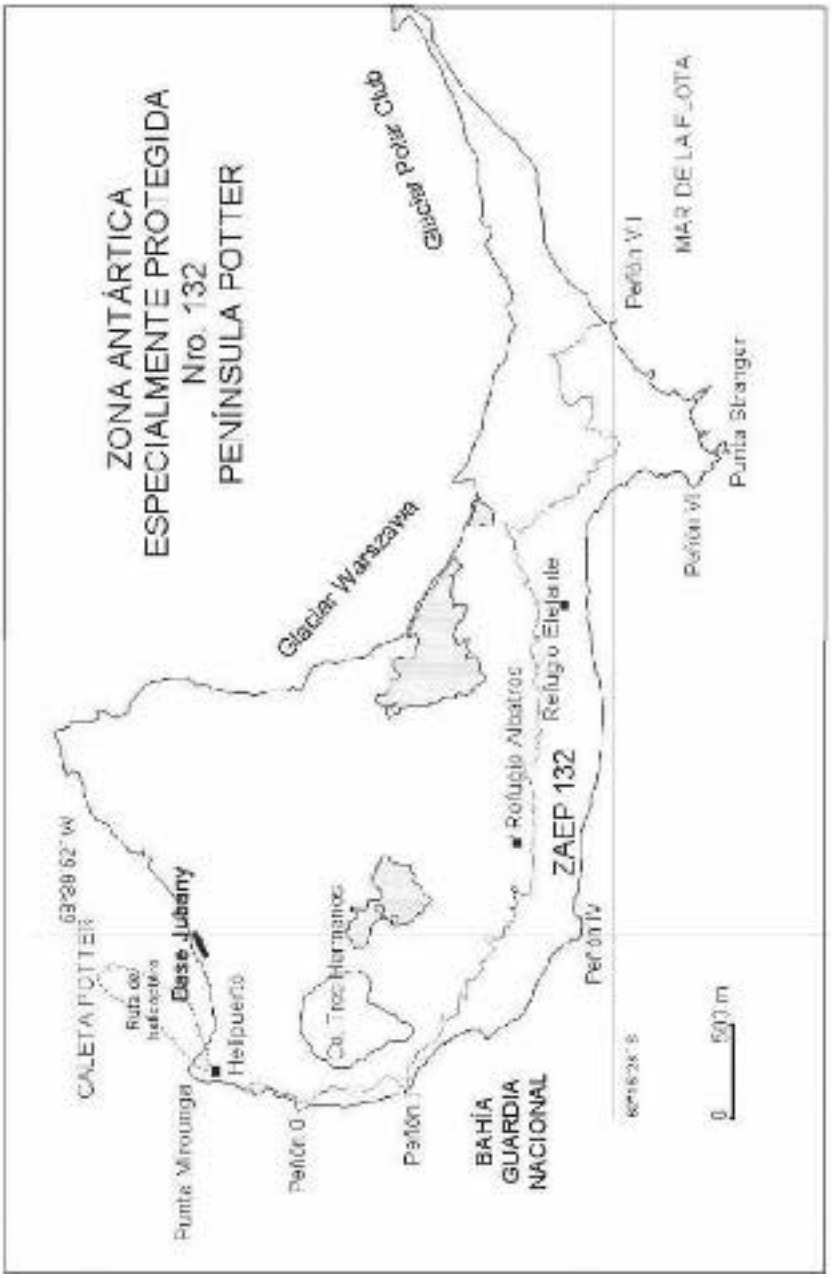
The principal Permit Holder for each Permit issued shall submit a report of activities conducted in the Area once the activity has been finalized. Such a report shall use the form submitted together with the Permit, and then sent to the authority that issued the Permit. The records of ASPA permits and post-visit reports will be Exchanged with the other Consultative Parties, as part of the Information Exchange system, as specified in Article 1 of Annex V. Such reports should be stored and made accessible to all interested Parties, SCAR, CCAMLR, and COMNAP, to provide the necessary information on human activities within the Area needed for proper management to be carried out.

Map 1: General location of Antarctic Specially Protected Area No. 132, Potter Peninsula (King George Island), in relation to the Antarctic Peninsula.

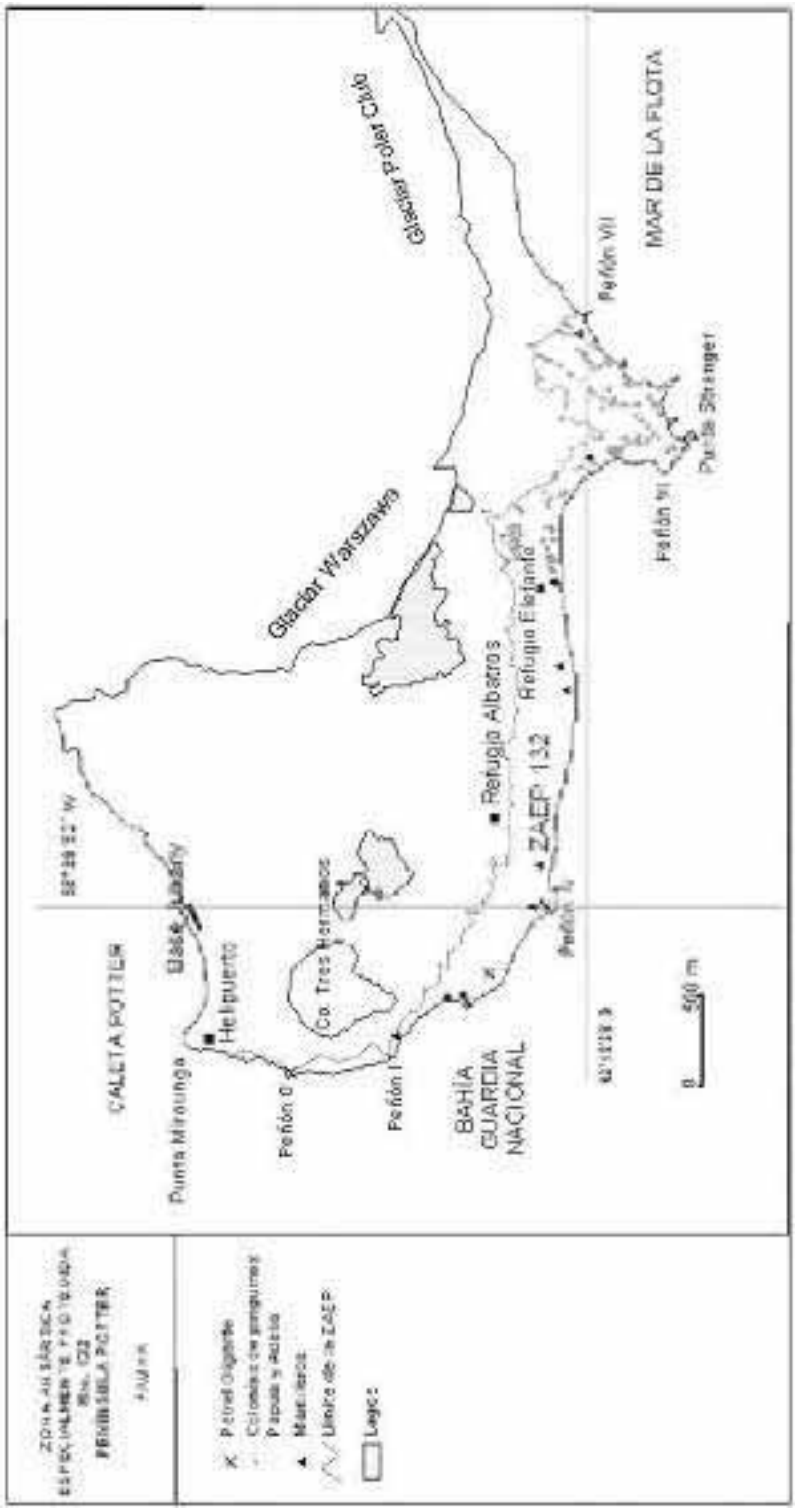


Map 2: Location of Antarctic Specially Protected Area No. 132, Potter Peninsula, in relation to King George and Nelson Islands.

Map 3: Antarctic Specially Protected Area No. 132, Potter Peninsula (ASPA boundaries in finely dotted-gray lines; unnamed lakes in light gray).



Map 4: Distribution of bird and mammal concentrations in the Antartic Specially Protected Area No. 132.



Management Plan for Antarctic Specially Protected Area No. 133

HARMONY POINT, NELSON ISLAND, SOUTH SHETLAND ISLANDS

1. Description of Values to be Protected

This Area (62° 18' S; 59° 14' W) was originally designated as Site of Special Scientific Interest (SSSI) No. 14 in Antarctic Treaty Consultative Meeting (ATCM) Recommendation XIII-8 after a proposal by Argentina and Chile, because of its diverse bird community and extensive and varied terrestrial vegetation cover.

During the XXI Antarctic Treaty Consultative Meeting (Christchurch, 1997), a revised Management Plan was adopted for the Area, following the format established by Annex V to the Madrid Protocol and according to Measure 3 (1997). During the XXV Antarctic Treaty Consultative Meeting (Warsaw, 2002) and once the Annex entered into force, the *Site of Special Scientific Interest* No. 14 became, by virtue of Measure 1 (2002), *Antarctic Specially Protected Area* No. 133.

The values to be protected in the Area are related to the composition and biological diversity of the site. The Area is an excellent example of the maritime Antarctic communities of birds and land ecosystems present in the South Shetland Islands, allowing to carry out long term research programs without damage or harmful interference.

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. The Area supports a large giant petrel colony (*Macronectes giganteus*) colony, a species which is highly sensitive to any kind of human disturbance and is decreasing in many sites in Antarctica. The seabird colonies are still important for scientific purposes. There is copious vegetation that has grown over different types of soils and characterized by the presence of moss, lichens and fungi. To a lesser extent, it is possible to find two species of vascular plants. As vegetation is one of the factors responsible for soil formation, in protecting the Area one makes sure the development of future research linked to the soils and the flora present in the Area are guaranteed.

2. Aims and Objectives

Management of ASPA No. 133 aims at:

- preserving the community of birds and the terrestrial ecosystem;
- preventing unnecessary human disturbance;
- permitting scientific research on birds and the terrestrial ecosystem without any interferences, in order to provide a baseline for the study of natural variability; and
- permitting the development of any other scientific research provided it does not compromise the values for which the Area is being protected.

3. Management Activities

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

- the staff to be posted at Harmony Point will be specifically trained on the conditions of the Management Plan;
- the circulation will only take place on vegetation-free areas and taking a wide berth from the fauna, except when the scientific projects specifically mention otherwise and provided the corresponding harmful interference permits have been issued;
- collection of samples will be limited to the minimum required for the authorized scientific research plans;
- visits shall be made as necessary to ensure management and maintenance measures are adequate; and
- all markers, signs and structures erected within the Area for scientific or management purposes will be properly secured and maintained in good condition.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Maps 1 and 3 are attached at the end of the present Management Plan. Map 1 shows the location of Nelson Island in relation to the South Shetland Islands and the Antarctic Peninsula. Map 2 shows the location of ASPA No. 133 on Nelson Island. Map 3 shows the extent of the Area, including Harmony Point and the Toe, while Map 4 shows the distribution of bird concentrations at Harmony Point.

6. Description of the Area

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

Geographical coordinates and boundaries

This Area is located on the west coast of Nelson Island, between King George (25 de Mayo/Rey Jorge) Island to the Northeast and Robert Island to the Southwest (62° 18’ S; 59° 14’ W) and includes Harmony Point and the Toe, the adjacent ice and surrounding marine zone within the rectangle shows on Maps 2 and 3.

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 m 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 height 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: 3347 pairs of gentoo penguins (*Pygoscelis papua*), 89685 pairs of chinstrap penguins (*Pygoscelis antarctica*), 746 pairs of southern giant petrels (*Macronectes giganteus*), 479 pairs of cape petrel (*Daption capense*), 45 pairs of blue eyed shag (*Phalacrocorax atriceps*), 144 pairs of snowy sheathbill (*Chionis alba*), 71 pairs of skuas (61 pairs of Antarctic skuas (*Catharacta antarctica*) and 11 of Polar skuas), 128 pairs of Dominican gull (*Larus dominicanus*) and between 100 and 150 individuals of Antarctic terns (*Sterna vittata*).

Other seabirds nesting in the Area are the Wilson's storm petrel (*Oceanites oceanicus*) and the black-bellied storm petrel (*Fregetta tropica*). Together they represent around 1000 pairs. Map 4 shows the distribution of bird concentrations at Harmony Point.

There are usually 3 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 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), including, although to a lesser degree, two vascular plant species (*Deschampsia antarctica* and *Colobanthus quitensis*), 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(ii) Restricted zones within the Area

There are no prohibited zones within the Area, but access to bird breeding areas should be restricted during the breeding season (September to March). In order to avoid damage to the vegetation, access on foot should take place on sectors deprived of vegetal coverage.

6(iii) Location of structures within the Area

There is a small refuge used by the scientific teams, and a storage building (with approximate surfaces of 30 m² and 12 m² respectively). The installations are used only during spring and summer. There is a Chilean radio beacon for navigating at the westernmost tip of Harmony Point and an Argentine one at the Toe.

6(iv) 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 Island (25 de Mayo/Rey Jorge), South Shetland Islands lies about 23 km north-north-east.
- ASPA No. 128, Western Shore of Admiralty Bay, King George Island (25 de Mayo/Rey Jorge), South Shetland Islands lies about 45 km east-north-east.

- ASPA No. 132, Potter Peninsula, King George Island (25 de Mayo/Rey Jorge), South Shetland Islands lies about 30 km east-north-east.

7. Permit Conditions

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

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

- it is issued only for scientific purposes, in accordance with the objectives of the Management Plan that cannot be served elsewhere;
- the actions permitted will not jeopardize the natural ecological system in the Area;
- any management activities (inspection, maintenance or revision) are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or authorized copy, is carried by the main scientist authorized to enter the Area; and
- a report be supplied to the appropriate national authority mentioned in the Permit.

7(i) Access to and movements within the Area

- Any access to the Area will be possible with a Permit delivered by an appropriate national authority, and it will only be issued for activities in agreement with the present Management Plan.
- Access to Harmony Point area will preferably take place from the sea. The appropriate landing site is almost in front of the shelter, at the end of the cove, on a well protected sand beach with no significant presence of fauna. Access to the navigation beacon located in the west most tip of Harmony Point is only permitted by boat, with landings taking place at the south of the beacon. No access points are specified for the Toe although access is limited to inflatable boats.
- Small aircraft are allowed to land on the glacier, and helicopters are entitled to land but they must not fly over the Area, especially the bird breeding areas. Approach for landing is to take place over the sea, and the landing spot is to be close to the shelter. Map 3 shows the flight path. Operation of aircraft over the ASPA shall follow, as a minimum standard, the provisions contained in Resolution 2 (2004), "Guidelines for the operation of aircraft over bird colonies". As a general rule, no aircraft is allowed to fly over the ASPA below 610 m (2000 ft), except for accessing the Area as specified above and in cases of emergency.
- Tourism and any other recreational activities are not allowed. Movements within the Area are to take place on pre-established routes, particularly during the breeding season. Vehicles are prohibited in the Area.

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

- scientific research which cannot be conducted elsewhere and which will not jeopardize the ecosystem of the Area;
- essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

- No additional structures are to be erected in the Area, or scientific equipment installed, except for essential scientific or management activities, and with a proper Permit.
- Any scientific equipment to be installed in the Area, as well as any research artifact, shall be approved in a Permit and clearly labeled, indicating the country, name of principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area or risk of disturbing the vegetation or the fauna.
- 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, an extension of the validity of the Permit shall be requested, authorizing those elements to remain there.

7(iv) Location of field camps

- If it is necessary to install tents they will have to be located in the immediate vicinity of the existing shelter. No other locations shall be used for this purpose, in order to restrict the human impact.
- Such an exclusion is not valid for installing tents with scientific instruments or materials, or those that are used as an observation base.

7(v) Restriction on material and organisms which may be brought into the Area

- No living animals or plant material shall be deliberately introduced into the Area.
- No herbicides or pesticides shall be brought into the Area. Any other chemicals, which shall be introduced with the corresponding Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. The purpose and type of chemicals shall be documented as well as possible for other scientists to be informed.
- 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.

7(vi) Taking 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 and its record shall, as a minimum standard, be lodged with the *Antarctic Master Directory* or, in Argentina, at the National Antarctic Data Center (*Centro de Datos Nacionales Antárticos*).
- Scientists who take samples of any kind will provide evidence that they are familiar with prior taking of samples in order to minimize the risk of a potential duplication.

7(vii) Collection or removal of anything not brought into the area by the Permit Holder

- Any material of the Area may be collected and/or removed from the Area only according to 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(viii) 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 shelter awaiting removal. Such waste must be stowed away according to Annex III to the Madrid Protocol, labeled as trash and secured against accidental loss.

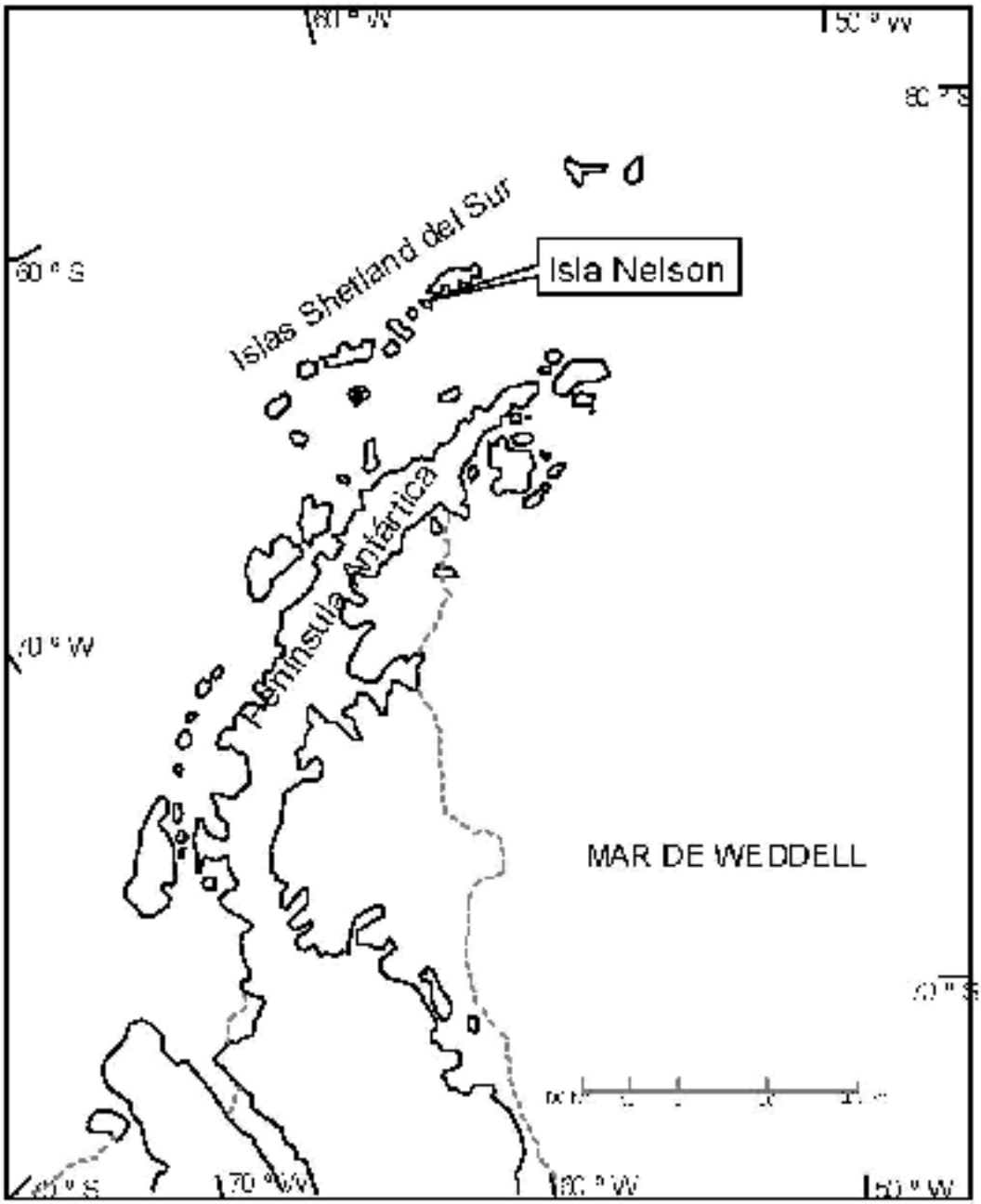
7(ix) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

- Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, including the collection of plant material and animals for scientific purposes, to erect or maintain notice boards and any other management measures.
- All scientific structures and instrumentation, including research markers, installed in the Area must be authorized in a Permit and clearly identified by country, name of principal researcher and year of installation. Research markers and structures must be removed at or before the expiry of the Permit.
- If specific scientific projects cannot be concluded within the permitted time, applications must be made for an extension to leave the items *in situ*. When it is necessary for scientific purposes, signs can be installed at the locations where experiments are being carried out.

7(x) Requirements for reports

The principal Permit Holder for each Permit issued shall submit a report of activities conducted in the Area once the activity has been finalized. Such a report shall use the form submitted together with the Permit, and then sent to the authority that issued the Permit. The records of ASPA permits and post-visit reports will be exchanged with the other Consultative Parties, as part of the Information Exchange System, as specified in Article 1 of Annex V. Such reports should be stored and made accessible to all interested Parties, SCAR, CCAMLR and COMNAP, to provide the necessary information on human activities within the Area needed for proper management to be carried out.

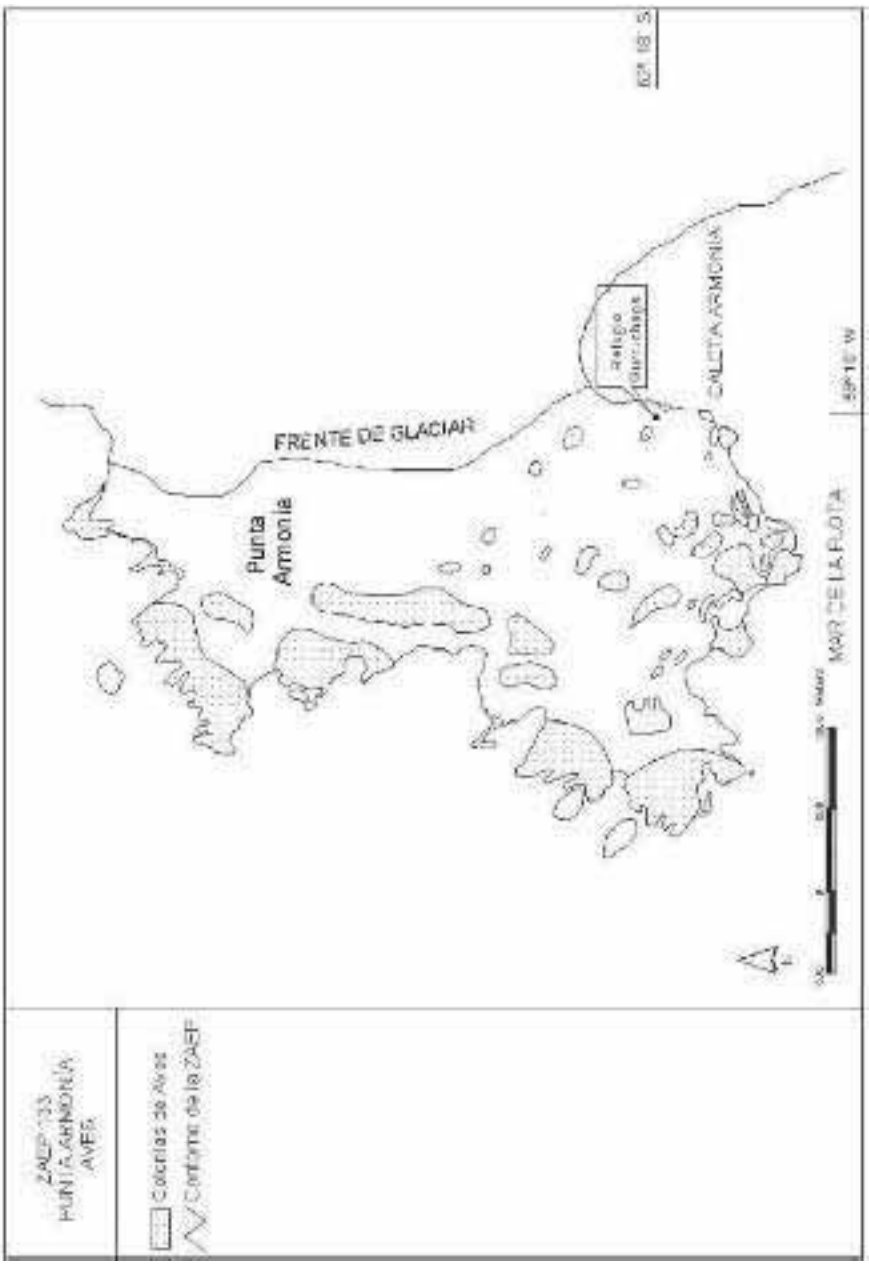
Map 1: Location of Nelson Island in relation to the South Shetland Islands and the Antarctic Peninsula.



Map 2: Location of Antarctic Specially Protected Area No. 133 on Nelson Island.

Map 3: Details of Antarctic Specially Protected Area No. 133, including Harmony Point and the Toe.

Map 4: Bird concentrations in Harmony Point.



Management Plan for Antarctic Specially Protected Area No. 149

CAPE SHIRREFF AND SAN TELMO ISLAND, LIVINGSTON ISLAND, SOUTH SHETLAND ISLANDS

1. Description of values to be protected

Cape Shirreff (62°27'30" S, 60°47'17" W, a peninsula of approximately 3.1 km^2), Livingston Island, South Shetland Islands, was originally designated as Specially Protected Area (SPA) No.11 through Recommendation IV-11 (1966) following the initiative of Chile in the light of results from the first census of Pinnipedia carried out in the South Shetland Islands (Aguayo and Torres, 1966). Formal proposal of the SPA was made by the United States of America. The Area included the ice-free ground of the Cape Shirreff peninsula north of the Livingston Island ice cap margin. Values protected under the original designation included the diversity of plant and animal life, many invertebrates, a substantial population of southern elephant seals (*Mirounga leonina*) and a small colony of Antarctic fur seals (*Arctocephalus gazella*).

Following designation, the size of the Cape Shirreff Antarctic fur seal colony increased to a level at which biological research could be undertaken without threatening continued increase. A survey of the South Shetland Islands and the Antarctic Peninsula identified Cape Shirreff – San Telmo Island as the most suitable site to monitor Antarctic fur seal colonies that could be affected by fisheries around the South Shetland Islands. In order to accommodate the monitoring program the SPA was redesignated as Site of Special Scientific Interest (SSSI) No. 32 through Recommendation XV-7 (1989) following a joint proposal by Chile, the United Kingdom and the United States of America. Designation was on the grounds that the "presence of both Antarctic fur seal and penguin colonies, and of krill fisheries within the foraging range of these species, make this a critical site for inclusion in the ecosystem monitoring network being established to help meet the objectives of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). The purpose of the designation is to allow planned research and monitoring to proceed, while avoiding or reducing, to the greatest extent possible, other activities which could interfere with or affect the results of the research and monitoring programme or alter the natural features of the Site". The boundaries were enlarged to include San Telmo Island and associated nearby islets. Following a proposal prepared by Chile and USA, the Area was subsequently designated as CCAMLR Ecosystem Monitoring Program (CEMP) Site No. 2 through CCAMLR Conservation Measure 82/XIII (1994), with boundaries identical to SSSI No. 32.

The current Management Plan reaffirms the exceptional scientific and monitoring values associated with the large and diverse populations of seabirds and pinnipeds which breed within the Area, and in particular those of the Antarctic fur seal colony. The Antarctic fur seal colony is the largest in the Antarctic Peninsula region and is the most southerly that is large enough to study growth, survival, diet, reproduction parameters: it numbered around 20,000 individuals in 2003-2004. Monitoring of the Antarctic fur seal colony began in 1965 (Aguayo and Torres, 1966; 1967) and seasonal data are available from 1991, making this one of the longest continuous Antarctic fur seal monitoring programs. As part of the CEMP, monitoring is established to detect and avoid possible adverse effects of fisheries on dependant species such as pinnipeds and seabirds, as well as target species such as Antarctic krill (*Euphausia superba*). Long-term studies are assessing and monitoring the survival, feeding ecology, growth, condition, reproduction, behavior, vital rates, and abundance of pinnipeds and seabirds that breed within the Area. Data from these studies will be compared alongside

environmental and other biological data and fisheries statistics in order to help identify possible cause-effect relationships between fisheries and pinniped and seabird populations.

In 2001 imprints of megaflora were discovered in rocks incorporated within moraines of the Livingston Island glacier (Palma-Heldt *et al.*, in review 2004) (Map 2). The fossiliferous rocks are of two different ages, and early interpretations suggest the rocks may assist understanding relationships between nearby fossil localities at Williams Point and Byers Peninsula, also on Livingston Island (Map 1). Studies of the fossils are on-going and it is important that they are protected from over-sampling.

The original values of the protected area associated with the plant and invertebrate communities cannot be confirmed as primary reasons for special protection of the Area because there is a lack of data available describing the communities.

The boundaries of the Area designated under Recommendation XV-7 have been revised in this Management Plan to include a larger marine component and also to incorporate the two new sites where plant fossils were discovered (Maps 1 and 2). The designated Area (9.7 km^2) comprises the entire Cape Shirreff peninsula north of the permanent Livingston Island ice cap, the San Telmo Island group, and the surrounding and intervening marine area enclosed within 100 m of the coast of the Cape Shirreff peninsula and of the outer islets of the San Telmo Island group. The boundary extends from the San Telmo Island group to the south of Mercury Bluff, and includes the adjacent part of the Livingston Island permanent ice cap where the fossil discoveries were recently made.

2. Aims and objectives

Management at Cape Shirreff aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance;
- avoid activities that would harm or interfere with CEMP research and monitoring activities;
- allow scientific research on the ecosystem and physical environment in the Area associated with the CEMP;
- allow other scientific research within the Area provided it is for compelling reasons which cannot be served elsewhere and provided it will not compromise the values for which the Area is protected;
- allow archaeological research and measures for artifact protection, while protecting the historic artifacts present within the Area from unnecessary destruction, disturbance, or removal;
- minimize the possibility of introduction of alien plants, animals and microbes to the Area; and
- allow visits for management purposes in support of the aims of the management plan.

3. Management activities

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

- Copies of this management plan, including maps of the Area, shall be made available at the following locations:
  a. accommodation facilities at Cape Shirreff;
  b. Saint Kliment Ohridski Station (Bulgaria), Hurd Peninsula, Livingston Island;

c. Arturo Prat Station (Chile), Discovery Bay/Chile Bay, Greenwich Island; and

d. Base Juan Carlos I (Spain), Hurd Peninsula, Livingston Island.

- A sign showing the location and boundaries of the Area with clear statements of entry restrictions should be placed at Módulo Beach to help avoid inadvertent entry.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition.
- 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.

4. Period of Designation

Designated for an indefinite period.

5. Maps

- Map 1: Cape Shirreff and San Telmo Island, ASPA No. 149, in relation to Livingston Island, showing the location of Base Juan Carlos I (Spain) and Saint Kliment Ohridiski Station (Bulgaria), and the location of the closest protected area, Byers Peninsula (ASPA No. 126), also on Livingston Island.

  Map specifications: Projection: Lambert Conformal Conic; Spheroid: WGS84; Standard parallels: 1st 60°00' S; 2nd 64°00' S; Central Meridian: 60°45' W; Latitude of Origin: 62°00' S; Horizontal accuracy: < ±200 m. Bathymetric contour interval 50 m and 500 m; vertical accuracy unknown. Data sources: land features from SCAR Antarctic Digital Database v. 4.0 (2002); bathymetry supplied by D. Demer & AMLR, NOAA, USA (2002).

  Inset: the location of Map 1 in relation to the South Shetland Islands and the Antarctic Peninsula.
- Map 2: Cape Shirreff and San Telmo Island, ASPA No. 149, protected area boundary and access guidelines.

  Map specifications: as per Map 1, except the vertical contour interval is 10 m and the horizontal accuracy is expected to be greater than ±5 m. Data source: from digital data supplied by Instituto Antártico Chileno (INACH) (2002) (Torres *et al*., 2001).
- Map 3: Cape Shirreff, ASPA No. 149: breeding wildlife and human features.

  Map specifications and data source: as per Map 2 with the exception of the vertical contour interval, which is 5 m.

6. Description of the Area

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

General description

Cape Shirreff (62°27’30" S, 60°47’17" W) is situated on the northern coast of Livingston Island, the second largest of the South Shetland Islands, between Barclay Bay and Hero Bay (Map 1). The cape lies at the northern extremity of an ice-free peninsula of low-lying, hilly relief. To the west of the

peninsula lies Shirreff Cove, to the east Black Point, and to the south lies the permanent ice cap of Livingston Island. The peninsula has an area of approximately 3.1 km², being 2.6 km from north to south and ranging from 0.5 to 1.5 km from east to west. The interior of the peninsula comprises a series of raised beaches and both rounded and steep-sided hills, rising to a high point at Toqui Hill (82 m) in the central northern part of the peninsula. The western coast is formed by almost continuous cliffs 10 to 15 m high, while the eastern coast has extensive sand and gravel beaches.

A small group of low-lying, rocky islets lie approximately 1200 m west of the Cape Shirreff peninsula, forming the western enclosure of Shirreff Cove. San Telmo Island, the largest of the group, is 950 m in length, up to 200 m in width, and of approximately 0.1 km² in area. There is a sand and pebble beach on the southeastern coast of San Telmo Island, separated from a sand beach to the north by two irregular cliffs and narrow pebble beaches.

Boundaries

The designated Area comprises the entire Cape Shirreff peninsula north of the permanent Livingston Island ice cap, the San Telmo Island group, and the surrounding and intervening marine area (Map 2). The marine boundary encloses an area that extends 100 m from, and parallel to, the outer coastline of the Cape Shirreff peninsula and the San Telmo Island group. In the north, the marine boundary extends from the northwestern extremity of the Cape Shirreff peninsula to the southwest for 1.4 km to the San Telmo Island group, enclosing the intervening sea within Shirreff Cove. The western boundary extends southwards for 1.8 km from 62°28' S to 62°29' S, passing around the western shore of a small island and proceeding a further 1.2 km south-east to the shore of Livingston Island at 62°28'30" S, which is approximately 300 m south of Mercury Bluff. From this point on the coast, the southern boundary extends approximately 300 m due east to 60°49' W, from where it proceeds in a northeasterly direction parallel to the coast for approximately 2 km to the ice sheet margin at 60°47' W. The southern boundary then extends due east for 600 m to the eastern coast. The eastern boundary is marine, following the eastern coastline 100 m from the shore. The boundary encompasses an area of 9.7 km² (Map 2).

Meteorology

Meteorological records for Cape Shirreff have been collected for a number of years by Chilean and US scientists. Data for recent summer seasons (4 Dec - 24 Feb, 1998-99, 1999-2000 and 2000-01) recorded a mean daily air temperature of between 2.0°C and 2.5°C (Goebel et al. 2000; 2001). Precipitation recorded in these seasons (21 Dec - 24 Feb) ranged from 56.0 mm (recorded on 36 days in 2000-01) to 59.6 mm (recorded on 43 days in 1998-99).Year-round meteorological data have not been collected at Cape Shirreff. The peninsula is snow-covered for much of the year, but is usually mostly snow-free by the end of the summer. The peninsula is particularly exposed to weather from the Drake Passage in the north and northwest, the directions from which winds prevail.

Geology, Geomorphology and soils

The geology at Cape Shirreff has not been studied in detail. The Cape Shirreff peninsula is predominantly a raised marine platform, 46 to 53 m above sea level, formed of inclined lava flows belonging to the Younger Volcanic Group of the Middle Jurassic to Lower Cretaceous (Bonner and Smith, 1985). The rocks are volcanic and volcaniclastic, including greenish andesite, basalt lavas, tuffs and agglomerates. The bedrock is largely covered by weathered rock and glacial deposits. Two lower platforms, covered with rounded water-worn pebbles, occur at elevations of approximately 7-9 m and 12-15 m a.s.l (Hobbs, 1968).

A fossilized wood specimen belonging to the *Araucariaceae* family (*Araucarioxylon sp*.) was recorded from Cape Shirreff (Torres, 1993). It is similar to fossils found at Byers Peninsula (ASPA No. 126), a

site with rich fossil flora and fauna 20 km to the southwest. Several fossil specimens have also been found at the northern extremity of the Cape Shirreff peninsula. In 2001-02 fossiliferous rocks of two different ages were discovered incorporated within frontal and lateral moraines of the Livingston Island glacier (Palma-Heldt et al., in review 2004) (Map 2). Rocks in the first group are assigned to the Carnian-Lias (Upper Triassic-Lower Jurassic), and the dominant plant taxa are *Cladophlebis oblonga* Halle, *C. antarctica* Nathorst, *Taeniopteris* Brongniart, *Goeppertella neuqueniana* Herbst, *Coniopteris cf. hymenophylloides* Brongniart, S*phenopteris metzgerioides* Harris, and *S. anderssonii* Halle. The second group consists of rocks assigned to the Lower Cretaceous, and is dominated by conifers from the Araucareaceae Family and *Ptilophyllum acutifolium* Morris.

There is little information on the soils of Cape Shirreff. They are mainly fine ash and scoria and are highly porous. The soils support a sparse vegetation and are enriched by bird and seal colonies which inhabit the Area.

Streams and lakes

There is one permanent lake on Cape Shirreff, located north and at the base of Toqui Hill (Map 3). The lake is approximately 2-3 m deep and 12 m long at full capacity, diminishing in size after February (Torres, 1995). Moss banks grow on surrounding slopes. There are also several ephemeral ponds and streams on the peninsula, fed by snow-melt, especially in January and February. The largest of the streams is found draining southwestern slopes toward the coast at Yamana Beach.

Vegetation and invertebrates

Although a comprehensive survey of the vegetation communities at Cape Shirreff has not been undertaken, Cape Shirreff appears to be less well vegetated than many other sites in the South Shetland Islands. Observations to date have recorded one grass, five species of moss, six of lichen, one fungi and one nitrophilous macroalgae (Torres, 1995).

Patches of Antarctic hairgrass (*Deschampsia antarctica*) can be found in some valleys, often growing with mosses. Mosses are predominantly found inland from the coast. In a valley running northwest from Half Moon Beach, there is a moderately well-developed wet moss carpet of *Warnstorfia laculosa* (=*Calliergidium austro-stramineum,* also =*Calliergon sarmentosum*) (Bonner 1989, in Heap, 1994). In areas with better drainage, *Sanionia uncinata* (=*Drepanocladus uncinatus*) and *Polytrichastrum alpinum* (=*Polytrichum alpinum*) are found. The raised beach areas and some higher plateaus have extensive stands of the foliose nitrophilous macroalga *Prasiola crispa*, which is characteristic of areas enriched by animal excreta and has been observed to replace moss-lichen associations damaged by fur seals (Bonner 1989, in Heap, 1994).

The six lichen species thus far described at Cape Shirreff are *Caloplaca* spp, *Umbilicaria antarctica*, *Usnea antarctica*, *U. fasciata*, *Xanthoria candelaria* and *X. elegans*. The fruticose species *Umbilicaria antarctica*, *Usnea antarctica* and *U. fasciata* form dense growths on cliff faces and on the tops of steep rocks (Bonner 1989, in Heap, 1994). The bright yellow and orange crustose lichens *Caloplaca* spp, *Xanthoria candelaria* and *X. elegans* are common beneath bird colonies and are also present with the fruticose species. The identity of the single recorded fungal species is unknown.

The invertebrate fauna at Cape Shirreff has not been described.

Breeding birds

The avifauna of Cape Shirreff is diverse, with ten species known to breed within the Area, and several non-breeding species present. Chinstrap (*Pygoscelis antarctica*) and gentoo (*P. papua*) penguins breed within the Area; Adélie penguins (*P. adeliae*) have not been observed to breed on Cape Shirreff or San Telmo Island, although are widely distributed throughout the region. Both the chinstrap

and gentoo penguins are found in small colonies on the northeastern and northwestern coasts of Cape Shirreff peninsula (Map 3). In 2000-01 there were 29 active breeding sub-colonies – 16 chinstrap, seven gentoo, and six with both species (Taft et al. 2001) – although the number of the sub-colonies and their composition show some inter-annual variation. In general, the chinstrap penguins nest on higher escarpments, although are also found breeding on small promontories near the shore. Gentoo penguins tend to breed on more gentle slopes and rounded promontories. Data available on penguin numbers are presented in Table 1.

Several other species breed within the Area (Map 3), although data on numbers are intermittent. Kelp gulls (*Larus domincanus*) and brown skuas (*Catharacta loennbergi*) nest in abundance along the entire coastline of the Area. In 2000 there were 25 and 22 breeding pairs of these species respectively (Wayne Trivelpiece, U.S. Antarctic Marine Living Resources Program, pers. comm. 2000; Saxer et al. 2003; Shill et al. 2003; Taft et al. 2001). Sheathbills (*Chionis alba*) nest in two places: one pair has been recorded nesting on the western coast of the Cape Shirreff peninsula; a second pair has been observed breeding among rocks at the northern beach on San Telmo Island, near an Antarctic fur seal breeding site (Daniel Torres, Instituto Antartico Chileno, pers. comm. 2002). Antarctic terns (*Sterna vittata*) breed in several locations, which have been observed to vary from year to year. Since 1990-91 a small colony of approximately 11 pairs of Antarctic shags (*Phalacrocorax [atriceps] bransfieldensis*) has been observed breeding on Yeco Rocks, on the western coast of the peninsula (Torres, 1995). Cape petrels (*Daption capense*) breed on cliffs on the western coast of the Area; 14 pairs were recorded in January 1993, nine in January 1994, three in January 1995 and eight in 1999. Wilson's storm petrels (*Oceanites oceanicus*) also breed on the western coast of the Area. Black-bellied storm petrels (*Fregetta tropica*) have been observed to breed near the field camp on the eastern coast. A large number of non-breeding southern giant petrels (*Macronectes giganteus*) frequent the Area in the summer, although a report of a breeding colony on the peninsula (Bonner 1989, in Heap 1994) is incorrect (Daniel Torres, Instituto Antartico Chileno, pers. comm. 2002). Other bird species recorded but not breeding within the Area include macaroni penguins (*Eudyptes chrysolophus*), king penguins (*Aptenodytes patagonicus*) snow petrels (*Pagadroma nivea*), white-rumped sandpipers (*Calidris fuscicollis*), black-necked swan (*Cygnus melanocorypha*), and the heron *Bubulcus ibis* (Torres, 1995; Olavarría et al., 1999).

Table 1: Chinstrap (*Pygoscelis antarctica*) and gentoo (*P. papua*) penguin numbers at Cape Shirreff.

Year	**Chinstrap (pairs)**	**Gentoo (pairs)**	**Source**
1958	2000 (N3[1])	200-500 (N11)	Croxall and Kirkwood, 1979
1981	2164 (A4)	843 (A4)	Sallaberry and Schlatter, 1983 [2]
1987	5200 (A3)	300 (N4)	Woehler, 1993
1997	6907 (N1)	682 (N1)	Hucke-Gaete *et al.* 1997a
1999-00	7744 (N1)	922 (N1)	AMLR data, Carten *et al.* 2001
2000-01	7212 (N1)	1043 (N1)	AMLR data, Taft *et al.* 2001

1. Alphanumeric code refers to the type of count, as in Woehler (1993).

2. Reported data did not specify species. It has been assumed that the higher number referred to Chinstrap penguins. Data were reported as individuals, which have been halved to derive 'pairs' in the table.

Breeding mammals

Cape Shirreff and San Telmo Island are presently the site of the largest known breeding colony of the Antarctic fur seal (*Arctocephalus gazella*) in the Antarctic Peninsula region. Antarctic fur seals were once abundant throughout the South Shetland Islands but were hunted to local extinction between 1820 and 1824. The next observation of Antarctic fur seals at Cape Shirreff was on 14 January 1958, when 27 animals were recorded, including seven juveniles (Tufft, 1958). The following season, on 31 January 1959, a group of seven adult males, one female and one male pup were recorded, along with one dead male pup. A second female arrived three days later, and by mid-March 32 Antarctic fur seals were present. The colony has continued to increase in size, as shown in Table 2. Antarctic fur seal breeding sites at Cape Shirreff are concentrated around the coastline of the northern half of the peninsula (Map 3). At San Telmo Island, breeding is concentrated at either end of the island, with juveniles commonly found near the middle (Torres, 1995). A small number of southern elephant seals (*Mirounga leonina*) breed in October on beaches Half Moon Bay (U.S. Antarctic Marine Living Resources Program, pers. comm. 2000; Daniel Torres, Instituto Antartico Chileno, pers. comm. 2002). On 2 Nov 1999, 34 pups were counted on beaches below Condor Hill (U.S. Antarctic Marine Living Resources Program, unpublished data). Groups of non-breeding southern elephant seals are also present, while isolated animals, mainly juveniles, may be found on various beaches. Weddell seals (*Leptonychotes weddelli*), leopard seals (*Hydrurga leptonyx)*, and crabeater seals (*Lobodon carcinophagus*) have been observed on the Cape Shirreff peninsula Bengtson et al., 1990; Oliva et al., 1988; Torres, 1995). Monitoring of *H. leptonyx* predation on the *A. gazell*a pup population was initiated in 2001-02 and was recorded during the 2003-04 Antarctic season (Vera et al., 2004).

Table 2: Antarctic fur seal (*Arctocephalus gazella*) numbers at Cape Shirreff and San Telmo Island.

	Cape Shirreff			**San Telmo Island**			**Whole Area Totals**		
	Adults	Pups	Subtotal	Adults	Pups	Subtotal	Adults	Pups	All
1965-66[1]						N/a	38	12	50
1972-73[1]						N/a	1441	300	1741
1986-87[1]	2430	718	3148	3906	1875	5781	6336	2593	8929
1991-92[1]	4771	2973	7744	684	2340	3024	5455	5313	10768
1992-93[1]	5277	3672	8949	2243	2050	4293	7520	5722	13242
1993-94[1]	5868	3474	9342	3214	2583	5797	9082	6057	15139
1994-95[1]	7020	4036	11056	2702	2083	4785	9722	6119	15841
1995-96[1]	7251	4968	12219	3212	2684	5896	10463	7652	18115
1996-97[1]	6901	5689	12590	3765	3326	7091	10666	9015	19681
1997-98[2]	5531	4943	10474	3205	2808	6013	8736	7751	16487
1998-99[3]	8218	5497	13715	2481	3027*	5508*	10699*	8524*	19223*
1999-00[4]	8267	5865	14132	3308	2699	6007	11575	8564	20139
2000-01[5]	9289	5951	15240	2444	2328	4772*	11733*	8279	20012*
2001-02[6]	8389	6453	14842	4224	2124	6348*	12613*	8577	21190*
2002-03[7]	5232	5408	10640	7604	3505*	11109*	12836*	8913*	21749*

N/a : Not available. * Data based on modelled projections.

Sources: (1) Hucke-Gaete et al., 1997b; (2) Hucke-Gaete et al., 1998; (3) Hucke-Gaete et al., 1999; (4) Vallejos et al., 2000; (5) Hucke-Gaete et al., 2001; (6) Acevedo et al., 2002; (7) Vallejos et al., 2003.

II. Measures

Marine environment

The seafloor surrounding the Cape Shirreff peninsula slopes relatively gently from the coast, reaching depths of 50 m approximately 2-3 km from the shore and 100 m at about 6-11 km (Map 1). This relatively shallow and broad submarine ridge extends to the NW for about 24 km before dropping more steeply at the continental shelf edge. The ridge is about 20 km in width and flanked either side by canyons reaching depths of around 300-400 m. Little published information is available on the nearshore marine environment within the Area. There is abundant macroalgae present in the intertidal zone. The limpet *Nacella concinna* is common, as elsewhere in the South Shetland Islands.

Historical features

Intensive sealing at Cape Shirreff between 1820 and 1824 exterminated almost the entire local populations of Antarctic fur seals and southern elephant seals (Smith and Simpson, 1987). In January 1821 60–75 British sealers were recorded living ashore at Cape Shirreff and 95,000 skins were taken during the 1821-22 season. Evidence of the sealers' occupation remains, with ruins of at least one sealers' hut in the northwestern region of the peninsula, and the shoreline of several bays is littered with timbers and sections of wrecked sealers' vessels. Other evidence of sealing activity includes the remains of stoves, pieces of glass bottles, a wooden harpoon, and a handcrafted bone figure, etc. (Torres and Aguayo, 1993). Fildes (1821) reported that sealers found spars and an anchor stock from the Spanish ship San Telmo on Half Moon Beach around the time she was lost. The ship sank in the Drake Passage at around 62°S on 4 September 1819, with 644 persons aboard (Headland, 1989; Pinochet de la Barra, 1991). These were possibly the first people to die in Antarctica, and the event remains the greatest single loss of life yet to occur south of 60°S. A cairn has been erected on the northwestern coast of Cape Shirreff peninsula to commemorate the loss, which is designated as Historic Monument No. 59 (Map 3).

The remains of a camp were found close to the site of present camp facilities (Torres and Aguayo, 1993). On the evidence of the script on items found at the site, the camp is believed to be of Russian origin and date from the 1940-50s, although its exact origins have yet to be determined. Items found include parts of an antenna, electrical wires, tools, boots, nails, battery cells, canned food, and a wooden box covered by a pyramid of stones. Several notes in Russian, dating from later visits, were found in this box.

In January 1985 a human skull was found at Yamana Beach (Torres, 1992), determined to be that of a young woman (Constantinescu and Torres, 1995). In January 1987 part of a human femur was found on the ground surface nearby, inland from Yamana Beach. After a careful surface survey, no other remains were evident at that time. However, in January 1991, another part of a femur was found in close proximity to the site of the earlier (1987) find. In January 1993 an archaeological survey was carried out in the area, although no further human remains were found. The original samples were dated as from approximately 175 years BP, and it was hypothesised they belong to a single individual; DNA analyses are planned to determine whether this is the case (Torres, 1999).

Human activities and impact

The modern era of human activity at Cape Shirreff has been largely confined to science. During the past three decades, the population of Antarctic fur seals in the South Shetland Islands grew to a level at which tagging and other research could be undertaken without threatening the continued existence and growth of the local population. Chilean studies on Cape Shirreff began in 1965 (Aguayo and Torres, 1966, 1967), with a more intensive program initiated by Chilean scientists in 1982, including an ongoing Antarctic fur seal tagging program (Cattan et al., 1982; Torres, 1984; Oliva et al., 1987). United States investigators have conducted pinniped and seabird surveys at Cape Shirreff and San Telmo Island since 1986-87 (Bengtson et al., 1990).

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The seafloor surrounding the Cape Shirreff peninsula slopes relatively gently from the coast, reaching depths of 50 m approximately 2-3 km from the shore and 100 m at about 6-11 km (Map 1). This relatively shallow and broad submarine ridge extends to the NW for about 24 km before dropping more steeply at the continental shelf edge. The ridge is about 20 km in width and flanked either side by canyons reaching depths of around 300-400 m. Little published information is available on the nearshore marine environment within the Area. There is abundant macroalgae present in the intertidal zone. The limpet *Nacella concinna* is common, as elsewhere in the South Shetland Islands.

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II. Measures

CEMP studies at Cape Shirreff began in the mid-1980s, initiated by Chilean and US scientists. Cape Shirreff was designated as a CEMP Site in 1994 to protect the site from damage or disturbance that could adversely affect long-term CEMP monitoring. As part of the CEMP, long-term studies are assessing and monitoring the feeding ecology, growth and condition, reproductive success, behavior, vital rates, and abundance of pinnipeds and seabirds that breed in the Area. The results of these studies will be compared with environmental data, offshore sampling data, and fishery statistics to identify possible cause-effect relationships between krill fisheries and pinniped and seabird populations.

Brucella and herpes virus antibodies were detected in tissue samples taken from Antarctic fur seals at Cape Shirreff over summer seasons from 1998-2001, and Brucella antibodies were also detected in Weddell seal tissue (Blank et al, 1999; Blank et al., 2001a & b). Studies on the mortality of *A. gazella* pups from diseases began in the 2003-04 Antarctic season (Torres and Valdenegro, 2004).

Plastic rubbish was first reported at Cape Shirreff by Torres and Gajardo (1985), and marine debris monitoring studies have been carried out regularly since 1992 (Torres and Jorquera, 1995). Recent surveys have yielded large numbers of articles, mostly of plastic. For example, the 2000-01 season survey recorded a total of 1,774 articles with a total weight of 124.5 kg, almost 98% of which were of plastic and the remainder being of glass, metal and paper. These quantities are comparable to the 1996-97 survey (Torres et al. 1997). It is significant that 34% of the plastic items found in 2000-01 were packing bands, representing approximately 589 bands. Of these, 40 were uncut and another 48 had been knotted into a loop, in contravention of CCAMLR Conservation Measure 63/XV and Annex IV of the Madrid Protocol. Several articles found in this survey were oiled, and some plastic articles were partially burnt. Antarctic fur seal entanglement in marine debris has been recorded frequently at Cape Shirreff (Torres, 1990; Hucke-Gaete et al. 1997c), primarily in fishing equipment such as nylon ropes, net fragments and packing bands. Between 1987-97 a total of 20 Antarctic fur seals were recorded with 'neck collars'. Plastic fibers are also found in kelp gull and chinstrap penguin nests (Torres and Jorquera, 1992), as well as those of sheathbills (Torres and Jorquera, 1994).

6(ii) Restricted and managed zones within the Area

None.

6(iii) Structures within and near the Area

A semi-permanent summer-only research camp has been established on the eastern coast of the Cape Shirreff peninsula, located at the base of Condor Hill (62°28'12" S, 60°46'17" W) (Map 3). Buildings for the camp remain *in situ* year-round. In 2001 the camp comprised a four-person fiberglass cabin (Chile), known as 'Guillermo Mann', and three additional small buildings with accommodation for six known as Cape Shirreff Field Station (US). The Chilean cabin was installed in 1990-91, while the US camp was established in 1996-97. Toilet facilities and storage areas are also present, and tents are erected seasonally nearby as required. The remains of a camp, believed to be of Russian origin, are present near the Chilean and US camps. In other parts of the peninsula, sparse evidence may be found of 19th Century sealers' camps (Smith and Simpson, 1987; Torres, 1993; Stehberg and Lucero, 1996). A cairn (Historic Monument No. 59) has been erected on Gaviota Hill on the northwestern coast to commemorate the loss of those aboard the *San Telmo* in 1819 (Map 3). In 1998-99 a 5x7 m bird observation / emergency hut (62°27'41" S, 60°47'28" W) was installed by US scientists on the northern slopes of Enrique Hill above Bahamonde Beach, close to the penguin colonies (Map 3).

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

The nearest protected areas to Cape Shirreff are Byers Peninsula (ASPA No. 126), which lies about 20 km to the southwest; Port Foster (ASPA No. 145, Deception Island) and other parts of Deception Island (ASPA No. 140), which are approximately 30 km to the south; and 'Chile Bay' (Discovery Bay) (ASPA No. 144), which lies about 30 km to the east at Greenwich Island (Map 1). CEMP Site No. 1 Seal Islands (60°59'S, 55°23'W), the only other CEMP site in the vicinity, is located 325 km to the northeast, 7 km north of Elephant Island.

7. Permit conditions

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

- it is issued only for scientific study associated with the CEMP, or for compelling scientific reasons that cannot be served elsewhere; or
- it is issued for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- the actions permitted will not jeopardize the values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or an authorized copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- permits shall be issued for a stated period.

7(i) Access to and movement within the Area

Access to the Area shall be by small boat, by helicopter, on foot or by vehicle.

BOAT ACCESS

Access by small boats should be at either of the following locations (Map 2):

- the eastern coast of the peninsula at El Módulo Beach, 300 m north of the camp facilities, where a deep channel enables relatively easy access;
- the northern end of Half Moon Beach, on the eastern coast of the peninsula;
- the northern end of Yámana Beach, on the western coast (suitable at high tide only);
- the southern end of the northern beach on San Telmo Island.

Access by small boat at other locations around the coast is allowed, provided this is consistent with the purposes for which a Permit has been granted. Two anchorages have been identified close to the Area; 1600 m north-east of the main camp facilities and approximately 800 m north of San Telmo Island [note: these remain in need of confirmation – positions in the CEMP plan do not conform with those on CEMP maps]. Visitors should, where practicable, avoid landing where pinniped or seabird colonies are present on or near the coast.

AIRCRAFT ACCESS AND OVERFLIGHT

Because of the widespread presence of pinnipeds and seabirds over the Cape Shirreff peninsula during the breeding season (1 November – 31 March), access to the Area by aircraft in this period is strongly discouraged. Where possible and by preference, access should be by small boat. All restrictions on aircraft access and overflight stipulated in this plan shall apply during the period 1 November – 31 March. When necessary for purposes consistent with plan objectives and alternative means of access are unavailable or impractical, aircraft may operate and land within the Area according to strict observance of the following conditions:

- All overflight of the Area for purposes other than access shall be conducted according to the height restrictions imposed in the following table:

Minimum overflight heights within the Area according to aircraft type

Aircraft type	Number of Engines	Minimum height above ground	
		Feet	Meters
Helicopter	1	*2460*	750
Helicopter	2	*3300*	1000
Fixed-wing	1 or 2	*1500*	450
Fixed-wing	4	*3300*	1000

- Helicopter access is prohibited within the Area north of 62°28' S (Map 2), or north of 62°29' S and west of 60°48' W, which includes the areas where the greatest concentrations of wildlife are found;
- Helicopter landing is permitted at two designated sites (Map 2). The landing sites with their coordinates are described as follows:
  (A) the summit of Condor Hill (50 m, or ~150 ft) (62°46’27"S, 60°28’17"W), which is the preferred landing site for most purposes; and
  (B) on the wide flat area on Ancho Pass (25 m), situated between Condor Hill and Selknam Hill (62°46’48"S, 60°28’16"W).
- The designated aircraft approach route is from the south over the Livingston Island ice cap, proceeding from the permanent ice edge north along the main ridgeline of the peninsula for 1200 m (~ 0.65 n. mi.) towards Selknam Hill (50 m, or ~150 ft). From here aircraft should proceed east across Ancho Pass (where landing is permitted, when appropriate) for 700 m (~ .0.4 n. mi.) direct to the summit of Condor Hill (50 m, or ~150 ft). Aircraft should avoid overflight of the hut and beach areas on the eastern side of Condor Hill. The departure route is identical in reverse;
- Weather with a low cloud ceiling often prevails at Cape Shirreff, particularly in the vicinity of the permanent ice cap, which can make snow/ice ground definition difficult to discern from the air. On-site personnel who may be advising on local conditions before aircraft approaches should be aware that a minimum cloud base of 150 m (500 ft) AMSL over the approach zone of the Livingston Island ice cap is necessary in order for access guidelines to be followed;
- Use of smoke grenades to indicate wind direction is prohibited within the Area unless absolutely necessary for safety, and any grenades used should be retrieved.

VEHICLE ACCESS AND USE

Access by vehicle over land may be made to the boundary to the Area. Access by vehicle over sea ice may be made to the shore within the Area. Vehicles are permitted to operate on land only in the coastal zone between Módulo Beach and the Chilean/US camp facilities (Map 3). The use of vehicles elsewhere within the Area is prohibited.

FOOT ACCESS AND MOVEMENT WITHIN THE AREA

With the exception of the restricted use of vehicles described above, movement on land within the Area shall be on foot. Pilots, air, boat or vehicle crew, or other people in aircraft, boats, or vehicles are prohibited from moving on foot beyond the immediate vicinity of their landing site or the hut facilities unless specifically authorised by Permit. Visitors should move carefully so as to minimize disturbance to flora, fauna, and soils, and should walk on snow or rocky terrain if practical, but taking care not to damage lichens. Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects.

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

- Scientific research that will not jeopardize the values of the Area, in particular those associated with the CEMP;
- Essential management activities, including monitoring;
- Restrictions on times and places at which activities may be conducted apply within the Area, and are specified in the relevant sections of this management plan;
- The appropriate authority should be notified of any activities/measures undertaken that were not included in the authorized Permit.

7(iii) Installation, modification or removal of structures

- Structures shall not be erected within the Area except as specified in a Permit.
- The principal camp facilities shall be limited to the area within 200 m of the existing Chilean and US field camps (Map 3).
- Small temporary hides, blinds or screens may be constructed for the purpose of facilitating scientific study of the fauna.
- All structures, scientific equipment or markers installed in the Area must be approved by Permit for a specified period, and adequately identified by country, name of the responsible investigator or agency, and year of installation. All such items should be made of materials that pose minimal risk of harm to fauna or of contamination of the Area. Installation, maintenance, modification or removal of structures shall be undertaken in a manner that minimizes disturbance to flora and fauna, preferably avoiding the main breeding season (1 November–1 March).
- Removal of structures, equipment, hides or markers for which the period specified in the Permit has expired shall be a condition of the Permit.

7(iv) Location of field camps

- Camping is permitted within 200 m of the facilities of the Chilean and US field camps, on the eastern coast of the Cape Shirreff peninsula (Map 3).
- The US bird observation hut on the northern slopes of Enrique Hill (62°27’41" S, 60°47’28" W) may be used for temporary overnight camping for research purposes, although should not be used as a semi-permanent camp.
- Camping is permitted on San Telmo Island when necessary for purposes consistent with plan objectives. The preferred camping location is at the southern end of the northern beach on the island.
- Camping is prohibited elsewhere within the Area.

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

- No living animals, plant material or microorganisms shall be deliberately introduced into the Area and the precautions listed in 7(ix) below shall be taken against accidental introductions.
- Dressed poultry should be free of disease or infection before shipment to the Area and, if introduced to the Area for food, all parts and wastes of poultry shall be completely removed from the Area and incinerated or boiled long enough to kill any potentially infective bacteria or viruses.
- No herbicides or pesticides shall be brought into the Area.
- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel is not to be stored in the Area, unless specifically authorized by Permit for scientific or management purposes.
- Anything introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized.
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material *in situ*.

7(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.
- 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. CEMP research programs in progress within the Area should be consulted before other Permits for taking or harmful interference with animals are granted.

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

- Collection or removal of anything not brought into the Area by the Permit holder shall only be in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs.
- Anything of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorized, may be removed unless the impact of removal is likely to be greater than leaving.

7(viii) Disposal of waste

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

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

- Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, which may involve the collection of limited samples for analysis or review, or for protective measures.
- Any specific sites of long-term monitoring that are vulnerable to inadvertent disturbance should be appropriately marked.
- To help maintain the scientific values found at Cape Shirreff and San Telmo Island visitors shall take special precautions against introductions. Of concern are pathogenic, microbial or plant introductions sourced from other Antarctic sites, including stations, or from regions outside Antarctica. Visitors shall ensure that sampling equipment or markers brought into the Area are clean. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including backpacks, carry-bags and tents) shall be thoroughly cleaned before entering the Area.
- To avoid interference with long-term research and monitoring activities or possible duplication of effort, persons planning new projects within the Area should consult with established programs working at Cape Shirreff, such as those of Chile and the US, before initiating the work.
- In view of the fact that geological sampling is both permanent and of cumulative impact, visitors removing geological samples from the Area shall complete a record describing the geological type, quantity and location of samples taken, which should, at a minimum, be deposited with their National Antarctic Data Centre or with the Antarctic Master Directory.

7(x) Requirements for reports

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

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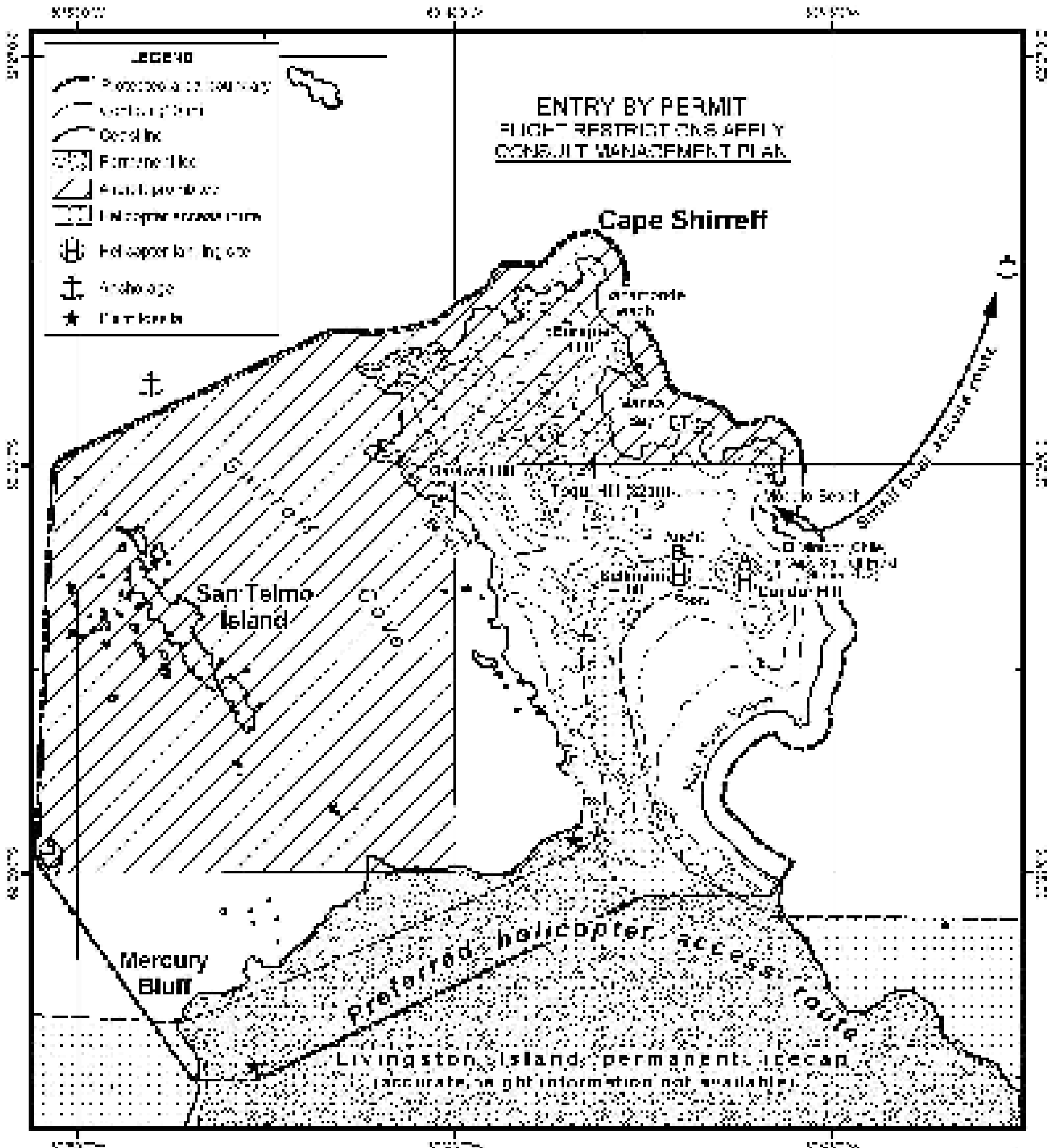
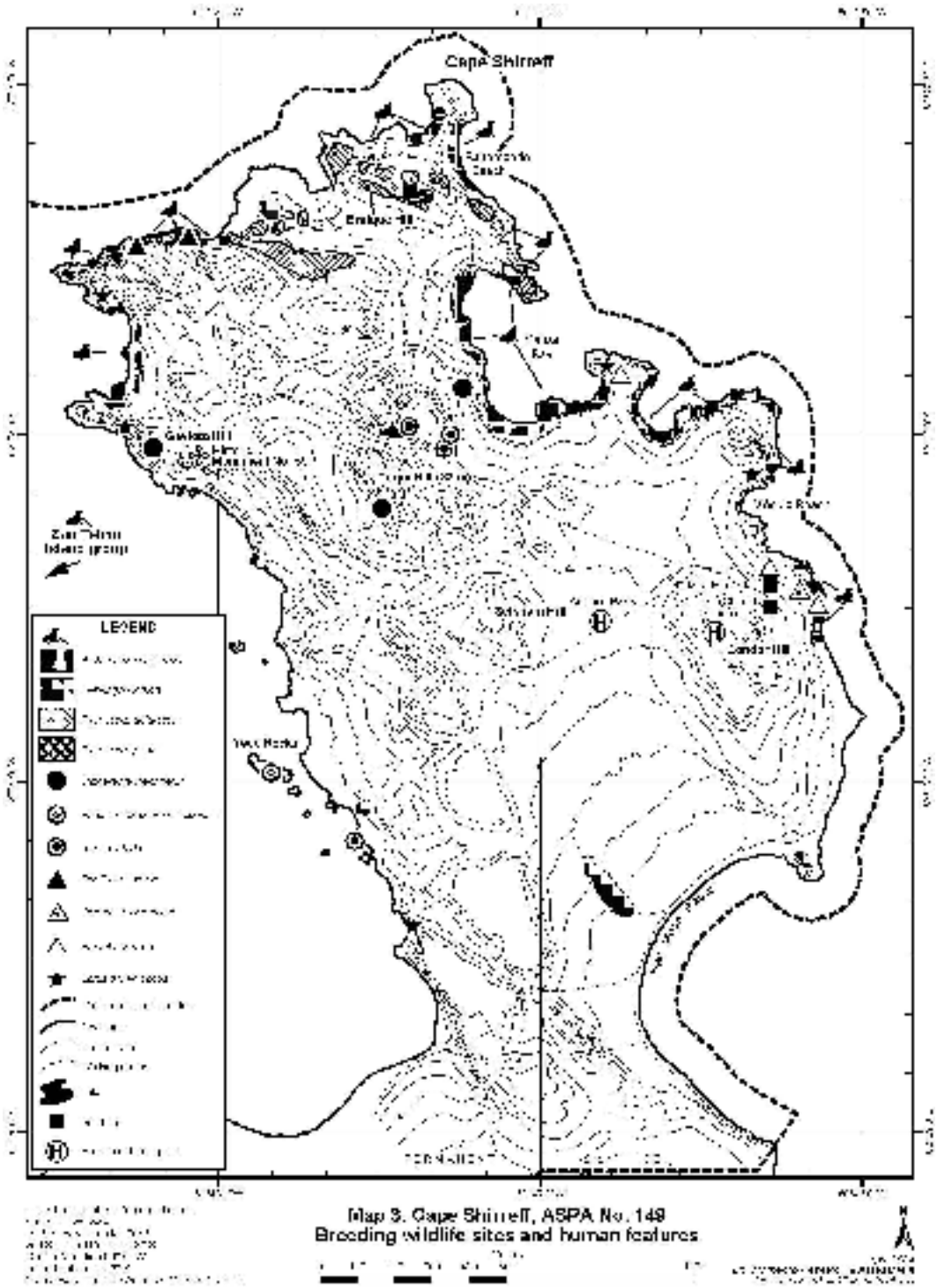
Cape Shirreff
ASPA No. 149
Map 2
Map 1. Cape Shirreff and San Telmo Island
ASPA No. 149, Livingston Island
South Shetland Islands



Map 2. Cape Shirreff and San Telmo Island, ASPA No. 149
Protected area boundary and access guidelines



Map 3. Cape Shirreff, ASPA No. 149
Breeding wildlife sites and human features

Management Plan for Antarctic Specially Protected Area No. 155

CAPE EVANS, ROSS ISLAND

(including Historic Sites and Monuments Nos. 16 and 17,
the historic *Terra Nova* hut of Captain R F Scott and its precincts)

1. Description of Values to be Protected

The significant historic value of this Area was formally recognised when it was listed as Historic Site and Monument No 16 and 17 in Recommendation 9 (1972). An area containing both sites was designated as Specially Protected Area No. 25 in Measure 2 (1997) and redesignated as Antarctic Specially Protected Area 155 in Decision 1 (2002).

The *Terra Nova* hut (Historic Site and Monument No. 16) is the largest of the historic huts in the Ross Sea region. It was built in January 1911 by the British Antarctic *Terra Nova* Expedition of 1910-1913, led by Captain Robert Falcon Scott, RN. It was subsequently used as a base by the Ross Sea party of Sir Ernest Shackleton's Imperial Trans-Antarctic Expedition of 1914-1917.

Historic Site and Monument No. 17 contains the Cross on Wind Vane Hill, (erected in the memory of three members of Shackleton's Ross Sea party who died in 1916). In addition to this, the anchors of the ship *Aurora* from the Imperial Trans-Antarctic Expedition, an instrument shelter, several supply dumps and dog kennels, and numerous artefacts are distributed around the site.

Some of the earliest advances in the study of earth sciences, meteorology, flora and fauna are associated with the *Terra Nova* Expedition based at this site. The data collected can provide a bench mark against which to compare current measurements. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica therefore contribute to both the historic and scientific value of the site.

The Cape Evans site is one of the principal sites of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration, and as such, has considerable historical significance.

2. Aims and Objectives

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

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the area through planned conservation work which may include:
  a. an annual 'on-site' maintenance programme,
  b. a programme of monitoring the condition of artefacts and structures, and the factors which affect them, and
  c. conservation of artefacts to be conducted on and off site;

- allow management activities which support the protection of the values and features of the Area including:
  a. mapping and otherwise recording the disposition of historic items in the hut environs, and
  b. recording other relevant historic data; and
- prevent unnecessary human disturbance to the Area, its features and artefacts through managed access to the Terra Nova hut.

3. Management Activities

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

- A regular programme of conservation work shall be undertaken on the *Terra Nova* hut and associated artefacts in the Area.
- Systematic monitoring shall be put in place to assess the impacts of present visitor limits, and the results and any related management recommendations included in reviews of this Management Plan.
- Visits shall be made as necessary for management purposes.
- National Antarctic Programmes operating in, or those with an interest in, the Area shall consult together with a view to ensuring the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

- Map A: Cape Evans regional map. This map shows the boundaries of the proposed Antarctic Specially Protected Areas with significant topographical features, approaches, field camp sites and helicopter landing sites. It also shows the approximate location of significant historical items within the area. *Inset:* Ross Island showing sites of nearby protected areas and stations.
- Map B: Cape Evans site map. This map shows the approximate location of specific historic artefacts and sites within the Area.

6. Description of the Area

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

Cape Evans is a small, triangular shaped, ice-free area in the south west of Ross Island, 10 kilometres to the south of Cape Royds and 22 kilometres to the north of Hut Point Peninsula on Ross Island. The ice-free area is composed of till-covered basalt bedrock. The designated Area is located on the north western coast of Cape Evans adjacent to Home Beach and centred on Scott's *Terra Nova* hut.

The boundaries of the ASPA are:

- South: a line extending east from a point at 77º 38' 15.47" S, 166º 25' 9.48" E – 20 metres south of the cross on Wind Vane Hill;
- South/west: a line from the reference point above extended to follow the crest of the small ridge descending in a north westerly direction to the shoreline at 77º 38' 11.50" S, 166º 24' 49.47" E;
- North/west: by the shoreline of Home Beach;
- North/east: by the line of the outlet stream from Skua Lake to Home Beach at 77º 38' 4.89" S, 166º 25' 13.46" E;
- East: by the line extending south from the western edge of Skua Lake at 77º 38' 5.96" S, 166º 25' 35.74" E – to intersect with the southern boundary at 77º 38' 15.48" S, 166º 25' 35.68" E.

Skuas (*Catharacta maccormicki*) nest on Cape Evans and Adelie penguins (*Pygoscelis adeliae*) from the rookery at Cape Royds may occasionally transit the Area. Weddell seals have also been seen hauled up on Home Beach.

6(ii) Access to the Area

When safe conditions exist, vehicle approach to the Area can be made across the sea ice. Vehicles should not be taken onto the land. During open water, landings by boat may be made directly in front of the hut at Home Beach. Helicopter landings may be made at either of the existing designated landing sites marked on Maps 1 and 2. One site is approximately 100 metres to the north of the hut, just outside the Area. The other is located adjacent to the New Zealand refuge hut approximately 250 metres beyond the south western boundary of the Area.

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

All structures located within the Area are of historic origin, although a temporary, modern protective enclosure around the magnetic hut remains in place. A major feature of the Area is Scott's Terra Nova hut located on the north western coast of Cape Evans at Home Beach. The hut is surrounded by many historic relics including the anchors from the Aurora, dog skeletons, instrument shelters, dog line, meteorological screen, fuel dump, magnetic hut, coal, stores, rubbish dumps and flag pole. A memorial cross to three members of Shackleton's Ross Sea party of 1914-1917 stands on West Vane Hill. All these features are included within the boundaries of the Area.

A New Zealand refuge hut, camp site and helicopter landing site are situated approximately 250 m to the south west of the Area.

The Greenpeace year-round World Park Base was sited to the north east of Scott's hut from 1987 to 1992. No visible sign of the base remains.

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

- ASPA 121 (previously SSSI No. 1) and
- ASPA 157 (SPA No. 27), Cape Royds are 10 kilometres north of Cape Evans.
- ASPA 122 (SSSI No. 2), Arrival Heights and
- ASPA 158 (SPA No. 28), Hut Point are approximately 20 kilometres south of Cape Evans at Hut Point Peninsula.
- ASPA 130 (SSSI No. 11), Tramway Ridge is approximately 20 kilometres east of Cape Evans.

All sites are located on Ross Island.

6(v) Special Zones within the Area

There are no special zones within the Area.

7. Terms and Conditions for Entry Permits

Entry to the Area is prohibited except in accordance with a Permit. Permits shall be issued only by appropriate national authorities and may contain both general and specific conditions. A Permit may be issued by a national authority to cover a number of visits in a season. Parties operating in the Area shall consult together and with groups and organisations interested in visiting the Area to ensure that visitor numbers are not exceeded.

Permits to enter the site may be issued for a stated period for:

- activities related to conservation, research and/or monitoring purposes;
- management activities in support of the objectives of the Plan;
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Plan.

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

- Control of movement within the Area is necessary to prevent damage caused by crowding around the many vulnerable features within the Area. The maximum number in the Area at any time (including guides and those within the hut) shall be: **40 people**.
- Control of numbers within the hut is necessary to prevent damage caused by crowding around the many vulnerable features within the hut. The maximum number within the hut at any time (including guides) shall be: **12 people**.
- Avoidance of cumulative impacts on the interior of the hut requires an annual limit on visitor numbers. The effects of the current visitor levels (average 1489 per year between 1998 and 2004) suggest that a significant increase could cause significant adverse impacts. The maximum annual number of visitors shall be: **2,000 people**.
- These limits have been set based on current visitor levels and on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). The limits are based on the proposition that any significant increase in the current level of visitor numbers would be detrimental to the values to be protected. An ongoing monitoring programme to assess the effects of visitors is required to provide the basis for future reviews of the Management Plan, in particular whether the current limits on numbers of visitors are appropriate.
- Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct set out in section 7(ii). All tourism, educational and recreational visits must be supervised by an experienced guide nominated by the operator (refer section 7(ix)).
- Helicopter landings are prohibited within the Area as they have the potential to damage the site by blowing scoria and ice particles and to accelerate the abrasion of the hut and surrounding artefacts. Vehicles are prohibited within the Area. Refer to 6(ii) for recommended approaches and landing sites.

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

Activities which may be conducted within the Area include:

- visits for conservation purposes;
- educational and/or recreational visits including tourism; and
- scientific activity which does not detract from the values of the Area.

Visitors should adhere to the following Code of Conduct, except where conservation, research, monitoring or management activities specified in the Permit require otherwise:

- To reduce floor abrasion, thoroughly clean grit and scoria, ice and snow from boots using the brushes provided before entering the hut;
- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;
- Do not touch, move or sit on any items or furniture in the huts - handling artefacts causes damage;
- As many areas are cramped and artefacts can be accidentally bumped, do not wear packs inside;
- When moving around the sites, take great care not to tread on any items which may be obscured by snow;
- Use of combustion style lanterns, naked flames or smoking in or around the huts is strictly forbidden as fire is a major risk; and
- Visits should be recorded in the book provided. This allows times and levels of visitation to be correlated with temperature and humidity data automatically logged inside the hut.

7(iii) Installation, modification or removal of structures

- No new structures are to be erected in the Area, or scientific equipment installed, except for conservation activities as specified in section 3.
- No historic structure shall be removed from the Area, unless specified in a Permit issued in accordance with the provisions of section 7(vii).

7(iv) Location of field camps

- Use of the historic hut for living purposes is not permitted. Camping is prohibited in the Area under any circumstances.
- An existing field camp site is associated with the two New Zealand field shelters located 250 m south west of the Area and should be used by all parties intending to camp in this area.

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

- No living animals, plant material, micro-organisms or soil shall be introduced to the Area. No food products shall be taken into the Area.
- Chemicals may only be introduced for permitted scientific or conservation purposes. Chemicals (including fuel) or other materials are not to be left in the Area, unless required for essential purposes connected with the conservation of the historic structures or associated relics.

- All materials are to be removed when no longer required and before a date to be specified in the relevant Permit.

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

- This activity is prohibited except in accordance with a Permit issued by the appropriate national authority specifically for that purpose under Article 3, Annex II to the Protocol on Environmental Protection.
- Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(vii) Collection or removal of anything not imported by the Permit Holder

- Material may be collected and removed from the Area for conservation reasons consistent with the objectives of this Plan only when specified in a Permit issued by the appropriate national authority.
- Materials which pose a threat to the environment or human health may be removed from the Area for disposal, in accordance with a Permit, where they meet one or more of the following criteria:
  (i) the artefact presents a threat to the environment, wildlife or human health and safety;
  (ii) it is in such poor condition that it is not reasonably possible to conserve it;
  (iii) it does not contribute in any significant way to our understanding of the hut, its occupants or the history of Antarctica;
  (iv) it does not contribute to, or it detracts from, the visual qualities of the site or the hut, and/or;
  (v) it is not a unique or rare item;

  and where such action is:
  (i) undertaken by parties with appropriate heritage conservation expertise; and
  (ii) part of an overall plan for conservation work at the site.
- National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.
- Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a Permit for storage in a controlled environment until such time as they can safely be returned to the Area.
- Samples of soil and other natural materials may be removed for scientific purposes only in accordance with an appropriate Permit.

7(viii) Disposal of waste

- All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

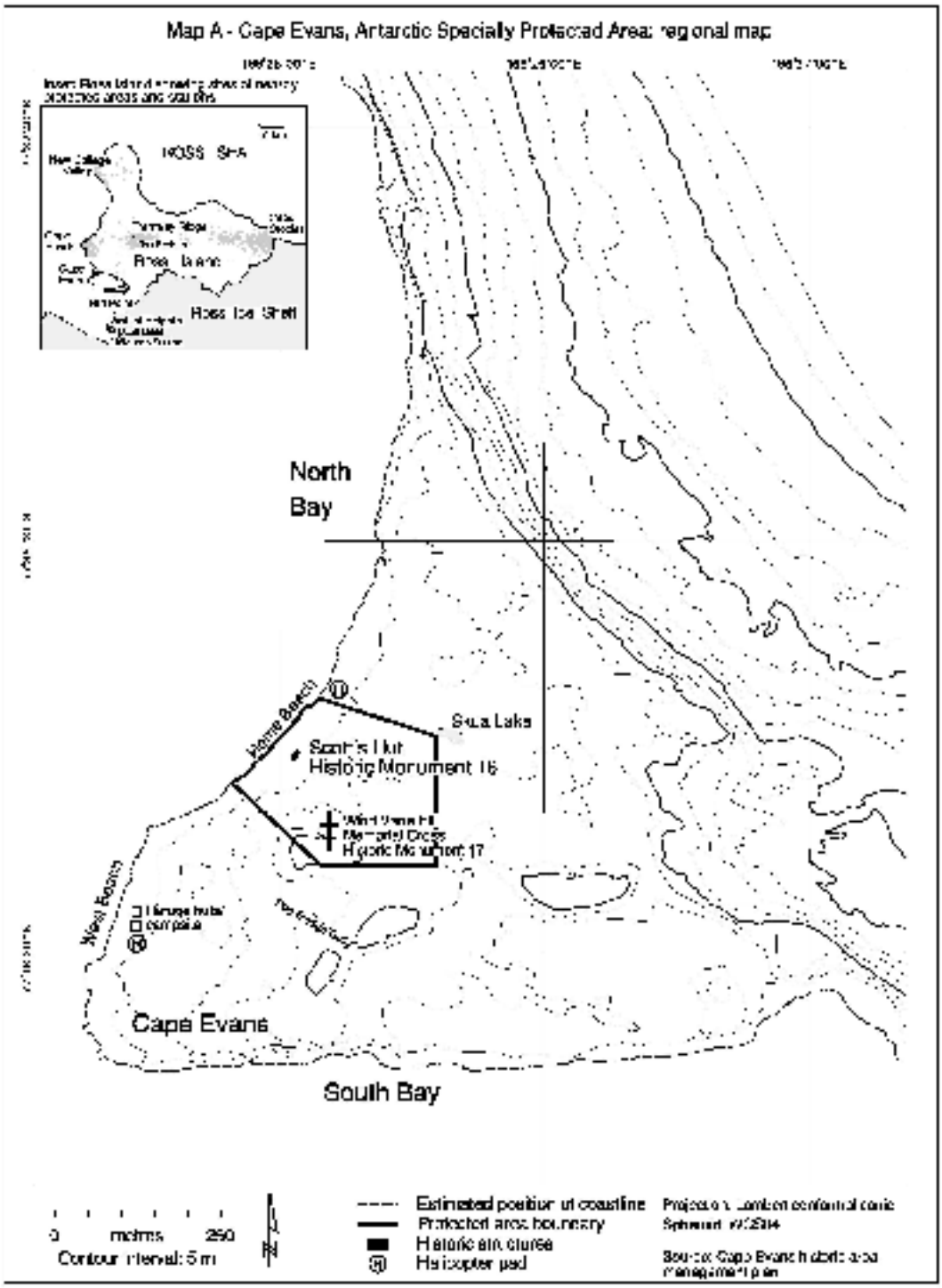
7(ix) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

- The Permit, or an authorised copy, shall be carried within the Area.
- Information on the requirements of this Plan shall be provided to all visitors.
- The Code of Conduct set out in section 7(ii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational and recreational visits (including tourism) to the Area shall, prior to commencement of the summer season, nominate people with a working knowledge of both the site and this Management Plan to act as guides during visits.
- All educational and recreational visits (including tourism) shall be supervised by a nominated guide, who is responsible for briefing visitors on the code of conduct and ensuring it is complied with.
- Parties shall consult and coordinate to develop skills and resources, particularly those related to conservation techniques, to assist with the protection of the Area's values.

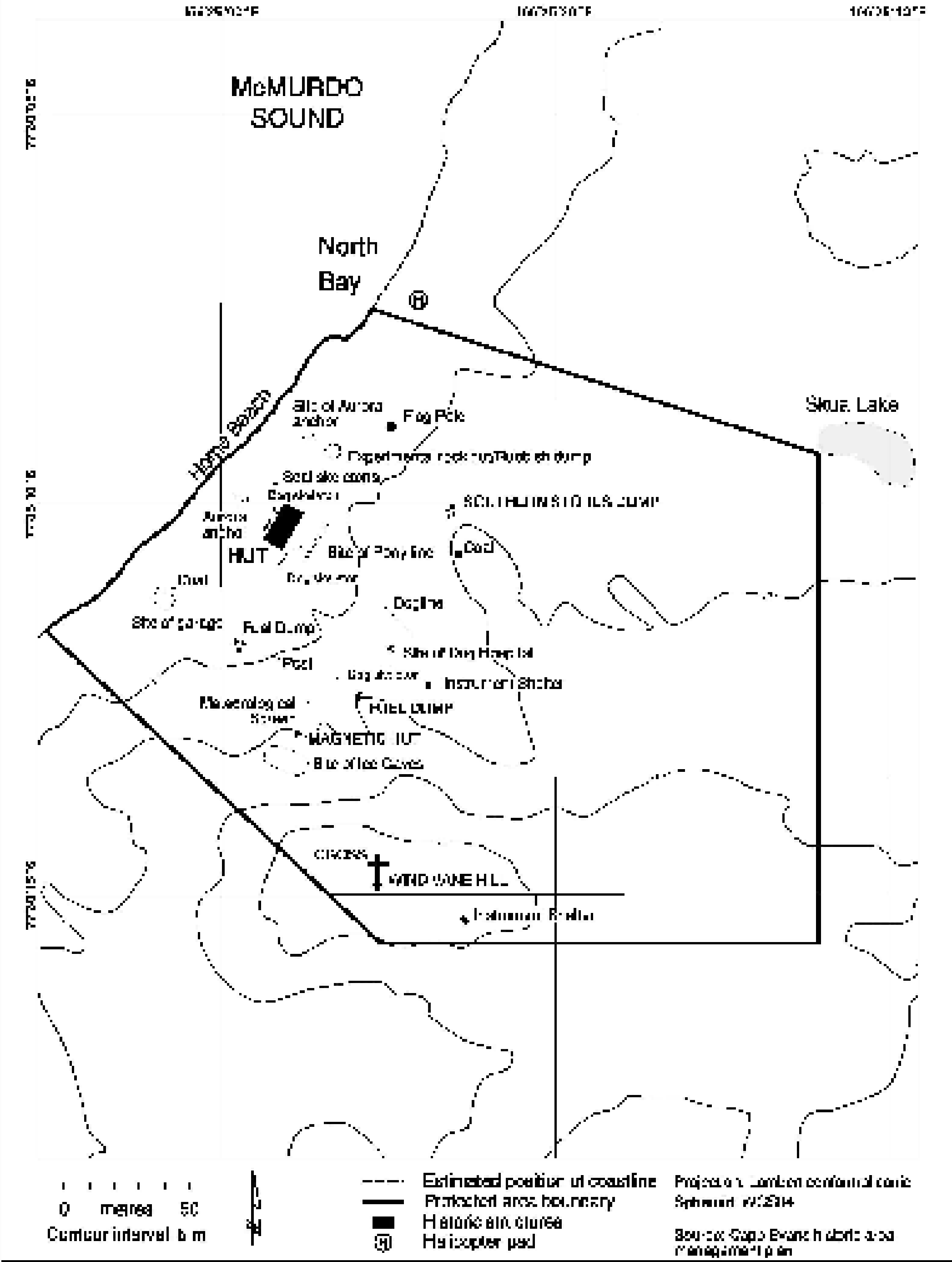
7(x) Requirements for Reports

Parties shall ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports shall include, as appropriate, the information identified in the Visit Report provided in Appendix 4 of Resolution 2 (1998). In addition, any removal of materials in accordance with section 7(vii) shall be detailed, including the reason for removal and the current location of the items or the date of disposal. Any return of such items to the site shall also be reported.

Parties shall maintain a record of activities within the Area and, in the Annual Exchange of Information, shall provide summary descriptions of activities conducted by persons subject to their jurisdiction, in sufficient detail to allow an evaluation of the effectiveness of the Management Plan. Parties should wherever possible deposit originals or copies of such reports in a publicly accessible archive to maintain a record of visitation, to be used both for review of the Management Plan and in managing further visitation to the site.


Map A - Cape Evans, Antarctic Specially Protected Area: regional map
ROSS SEA
Ross Island
Ross Ice Shelf
North Bay
Scott's Hut
Historic Monument 16
Skua Lake
Home Beach
West Beach
Cape Evans
South Bay
0 metres 250
Contour interval: 5 m
Estimated position of coastline
Protected area boundary
Helicopter pad

Map B - Cape Evans, Antarctic Specially Protected Area: site map



II. Measures

Management Plan for Antarctic Specially Protected Area No. 157

BACKDOOR BAY, CAPE ROYDS, ROSS ISLAND

(including Historic Site and Monument No. 15,
the historic hut of Sir Ernest Shackleton and its precincts)

1. Description of Values to be Protected

The significant historic value of this Area was formally recognised when it was listed as Historic Site and Monument No. 15 in Recommendation 9 (1972). It was designated as Specially Protected Area No. 27 in Measure 1 (1998) and redesignated as Antarctic Specially Protected Area (ASPA) 157 in Decision 1 (2002).

The hut on which this Area is centred was built in February 1908 by the British Antarctic (*Nimrod*) Expedition of 1907-1909 which was led by Sir Ernest Shackleton. It was also periodically used by the Ross Sea Party of Shackleton's Imperial Trans-Antarctic Expedition of 1914-1917.

Structures associated with the hut include stables, kennels, a latrine and a garage created for the first motor vehicle in Antarctica. Other significant relics in the Area include an instrument shelter, supply depots, and a rubbish site. Numerous additional artefacts are distributed around the Area.

Cape Royds is one of the principal areas of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, flora and fauna in Antarctica are associated with the *Nimrod* Expedition which was based at this site. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica give this Area significant scientific, aesthetic and historic values.

2. Aims and Objectives

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

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:
  a. an annual 'on-site' maintenance programme,
  b. a programme of monitoring the condition of artefacts and structures, and the factors which affect them, and
  c. a programme of conservation of artefacts conducted on and off site;
- allow management activities which support the protection of the values and features of the Area including:
  a. mapping and otherwise recording the disposition of historic items in the hut environs, and
  b. recording other relevant historic data;
- prevent unnecessary human disturbance to the Area, its features and artefacts through managed access to the *Nimrod* hut.

3. Management Activities

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

- A regular programme of conservation work shall be undertaken on the *Nimrod* hut and associated artefacts in the Area.
- Visits shall be made as necessary for management purposes.
- Systematic monitoring shall be put in place to assess the impacts of present visitor limits, and the results and any related management recommendations included in reviews of this Management Plan.
- National Antarctic Programmes operating in, or those with an interest in, the Area shall consult together with a view to ensuring the above management activities are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

- Map A: Cape Royds regional map. This map shows the location of the Area in relation to ASPA 121 and significant topographic features in the vicinity. Inset: shows the position of the site in relation to other protected sites on Ross Island.
- Map B: Cape Royds Area map. This map shows the boundaries of the Area and the adjacent ASPA 121. Also shown are the approaches, field camp and helicopter landing sites.

6. Description of the Area

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

Cape Royds is an ice free area at the western extremity of Ross Island, approximately 40 kilometres to the south of Cape Bird and 35 kilometres to the north of Hut Point Peninsula on Ross Island. The ice free area is composed of till covered basalt bedrock. The designated Area is located to the north east of Cape Royds adjacent to Backdoor Bay. It is immediately to the east of ASPA 121, an Adélie penguin rookery. The Area is centred on Shackleton's *Nimrod* expedition hut.

The boundaries of the Area are:

- South and East, by the shoreline of the eastern coast of Cape Royds including Arrival and Backdoor Bays;
- West, by a line following the boundary of ASPA 121 from the coastline at Arrival Bay to a signpost (77°31' 12.6" S, 166° 10' 01.3" E) and then continuing to follow the boundary of ASPA 121 for 40 m in a northeast direction;
- Northwest, by a line extending in a northwest direction from the boundary of ASPA 121 and following the shore of a small lake to the NW of Pony Lake and then along a gully leading to a point at 77° 33' 7.5" S, 166° 10' 13" E; and
- North, by a line extended due east from a point at 77° 33' 7.5" S, 166° 10' 13" E to the coastline of Backdoor Bay.

Adélie penguins *(Pygoscelis adeliae)* from the adjacent colony at Cape Royds often transit the Area. Skuas *(Catharacta maccormicki)* nest in the vicinity.

6(ii) Access to the Area

Access to the Area should be made on foot from Backdoor Bay or the helicopter landing sites using the routes shown in Map B. Landings by boat (when there is open water), or vehicle (when safe sea ice conditions exist), may be made in Backdoor Bay. Care should be taken to avoid the marine extent of ASPA 121 (see Map A). Helicopter landings may be made at the designated landing sites marked on Map B. The primary (and preferred) site is approximately 100 metres north of the Area. A secondary landing site is located 30 metres north of the Area and should be avoided from the start of November until the start of March, when the nearby Adélie penguin colony is occupied.

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

Apart from a Treaty plaque, all structures within the Area are of historic origin. A major feature of the Area is Shackleton's *Nimrod* expedition hut located in a sheltered basin. The hut is surrounded by many other historic relics including an instrument shelter, supply depots, and a dump site. Numerous additional artefacts are distributed around the site.

A New Zealand refuge hut and camp site are located at the north west corner of the ASPA.

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

- ASPA 121 (previously SSSI No. 1), Cape Royds is immediately adjacent to this Area.
- ASPA 122 (SSSI No. 2), Arrival Heights and
- ASPA 158 (SPA No. 28), Hut Point are approximately 30 kilometres south of Cape Royds at Hut Point Peninsula.
- ASPA 130 (SSSI No. 11), Tramway Ridge is 20 kilometres east of Cape Royds.
- ASPA 116 (SSSI No. 10, SPA No. 20), New College Valley is located 35 kilometres north in the vicinity of Cape Bird.
- ASPA 155 (SPA No. 25), Cape Evans is 12 kilometres south.
- ASPA 156 (SPA No. 26), Lewis Bay is 36 kilometres to the north east.

All sites are located on Ross Island.

6 (v) Special Zones within the Area

There are no special zones within the Area.

7. Terms and Conditions for Entry Permits

Entry to the Area is prohibited except in accordance with a Permit. Permits shall be issued only by appropriate national authorities and may contain both general and specific conditions. A Permit may be issued by a national authority to cover a number of visits in a season. Parties operating in the Area shall consult together and with groups and organisations interested in visiting the Area to ensure that visitor numbers are not exceeded.

II. Measures

Permits to enter the site may be issued for a stated period for:

- activities related to conservation, research and/or monitoring purposes;
- management activities in support of the objectives of this Plan; and
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Plan.

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

- *Control of movement within the Area* is necessary to prevent damage caused by crowding around the many vulnerable features within the Area. The maximum number in the Area at any time (including those within the hut) shall be: **40 people.**
- *Control of numbers within the hut* is necessary to prevent damage caused by crowding around the many vulnerable features within the hut. The maximum number within the hut at any time (including guides) shall be: **8 people.**
- Avoidance of cumulative impacts on the interior of the hut requires an annual limit on visitor numbers. The effects of current visitor levels (average 1020 per year between 1998 and 2004) suggest that an increase of more than 100% could cause significant adverse impacts. The annual maximum number of visitors shall be: **2000 people.**
- These limits have been based on current visitor levels and on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). The limits are based on the proposition that any significant increase in the current level of visitors would be detrimental to the values to be protected. An ongoing monitoring programme to assess the effect of visitors is required to provide the basis for future reviews of the Management Plan, in particular whether the current limits on numbers of visitors are appropriate.
- Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct set out in section 7(vii). All tourism, educational and recreational visits must be supervised by an experienced guide nominated by the operator (refer section 7(ix)).
- Helicopter landings are prohibited within the Area as they have the potential to damage the site by blowing scoria and ice particles and to accelerate the abrasion of the hut and surrounding artefacts. Vehicles are prohibited within the Area. Refer to 6(ii) for recommended approaches and landing sites.

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

Activities which may be conducted within the Area include:

- visits for conservation purposes;
- educational and/or recreational visits including tourism;
- scientific activity which does not detract from the values of the Area.

Visitors should adhere to the following Code of Conduct, except where conservation, research, monitoring or management activities specified in the Permit require otherwise:

- Thoroughly clean grit and scoria, ice and snow from boots using the brushes provided before entering the hut to reduce floor abrasion;
- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;

- Do not touch, move or sit on any items or furniture in the huts - handling artefacts causes damage;
- As many areas are cramped and artefacts can be accidentally bumped, do not wear packs inside;
- When moving around the sites, take great care not to tread on any items which may be obscured by snow;
- Use of combustion style lanterns, naked flames or smoking in or around the huts is prohibited, as fire is a major risk; and
- Visits should be recorded in the book provided. This allows times and levels of visitation to be correlated with temperature and humidity data automatically logged inside the hut.

7(iii) Installation, modification or removal of structures

- No new structures are to be erected in the Area, or scientific equipment installed, except for conservation or scientific activities that do not detract from the values of the Area as specified in 1.
- No historic structure shall be removed from the Area, unless specified in a Permit issued in accordance with the provisions of section 7(vii).

7(iv) Location of field camps

- Use of the historic hut for living purposes is not permitted. Camping is prohibited within the Area under any circumstances.
- An existing field camp site and a New Zealand shelter is located at the north western boundary of the Area (see Map B).

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

- No living animals, plant material, soil or micro-organisms shall be introduced to the Area. No food products shall be taken into the Area.
- Chemicals may only be introduced for permitted scientific or conservation purposes. Chemicals (including fuel) or other materials are not to be left in the Area, unless required for essential purposes connected with the conservation of the historic structures or the associated relics.
- All materials are to be removed when no longer required and before a date to be specified in the relevant Permit.

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

- This activity is prohibited except in accordance with a permit issued by the appropriate national authority specifically for that purpose under Article 3, Annex II to the Protocol on Environmental Protection.
- Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(vii) Collection of anything not imported by the Permit Holder

- Material may be collected and removed from the Area for conservation reasons consistent with the objectives of this Plan only when specified in a Permit issued by the appropriate national authority.
- Materials which pose a threat to the environment or human health may be removed from the Area for disposal, in accordance with a Permit, where they meet one or more of the following criteria:
  (i) the artefact presents a threat to the environment, wildlife or human health and safety;
  (ii) it is in such poor condition that it is not reasonably possible to conserve it;
  (iii) it does not contribute in any significant way to our understanding of the hut, its occupants or the history of Antarctica;
  (iv) it does not contribute to, or it detracts from, the visual qualities of the site or the hut; and/or
  (v) it is not a unique or rare item;

  and where such action is:
  (i) undertaken by parties with appropriate heritage conservation expertise; and
  (ii) part of an overall plan for conservation work at the site.

National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.

Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a Permit for storage in a controlled environment until such time as they can safely be returned to the Area.

7(viii) Disposal of waste

- All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

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

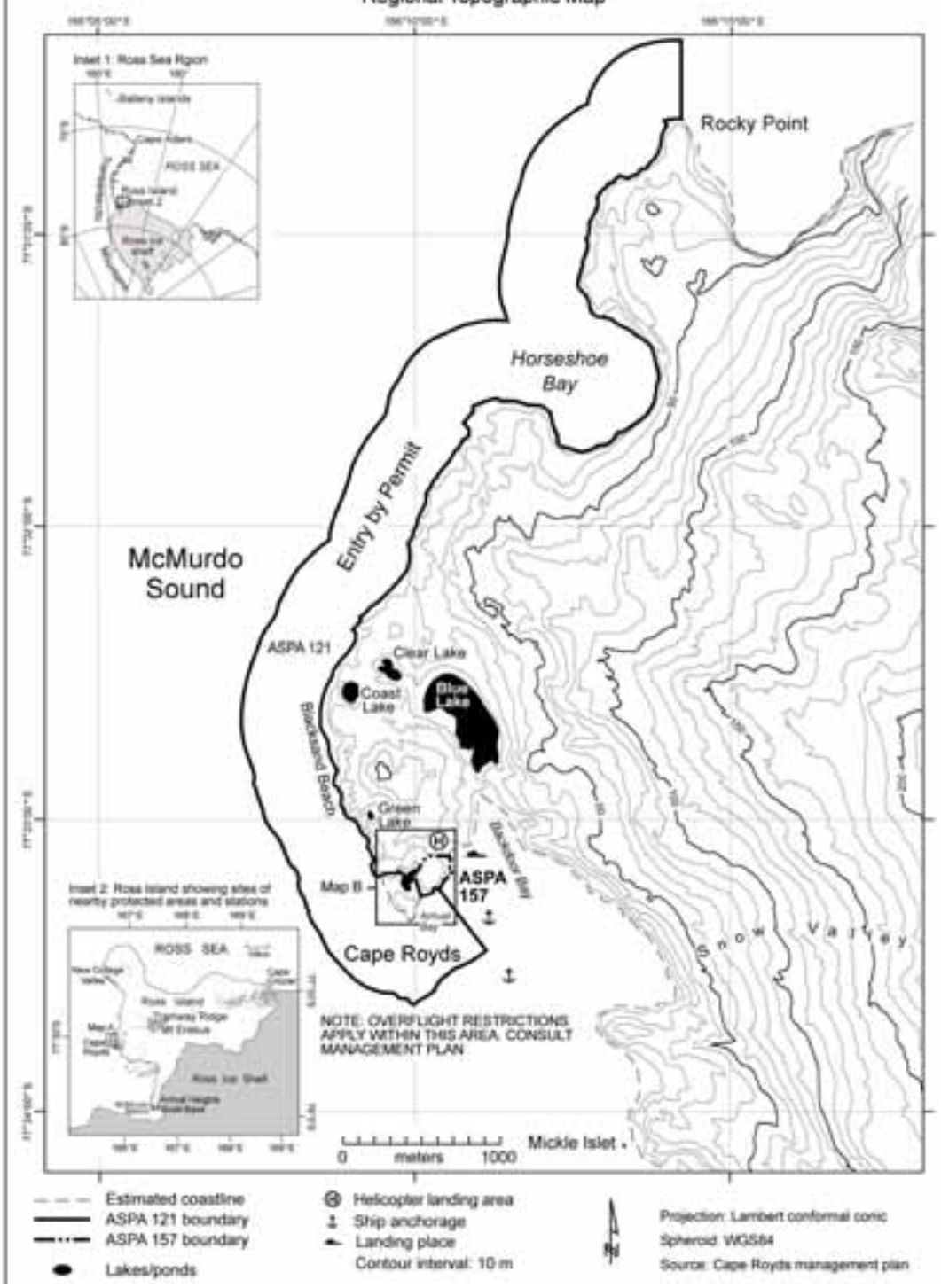
- The Permit, or an authorised copy, shall be carried within the Area.
- Information on the requirements of this Plan shall be provided to all visitors.
- The Code of Conduct set out in section 7(ii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational and recreational visits (including tourism) to the Area should prior to commencement of the summer season, nominate people with a working knowledge of both the site and this Management Plan to act as guides during visits.
- All educational and recreational visits should be supervised by a nominated guide, who is responsible for briefing visitors on the code of conduct and ensuring it is complied with.
- Parties should consult and coordinate to develop skills and resources, particularly those related to conservation techniques, to assist with the protection of the Area's values.

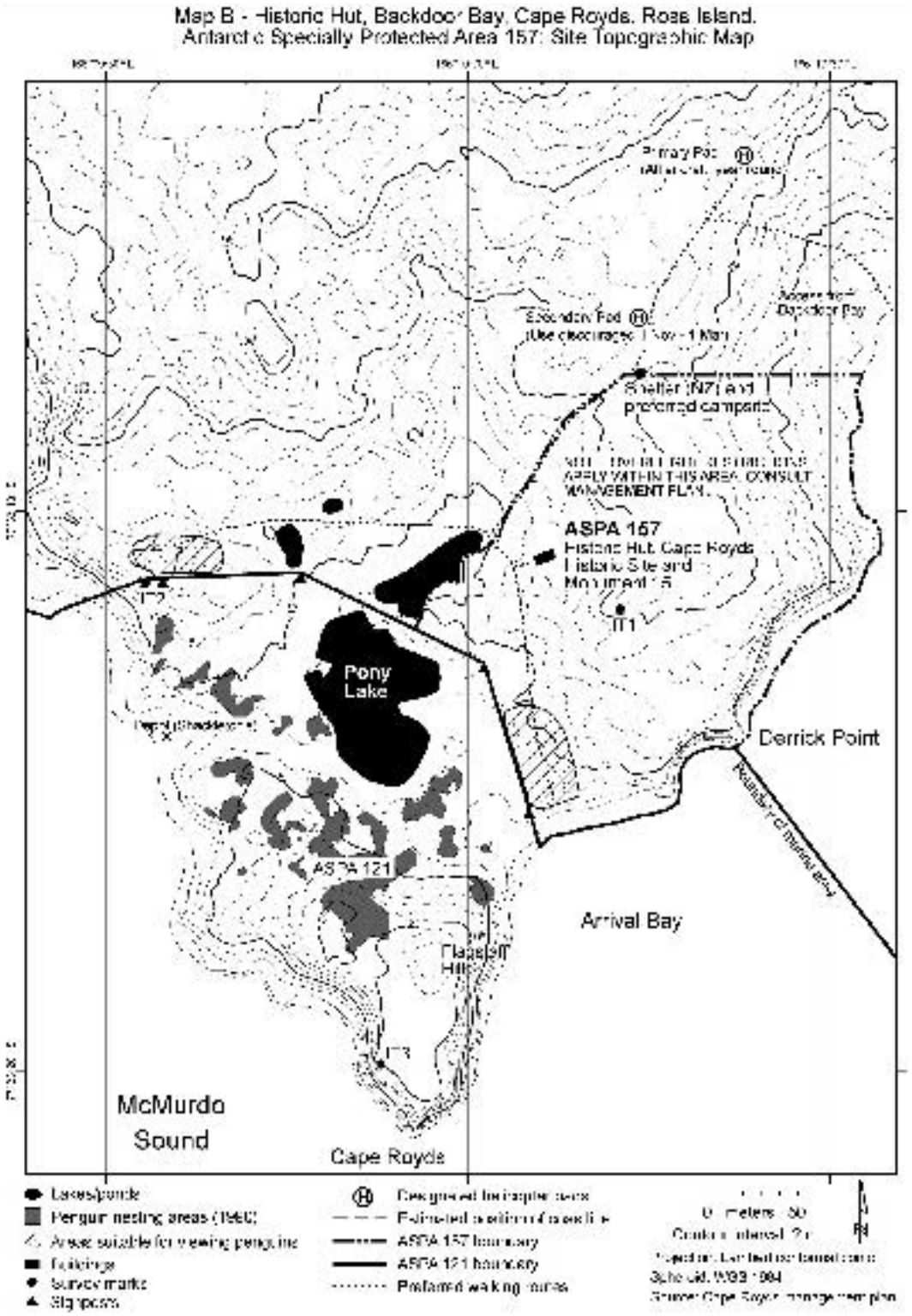
7(x) Requirements for reports

Parties shall ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports shall include, as appropriate, the information identified in the Visit Report Form provided in Appendix 4 of Resolution 2 (1998). In addition, any removal of materials in accordance with section 7(viii) shall be detailed, including the reason for removal and the current location of the items or the date of disposal. Any return of such items to the site shall also be reported.

Parties shall maintain a record of activities within the Area and, in the Annual Exchange of Information, shall provide summary descriptions of activities conducted by persons subject to their jurisdiction, in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should wherever possible deposit originals or copies of such reports in a publicly accessible archive to maintain a record of visitation, to be used both for review of the Management Plan and in managing further visitation to the site.

Map A - Historic Hut, Backdoor Bay, Cape Royds, Ross Island, Antartic Specially Protected Area 157:
Regional Topographic Map




Map B - Historic Hut, Backdoor Bay, Cape Royds, Ross Island.
Antarctic Specially Protected Area 157: Site Topographic Map
Primary Pad
Backdoor Bay
Shelter (NZ) and
ASPA 157
Historic Hut, Cape Royds
Historic Site and
Monument 15
HT1
HT2
Pony
Lake
Derrick Point
ASPA 121
Arrival Bay
Flagstaff
Hill
McMurdo
Sound
Cape Royds
Lakes/ponds
Penguin nesting areas (1960)
Fuel cache
Survey marks
Signposts
ASPA 157 boundary
ASPA 121 boundary
Prefered walking routes

II. Measures

Management Plan for Antarctic Specially Protected Area No. 158

HUT POINT, ROSS ISLAND

(including Historic Site and Monument No. 18, the historic *Discovery* hut of Captain R F Scott)

1. Description of Values to be Protected

The significant historic value of this Area was formally recognised when it was designated as Historic Site and Monument No. 18 in Recommendation 9 (1972). It was designated as Specially Protected Area No. 28 in Measure 1 (1998) and redesignated as Antarctic Specially Protected Area 158 in Decision 1 (2002).

The hut was built in February 1902 during the National Antarctic *(Discovery)* Expedition of 1901-1904, led by Captain Robert Falcon Scott who later found it a valuable advance staging point for journeys on the "Barrier" during his 1910-1913 expedition. It was also used by Sir Ernest Shackleton during the 1907-1909 British Antarctic Expedition and later by his stranded Ross Sea Party during the Imperial Trans-Antarctic Expedition of 1914-1917. This building was prefabricated in Australia to an 'outback' design with verandahs on three sides.

The Hut Point site is one of the principal sites of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, flora and fauna in Antarctica are associated with the *Discovery* Expedition based at this site. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica give this Area significant scientific, aesthetic and historic values.

2. Aims and Objectives

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

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:
  a. an annual 'on-site' maintenance programme,
  b. a programme of monitoring the condition of artefacts and structures, and the factors which affect them, and
  c. a programme of conservation of artefacts conducted on and off site;
- allow management activities which support the protection of the values and features of the Area including recording of any relevant historic data; and
- prevent unnecessary human disturbance to the Area, its features and artefacts through managed access to the *Discovery* hut.

3. Management Activities

- A regular programme of conservation work shall be undertaken on the *Discovery* hut and associated artefacts in the Area;
- Visits shall be made as necessary for management purposes;
- Systematic monitoring shall be put in place to assess the impacts of present visitor limits, and the results and any related management recommendations included in reviews of this Management Plan;
- National Antarctic Programmes operating in, or those with an interest in, the Area shall consult together with a view to ensuring the above management activities are implemented.

4. Period of Designation

Designated for an indefinite period.

5. Maps

- Map A: Hut Point regional map. This map shows the wider environs of the Area with significant topographic features and the adjacent US McMurdo Station. Inset: shows the position of the site in relation to other protected sites on Ross Island.
- Map B: Hut Point site map. This map shows the location of the historic hut, Vince's cross and other detail of the immediate environs.

6. Description of the Area

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

Hut Point is a small ice free area protruding south west from the Hut Point Peninsula and situated to the west of the United States McMurdo Station. The designated Area consists solely of the structure of the hut which is situated near the south western extremity of Hut Point.

6(ii) Access to the Area

There are no designated helicopter landings sites in the vicinity of the hut as helicopters have the potential to damage the hut by blowing scoria and ice particles and to accelerate the abrasion of the hut and surrounding artefacts. Vehicles may approach the hut along the road leading from the United States McMurdo Station, or from the sea ice when safe conditions exist. During open water, landings by boat may be made to the north of the hut.

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

The designated Area consists solely of the structure of the historic Discovery hut. Historic Site and Monument No. 17, a cross to the memory of G.T. Vince (a member of the Discovery expedition who died in the vicinity), is situated approximately 75 metres west of the hut.

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

- ASPA 121 (previously SSSI No. 1) and
- ASPA 158 (SPA No. 28), Cape Royds, are 32 kilometres north of Hut Point.
- ASPA 122 (SSSI No. 2), Arrival Heights, is 2 kilometres north of Hut Point on Hut Point Peninsula.
- ASPA 155 (SPA No. 25), Cape Evans, is 22 kilometres to the north of Hut Point. All sites are located on Ross Island.

6(v) Special Zones within the Area

There are no special zones within the Area.

7. Terms and Conditions for Entry Permits

Entry to the Area is prohibited except in accordance with a Permit. Permits shall be issued only by appropriate national authorities and may contain both general and specific conditions. A Permit may be issued by a national authority to cover a number of visits in a season. Parties operating in the Area shall consult together and with groups and organisations interested in visiting the Area to ensure that visitor numbers are not exceeded.

Permits to enter the site may be issued for a stated period for:

- activities related to conservation, research and/or monitoring purposes;
- management activities in support of the objectives of this Plan; and
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Plan.

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

- Control of numbers within the hut is necessary to prevent damage caused by crowding around the many vulnerable features within the hut. The maximum number within the hut at any time (including guides) shall be: **8 people.**
- Avoidance of cumulative impacts on the interior of the hut require an annual limit on visitor numbers. The effects of current visitor levels (average 1033 per year between 1998 and 2004) suggest that an increase of more than 100% could cause significant adverse impacts. The annual maximum number of visitors shall be: **2000 people.**
- These limits have been based on current visitor levels and on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). The limits are based on the proposition that any significant increase in the current level of visitors would be detrimental to the values to be protected. An ongoing monitoring programme to assess the effect of visitors is required to provide the basis for future reviews of the Management Plan, in particular whether the current limits on numbers of visitors to the area are appropriate.
- Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct set out in section 7(ii). All tourism, educational and recreational visits must be supervised by an experienced guide nominated by the operator (refer section 7(ix)).

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

Activities which may be conducted within the Area include:

- visits for conservation purposes;
- educational and/or recreational visits including tourism;
- scientific activity which does not detract from the values of the Area.

Visitors should adhere to the following Code of Conduct, except where conservation, research, monitoring or management activities specified in the Permit require otherwise:

- Thoroughly clean grit and scoria, ice and snow from boots using the brushes provided before entering the hut to reduce floor abrasion;
- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;
- Do not touch, move or sit on any items or furniture in the huts - handling artefacts causes damage;
- As many areas are cramped and artefacts can be accidentally bumped, do not wear packs inside.
- When moving around the sites, take great care not to tread on any items which may be obscured by snow;
- Use of combustion style lanterns, naked flames or smoking in or around the huts is prohibited, as fire is a major risk; and
- Visits should be recorded in the book provided. This allows times and levels of visitation to be correlated with temperature and humidity data automatically logged inside the hut.

7(iii) Installation, modification or removal of structures

- No alteration to the structure shall be made, except for conservation purposes or scientific activities that do not detract from the values of the Area as specified in 1. No historic structure shall be removed from the Area, unless specified in a Permit issues in accordance with the provisions of section 7(viii).

7(iv) Location of field camps

- Use of the historic hut for living purposes is not permitted.

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

- No living animals, or material, soil or micro-organisms shall be introduced to the Area.
- No food products shall be taken into the Area.
- Chemicals may only be introduced for permitted scientific or conservation purposes. Chemicals (including fuel) or other materials are not to be left in the Area, unless required for essential purposes connected with the conservation of the historic structure or the associated relics. All materials are to be removed when no longer required and before a date to be specified in the relevant Permit.

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

- There are no native flora or fauna within the designated Area.

7(vii) Collection of anything not imported by the Permit Holder

- Material may be collected and removed from the Area for conservation reasons consistent with the objectives of this Plan only when specified in a Permit issued by the appropriate national authority.
- Materials which pose a threat to the environment or human health may be removed from the Area for disposal, in accordance with a Permit, where they meet one or more of the following criteria:
  (i) the artefact presents a threat to the environment, wildlife or human health and safety;
  (ii) it is in such poor condition that it is not reasonably possible to conserve it;
  (iii) it does not contribute in any significant way to our understanding of the hut, its occupants or the history of Antarctica;
  (iv) it does not contribute to, or it detracts from, the visual qualities of the site or the hut, and/or;
  (v) it is not a unique or rare item;

  and where such action is:
  (i) undertaken by parties with appropriate heritage conservation expertise; and
  (ii) part of an overall plan for conservation work at the site.
- National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.
- Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a Permit for storage in a controlled environment until such time as they can safely be returned to the Area.

7(viii) Disposal of waste

- All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

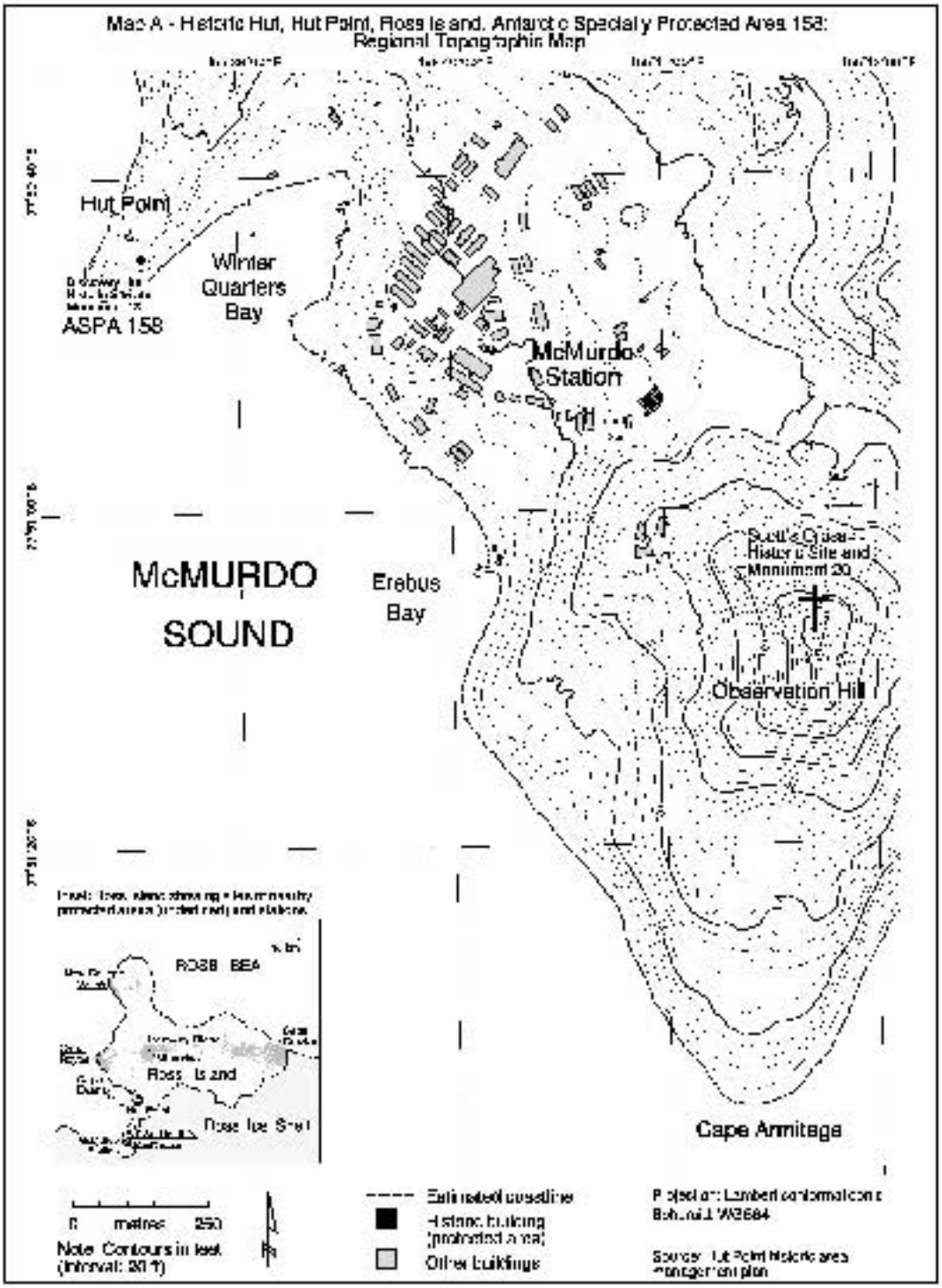
7(ix) Measures that may be necessary to ensure that the aims and objectives of the plan continue to be met

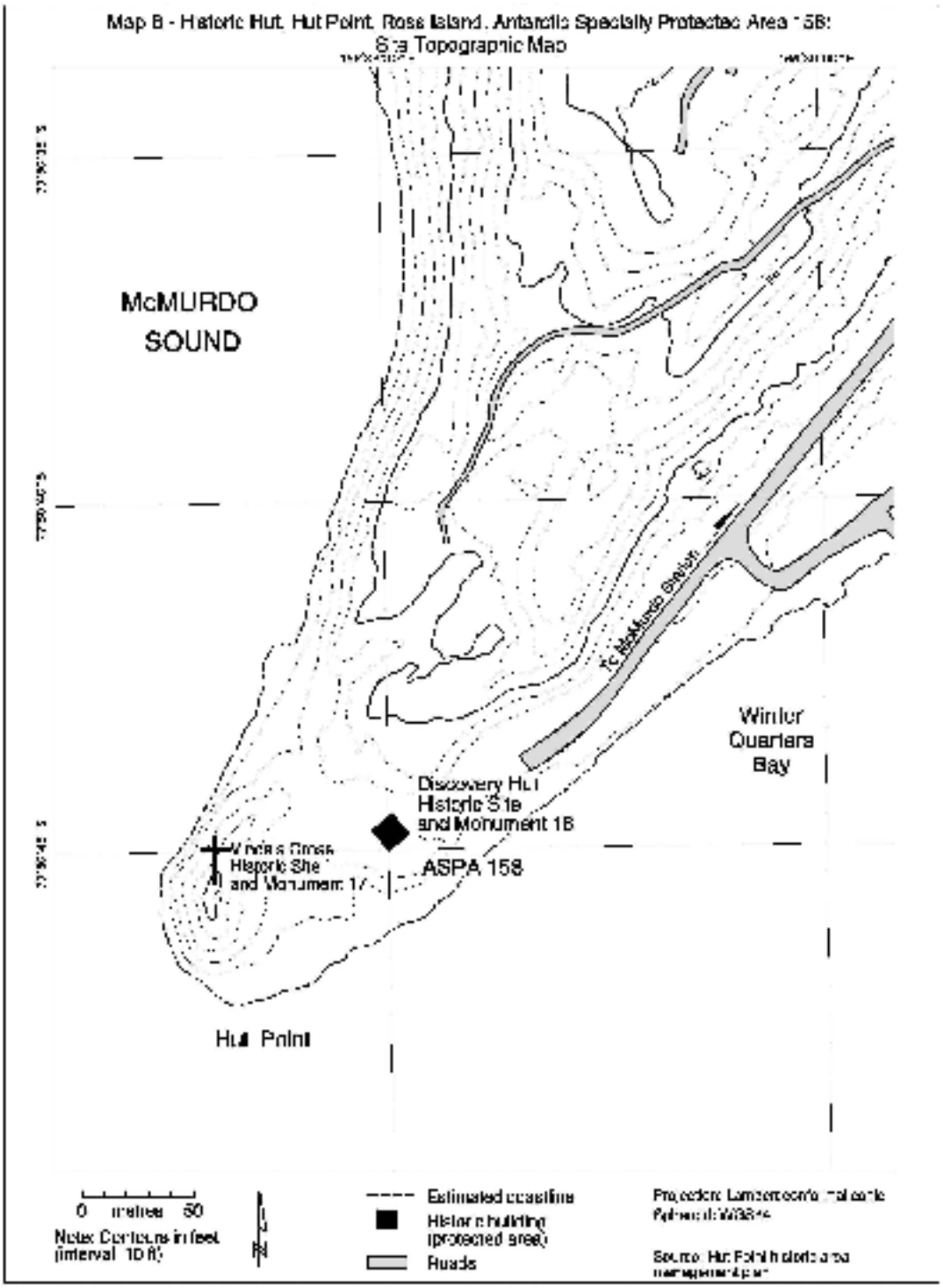
- The Permit, or an authorised copy, shall be carried within the Area.
- Information on the requirements of this Plan shall be provided to all visitors.
- The Code of Conduct set out in section 7(ii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational and recreational visits (including tourism) to the Area shall, prior to commencement of the summer season, nominate people with a working knowledge of both the site and this Management Plan to act as guides during visits.
- All educational and recreational visits (including tourism) shall be supervised by a nominated guide, who is responsible for briefing visitors on the code of conduct and ensuring it is complied with.
- Parties shall consult and coordinate to develop skills and resources, particularly those related to conservation techniques, to assist with the protection of the Area's values.

7(x) Requirements for reports

Parties shall ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports shall include, as appropriate, the information identified in the Visit Report Form provided in Appendix 4 of Resolution 2 (1998). In addition, any removal of materials in accordance with section 8(viii) shall be detailed, including the reason for removal and the current location of the items or the date of disposal. Any return of such items to the site shall also be reported.

Parties shall maintain a record of activities within the Area and, in the Annual Exchange of Information, shall provide summary descriptions of activities conducted by persons subject to their jurisdiction, in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should wherever possible deposit originals or copies of such reports in a publicly accessible archive to maintain a record of visitation, to be used both for review of the Management Plan and in managing further visitation to the site.


Map A - Historic Hut, Hut Point, Ross Island, Antarctic Specially Protected Area 158:
Regional Topographic Map
Hut Point
Winter Quarters Bay
ASPA 158
McMurdo Station
McMURDO SOUND
Erebus Bay
Observation Hill
Cape Armitage
ROSS SEA
Ross Island
Ross Ice Shelf
0 metres 250
Note: Contours in feet
(Interval: 20 ft)
Estimated coastline
Historic building (protected area)
Other buildings
Projection: Lambert conformal conic
Datum: WGS84
Source: Hut Point Historic Area management plan


McMURDO
SOUND
Winter
Quarters
Bay
Discovery Hut
Historic Site
and Monument 18
ASPA 158
Hut Point
Estimated coastline
Historic building
(protected area)
Roads

Management Plan for Antarctic Specially Protected Area No. 159

CAPE ADARE, BORCHGREVINK COAST

(including Historic Site and Monument No. 22, the historic huts of Carsten Borchgrevink and Scott's Northern Party and their precincts)

1. Description of Values to be Protected

The historic value of this Area was formally recognized when it was listed as Historic Site and Monument No. 22 in Recommendation VII-9 (1972). It was designated as Specially Protected Area No. 29 in Measure 1 (1998) and redesignated as Antarctic Specially Protected Area (ASPA) 159 in Decision 1 (2002).

There are three main structures in the Area. Two were built in February 1899 during the British Antarctic (*Southern Cross*) Expedition led by C.E. Borchgrevink (1898-1900). One hut served as a living hut and the other as a store. They were used for the first winter spent on the Antarctic continent.

Scott's Northern Party hut is situated 30 metres to the north of Borchgrevink's hut. It consists of the collapsing remains of a third hut built in February 1911 for the Northern Party led by V.L.A. Campbell of R.F. Scott's British Antarctic (*Terra Nova*) Expedition (1910-1913), which wintered there in 1911.

In addition to these features there are numerous other historic relics located in the Area. These include stores depots, a latrine structure, two anchors from the ship *Southern Cross*, an ice anchor from the ship *Terra Nova*, and supplies of coal briquettes. Other historic items within the Area are buried in guano.

Cape Adare is one of the principal sites of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, flora and fauna in Antarctica are associated with the two earliest expeditions based at this site. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica give this Area significant scientific, aesthetic and historic values.

2. Aims and Objectives

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

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:
  a. 'on-site' maintenance,
  b. monitoring the condition of artefacts and structures, and the factors which affect them, and
  c. conservation of artefacts to be conducted on and off site;

- allow management activities which support the protection of the values and features of the Area including:
  a. mapping and otherwise recording the disposition of historic items in the hut environs, and
  b. recording other relevant historic data; and
- prevent unnecessary human disturbance to the Area, its features and artefacts through managed access to Borchgrevink's hut.

3. Management Activities

- A programme of conservation work shall be undertaken on the *Southern Cross* hut and associated structures and artefacts in the Area.
- Visits shall be made as necessary for management purposes.
- Systematic monitoring shall be put in place to assess the impacts of present visitor limits, and the results and any related management recommendations included in reviews of this Management Plan. National Antarctic Programmes operating in, or those with an interest in, the Area shall consult together with a view to ensuring the above management activities are implemented.

4. Period of Designation

Designated for an indefinite period.

5. Maps

- Map A: Cape Adare regional map. This map shows the Cape Adare region along with the boundaries of the Area with significant topographic features. It also shows the approximate location of significant historical items within the Area.
- Map B: Cape Adare site map. This map shows the approximate location of specific historic relics and structures within the Area.

6. Description of the Area

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

Cape Adare is a generally ice free, prominent volcanic headland, at the northern extremity of Victoria Land, which marks the western approaches to the Ross Sea. The Area is located to the south west of the Cape on the southern shore of Ridley Beach, which encloses a large, flat, triangular area of shingle.

The whole of the flat area and the lower western slopes of the Adare Peninsula are occupied by one of the largest Adélie penguin (*Pygoscelis adeliae*) rookeries in Antarctica. Penguins have almost completely occupied the Area and the need to avoid disturbance often restricts access to the huts.

The boundaries of the ASPA are:

- North, an east-west line drawn 50 metres north of the Northern Party Hut;

- East, a north-south line drawn 50 metres to the west of Borchgrevink's stores hut;
- West, a north-south line drawn 50 metres to the east of Borchgrevink's living hut; and
- South, the shoreline of Ridley Beach.

Skuas (*Catharacta maccormicki*) nest in the vicinity and Weddell seals also haul up along the beach.

6(ii) Access to the Area

There are no designated helicopter pads in the vicinity of the Area. Helicopter landings should be avoided as for most of the summer season it is difficult to operate helicopters without causing disturbance to penguins and skuas. Landings from the sea by boat, or vehicles travelling on the sea ice, may be made directly onto the beach as ice and surf conditions allow. From the beach, access to the Area is by foot. Care must be taken to avoid damage to artefacts in the Area and disturbance to birds nesting on and around the structures.

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

Apart from a Treaty plaque all structures within the Area are of historic origin. Major features of the Area include Borchgrevink's Southern Cross expedition living hut and the unroofed stores hut. Scott's Northern Party hut is situated 30 metres to the north of Borchgrevink's living hut and is in a state of collapse.

In addition to these structures there are many other historic relics distributed around the Area. These include stores depots, a latrine structure, two anchors from the ship Southern Cross, an ice anchor from the ship Terra Nova, and supplies of coal. Many of these items are either partly or completely covered in the guano of the Adélie penguins which also occupy the Area.

The grave (Historic Site and Monument No. 23) of Nicolai Hanson (biologist with the Southern Cross expedition) is located approximately 1.5 km north east of historic huts. It is marked by a large boulder with an iron cross, a brass plaque and a white cross marked out in quartz pebbles.

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

The nearest ASPA is 106 (previously SPA 7), approximately 115 km to the south, on the western side of Cape Hallett.

6(iv) Special Zones within the Area

There are no special zones within the Area.

7. Permit Conditions

Entry to the Area is prohibited except in accordance with a Permit.

Permits shall be issued only by appropriate national authorities and may contain both general and specific conditions. A Permit may be issued by a national authority to cover a number of visits in a season. Parties operating in the Area shall consult together and with groups and organisations interested in visiting the Area to ensure that visitor numbers are not exceeded.

II. Measures

Permits to enter the site may be issued for a stated period for:

- activities related to conservation, research and/or monitoring purposes;
- management activities in support of the objectives of this Plan; and
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Plan.

7(i) Access to and movement within the Area

- Control of movement within the Area is necessary to prevent disturbance to wildlife and damage caused by crowding around the many vulnerable historic features within the Area. The maximum number in the Area at any time (including those within the hut) shall be: **40 people.**
- Control of numbers within Borchgrevink's hut is necessary to prevent damage caused by crowding around the many vulnerable features within the hut. The maximum number within the hut at any time (including guides) shall be: **4 people.**
- Avoidance of cumulative impacts on the interior of Borchgrevink's hut requires an annual limit on visitor numbers. The number of visitors to the hut varies considerably from year to year but the effect of visitors to other Ross Sea area historic huts suggests that similar limits should apply. The annual maximum number of visitors shall be: **2000 people.**
- These limits have been based on current visitor levels and on the best advice available from conservation advisory agencies (which include conservators, archaeologists, historians, museologists and other heritage protection professionals). The limits are based on the proposition that any significant increase in the current level of visitors would be detrimental to the values to be protected. An ongoing monitoring programme to assess the effect of visitors is required to provide the basis for future reviews of the management plan, in particular whether the limits on number of visitors are appropriate.
- Adequate supervision of visits to the Area is necessary to prevent damage caused by crowding and by actions inconsistent with the Code of Conduct set out in section 7(ii). All tourism, educational and recreational visits must be supervised by an experienced guide nominated by the operator (refer section 7(ix)).
- Helicopter landings are prohibited within the Area.
- Vehicles are prohibited within the Area.

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

Activities which may be conducted within the Area include:

- visits for conservation purposes;
- educational and/or recreational visits including tourism; and
- scientific activity which does not detract from the values of the Area.

Visitors should adhere to the following Code of Conduct, except where conservation, research, monitoring or management activities specified in the Permit require otherwise:

- Thoroughly clean grit and scoria, ice and snow from boots using the brushes provided before entering the hut to reduce floor abrasion;
- Remove any clothing made wet by sea water, and any sea ice crystals from boots, as salt particles accelerate corrosion of metal objects;

- Do not touch, move or sit on any items or furniture in the huts - handling artefacts causes damage;
- As many areas are cramped and artefacts can be accidentally bumped, do not wear packs inside;
- When moving around the sites, take great care not to tread on any items which may be obscured by snow;
- Use of combustion style lanterns, naked flames or smoking in or around the huts is prohibited, as fire is a major risk; and
- Visits should be recorded in the book provided. This allows times and levels of visitation to be correlated with temperature and humidity data automatically logged inside the hut.

7(iii) Installation, modification or removal of structures

- No new structures are to be erected in the Area, or scientific equipment installed, except for conservation or scientific activities that do not detract from the values of the Area as specified in 1.
- No historic structure shall be removed from the Area, unless specified in a Permit issued in accordance with the provisions of section 7(vii).

7(iv) Location of field camps

- Use of the historic hut, or other structures in the Area, for living purposes is not permitted.
- Camping is prohibited within the Area under any circumstances.

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

- No living animals, plant material, soil or micro-organisms shall be introduced to the Area.
- No food products shall be taken into the Area.
- Chemicals may only be introduced for permitted scientific or conservation purposes. Chemicals (including fuel) or other materials are not to be left in the Area, unless required for essential purposes connected with the conservation of the historic structures or the associated relics. All materials are to be removed when no longer required and before a date to be specified in the Permit.

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

- This activity is prohibited except in accordance with a permit issued by the appropriate national authority specifically for that purpose under Article 3, Annex II to the Protocol on Environmental Protection.
- Where animal taking or harmful interference is involved, this should, as a minimum standard, be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica.

7(vii) Collection of anything not imported by the Permit Holder

- Material may be collected and removed from the Area for conservation reasons consistent with the objectives of this Plan only when specified in a Permit issued by the appropriate national authority.

- Materials which pose a threat to the environment or human health may be removed from the Area for disposal, in accordance with a Permit, where they meet one or more of the following criteria:
  (i) the artefact presents a threat to the environment, wildlife or human health and safety;
  (ii) it is in such poor condition that it is not reasonably possible to conserve it;
  (iii) it does not contribute in any significant way to our understanding of the hut, its occupants or the history of Antarctica;
  (iv) it does not contribute to, or it detracts from, the visual qualities of the site or the hut, and/or;
  (v) it is not a unique or rare item;

  and where such action is:
  (i) undertaken by parties with appropriate heritage conservation expertise; and
  (ii) part of an overall plan for conservation work at the site.

National authorities should ensure that any removal of artefacts and assessment against the above criteria is carried out by personnel with appropriate heritage conservation expertise.

Artefacts judged to be of high historic value, which cannot be conserved on site with currently available techniques, may be removed in accordance with a Permit for storage in a controlled environment until such time as they can safely be returned to the Area.

7(viii) Disposal of waste

- All human waste, grey water and other waste generated by work parties or visitors shall be removed from the Area.

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

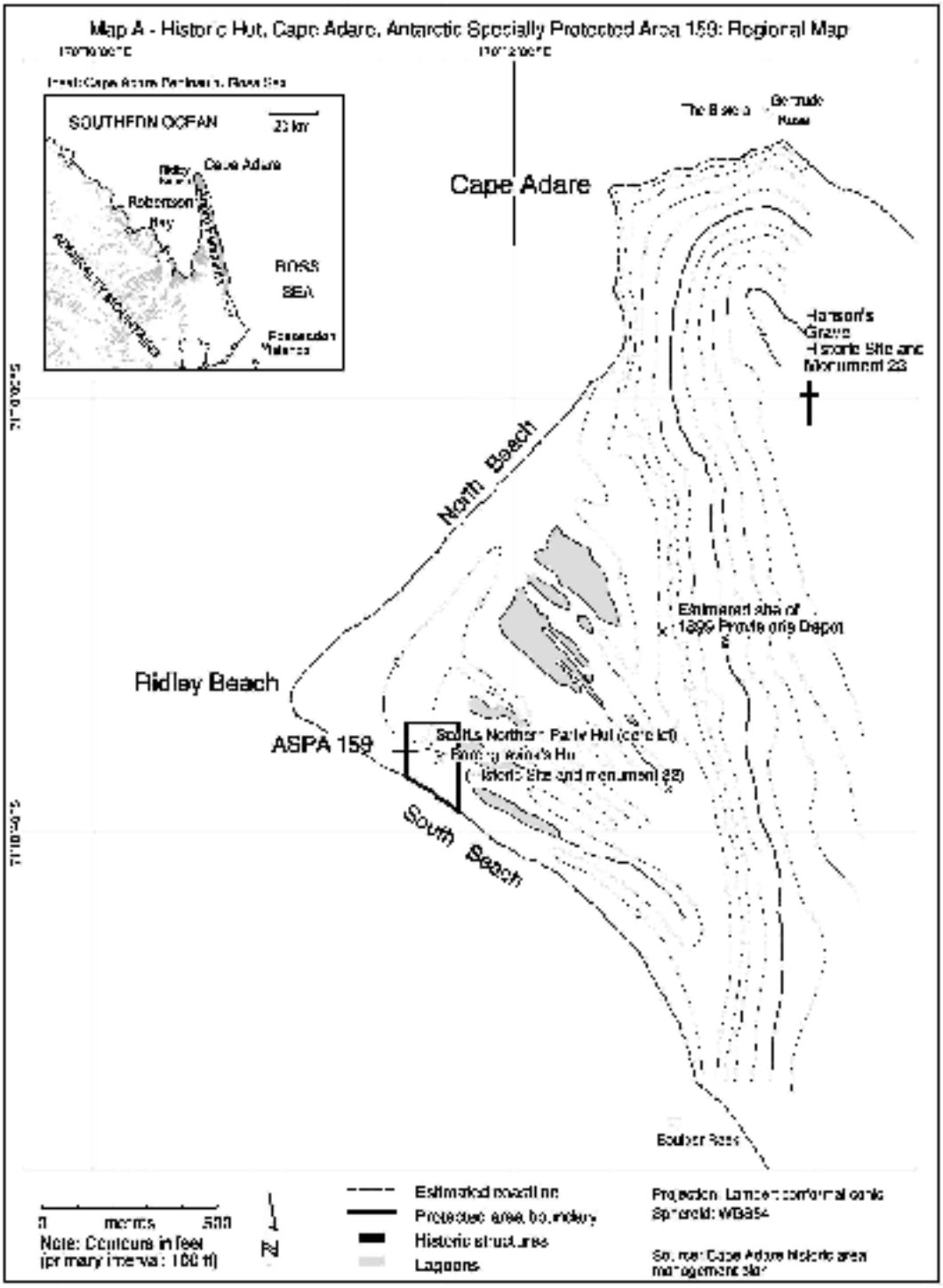
- The Permit, or an authorised copy, shall be carried within the Area.
- Information on the requirements of this Plan shall be provided to all visitors.
- The Code of Conduct set out in section 7(ii) shall be followed by all visitors, except where conservation, research, monitoring or management purposes require otherwise.
- Operators facilitating educational and recreational visits (including tourism) to the Area shall, prior to commencement of the summer season, nominate people with a working knowledge of both the site and this Management Plan to act as guides during visits.
- All educational and recreational visits (including tourism) shall be supervised by a nominated guide, who is responsible for briefing visitors on the code of conduct and ensuring it is complied with.
- Parties shall consult and coordinate to develop skills and resources, particularly those related to conservation techniques, to assist with the protection of the Area's values.

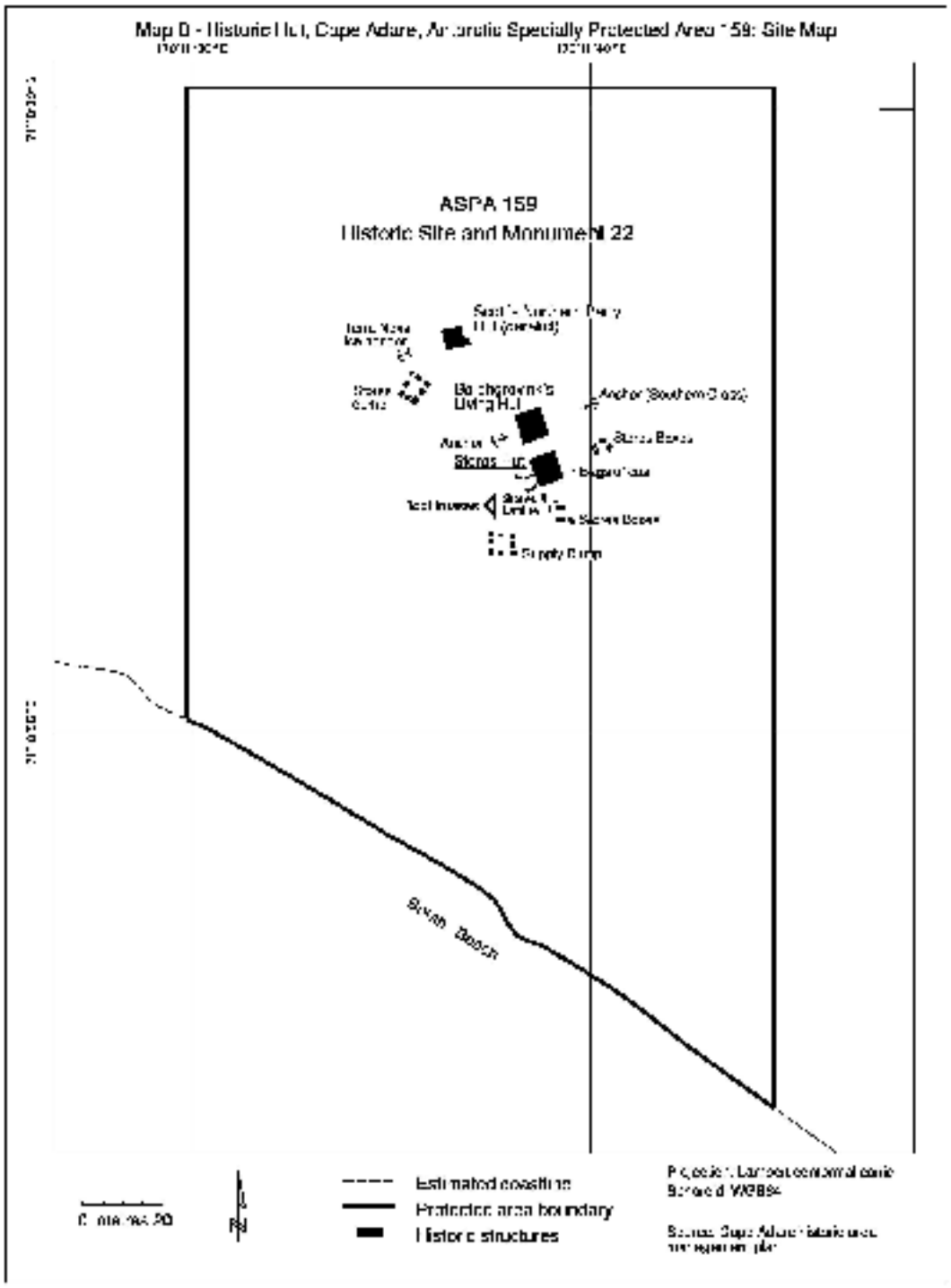
7(x) Requirements for reports

Parties shall ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports shall include, as appropriate, the information identified in the Visit Report Form provided in Appendix 4 of Resolution 2 (1998). In addition, any removal of materials in accordance with section 8(viii) shall be detailed, including the

reason for removal and the current location of the items or the date of disposal. Any return of such items to the site shall also be reported.

Parties shall maintain a record of such activities and, in the Annual Exchange of Information, shall provide summary descriptions of activities conducted by persons subject to their jurisdiction, in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should wherever possible deposit originals or copies of such reports in a publicly accessible archive to maintain a record of visitation, to be used both for review of the Management Plan and in managing further visitation to the site.


Map A - Historic Hut, Cape Adare, Antarctic Specially Protected Area 159: Regional Map
SOUTHERN OCEAN
Cape Adare
Ridley Beach
North Beach
South Beach
ASPA 159
Hanson's Grave Historic Site and Monument 23
Estimated site of 1899 Provisions Depot
Scott's Northern Party Hut (constructed by Borchgrevink's Hut (Historic Site and monument 22)
Boulder Rock
ROSS SEA
Estimated coastline
Protected area boundary
Historic structures
Lagoons
Projection: Lambert conformal conic
Spheroid: WGS84
Note: Contours in feet (primary interval: 100 ft)


ASPA 159
Historic Site and Monument 22
South Beach
Estimated coastline
Protection area boundary
Historic structures

II. Measures

Management Plan for Antarctic Specially Protected Area No. 163

DAKSHIN GANGOTRI GLACIER, DRONNING MAUD LAND

Introduction

In accordance with the provisions of Annex V to the Protocol on Environmental Protection to the Antarctica on Treaty Area Protection and Management, India initiated a review of the management plans for the Antarctic Specially Protected Area: Dakshin Gangotri Glacier, Dronning Maud Land. This ASPA is renamed from the previous Specially Protected Area and Site of Special Scientific Interest (SSSI) in accordance with Decision 1 (2002) of the XXV ATCM at Warsaw.

1. Description of values to be protected

Historic Value

Dakshin Gangotri Glacier is a small tongue of polar continental ice sheet, overriding the Schirmacher Oasis of central Dronning Maud Land (CDML). It was identified by the second Indian Antarctic Expedition in 1983 and since then its snout is being monitored continuously.

Scientific Value

With the availability of this vast amount of data for the past two decades, it has become a valuable site for observing the changes in the movement of the Antarctic ice sheet under the impact of global warming. The area has primary scientific importance for glaciologists and environmental scientists. Due to the scientific values of the Area and the nature of the research, it is protected as an Antarctic Specially Protected Area consistent with Articles 2, 3, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, to prevent interference with ongoing planned scientific investigations.

Environmental Value

In the designated Area exploration shows the faunal diversity and ecology of the moss-inhabiting terrestrial invertebrate fauna and it is also extensively explored lichenologically. Schirmacher Oasis is also an important area for the algal and cyanobacterial flora diversity. Terrestrial mosses are quite widespread in the Schirmacher Oasis colonizing a range of habitats. The bryophytes, because of their poikilohydric nature and alternative strategy of adaptation, are one of the very few plant groups which grow in Antarctica. As such their role in habitat modification, nutrient cycling, primary production and providing shelter and security to associated invertebrate animals, for example the bryobionts, bryophiles, bryoxenes assume a particular significance. Bryophytes have been reported in Schirmacher Oasis (divided in Eastern, Central and Western Schirmacher). Lichens, fungi, algae and bacteria have also been reported in the Area. Distribution of algae and cyanobacteria flora of fresh water streams of the Oasis at the designated area are studied. Examination of algae and cyanobacteria is conducted in the glacier-melt water stream. The species reported are *G. magma, Chaemosiphon subglobosus, Oscillatoria limosa, O. limnetica, P. frigidum, P. autumnale, Nostoc commune, N. punctiforme, Calothrix gracilis, C. brevissima, Uronema* sp.*,* and *Cosmarium* leave. Among the cyanobacteria encountered in the stream of Schirmacher Oasis, contribution by N_2 –fixing species might play a

significant role in nitrogen economy of the ecosystem through N_2–fixation. Studies on polar Skuas are also conducted at Schirmacher Oasis and their nesting and breeding success is reported around the designated place.

2. Aims and Objectives

Management at Dakshin Gangotri Glacier aims to:

- Avoid degradation of values of the Area by preventing undue human disturbance;
- Allow glaciological and environmental scientific research, while ensuring protection of observational accuracy from any sort of man-made inputs;
- Ensure that peripheral points along the snout are not adversely affected by human activity in the Area;
- Maintain the Area as a reference marker for studying the movement patterns of this part of the Antarctic ice-sheet under the influence of global warming;
- Allow visits for management purposes in support of the aims of the Management Plan for the Area.

3. Management Activities

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

- A detailed map showing the location & boundaries of the Area and stating the special restrictions that apply will be displayed prominently at Maitri (India) and Novolazarevskaya (Russia) research stations; copies of this management plan shall also be made available at both the stations.
- Two signs displaying the location and boundaries of the Area with clear statements of entry restrictions shall be placed on prominent rocks near both the entrance points to the valley, the eastern end and the south-eastern end; to help avoid inadvertent entry.
- Copies of this management plan along with location and boundary maps of the Area will be provided to all the visiting ships/aircraft.
- Markers, signs, cairns and other structures erected within the Area for scientific and management purposes will be secured and maintained in good condition, and will be removed when no longer necessary.
- Visits shall be made as necessary (at least once every year) to assess whether the Area continues to serve the purposes for which it was designated and to ensure that maintenance and management are adequate.
- The management plan shall be reviewed no less than once every five years and updated as required.

4. Period of Designation

The ASPA is designated for an indefinite period.

5. Maps

The following maps and photographs are enclosed for illustrating the Area and the Management Plan:

- Map 1: Location of Schirmacher Oasis in central Dronning Maud Land, East Antarctica.
- Map 2: Map of Schirmacher Oasis, showing locations of Maitri Research Station (India) and Novolazarevskaya Research Station (Russia).
- Map 3: Classification and Numbering of Lakes of Schirmacher Oasis (after Ravindra et al, 2001).
- Map 4: Topographic map of the Area (contour interval 10 m).
- Map 5: Paths of Fossil Glaciers in Schirmacher Oasis (after Beg et al, 2000).
- Map 6: Aerial view of the Dakshin Gangotri Glacier Snout.

6. Description of the Area

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

Schirmacher Oasis is a rocky hill range, about 17 km long in E-W trend (bounded by Eastern longitudes 11° 22' 40" and 11° 54' 20") and about 0.7 km to 3.3 km wide (bounded by Southern latitudes 70° 43' 50" and 70° 46' 40"). Its elevation varies from 0 to 228 m above the msl. It is a part of central Dronning Maud Land in Eastern Antarctica. The Area is a fragment of the western part of Schirmacher Oasis.

The Area is bounded by the Eastern longitudes 11° 33' 30" and 11° 36' 30" and by the Southern latitudes 70° 44' 10" and 70° 45' 30". The Area is 4.53 sq. km in aerial extent. The northeastern and northwestern corners of the Area are on shelf-ice, while the southwestern extremity is on polar ice-sheet. The southeastern end lies on a rocky outcrop.

Topographically, the Area can be divided into four distinct units–the southern continental ice-sheet, rocky hill slopes, a vast central proglacial lake (Lake-B7, Sbrosovoye Lake) and northern undulatory shelf ice.

The southernmost ice-sheet is bare 'blue ice', descending from 180 m contour to 10 m contour at the snout of the Glacier. It is crevassed and crisscrossed by NE-SW to NNE-SSW trending fractures. Two small and ephemeral supraglacial streams flow over the snout in a NNE direction.

The rocky terrain is uneven and has the minimum width of the Schirmacher Oasis at the snout point; less than 50 m only. The eastern and western sides of the hills slope towards the snout, making a wide valley. The contours descend from 150 m to msl at the northern margin of the rock outcrops.

The central part of the Area is occupied by Lake B7. It is a lake of glacial origin. The dimensions of the lake are about 500 m x 300 m.

The northernmost part of the Area comprises shelf ice with pressure ridges, fractures and crevasses. The contact between shelf ice and eastern rocky slopes is marked by a prominent 3-km long, NNE-SSW trending lineament. The fractures in the ice are also aligned parallel to this lineament.

Schirmacher Oasis exposes a granulite to amphibolite facies metamorphic terrain. The rock types are represented by charnockites, enderbites, garnet-sillimanite, gneisses, garnet-biotite gneisses, quartzofeldspathic augen gneisses with some foliated lamprophyres, amphibolites, dolerite, metagabbro and metabasalt. The rock suites dominantly fall under Grenvillean (1000 Ma) and Pan-African (550 Ma) events. Three phases of deformation are distinct.

II. Measures

The Area comprises mostly charnockite-Khondalite type of rocks (quartz-garnet-sillimanite-perthite±graphite gneisses) with some interlayering of garnet-sillimanite quartzites, calc silicate gneisses and mafic granulites. Two sets of faults (N30E and N50E) are quite prominent. One such major fault runs from the north-eastern corner of the Area; cutting all the three geomorphological units–shelf ice, rocks and continental ice-sheet.

Meteorological data from the nearby Indian Research Station Maitri shows that the Area has a dry polar climate. The extreme temperatures for the warmest and the coldest months range between 7.4 to -34.8°C. The mean annual temperature is -10.2°C. December is the warmest month of the year and August is the coldest. The blizzards touch a gale speed of 90 to 95 knots; the mean annual wind speed is 18 knots. The dominant wind direction is E-SE. Snowfall is quite frequent during the winter months, but gale force winds scrub the rocky surfaces clean and snow deposition is widespread on the leeward side of the hillocks.

Glaciological observations from 1983 to 1996 were carried out by surveys from two fixed points ('G' and 'H') using EDM or theodolite. The results showed that the Glacier is steadily receding every year at an average recession rate of 70 cm per annum.

In 1996, to enhance the accuracy of the observations, 19 peripheral points were marked encircling the snout of the Glacier. The average annual recession in the years 1997 to 2002 was 48.7 cm, 74.9 cm, 69.5 cm, 65.8 cm and 62.7 cm, respectively.

This translates into an overall average recession of 65.3 per annum for the period 1996-2002; which is in conformity with the observations for the previous period (1983 – 1996) of a recession rate of 7 meters per decade.

6(ii) Restricted and managed zones within the Area

Along the periphery of the Dakshin Gangotri Glacier, 19 observation points have been marked in February 1996. With reference to these points it has become possible to record the movement of the Glacier within an accuracy of 1 cm. Precise monitoring on cm-scale is also available for the years 1996-2002. Access to this zone should be restricted. It is proposed that a 100m radius all along the periphery of the Glacier should have limited admittance to protect the accuracy of scientific observations.

6(iii) Structures within and near the Area

There are no structures present in the Area, apart from two cairns ('G' and 'H') marking the sites used for glaciological and topographical surveys.

In future, some signs and cairns will be erected notifying the protected status of the Area.

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

In the entire Schirmacher Oasis, there are no other protected areas.

7. Permit Conditions

7(i) Access to and movement within the Area

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

A permit to enter the Area may only be issued for scientific research, or for essential management purposes consistent with the Management Plan's objectives and provisions; with the condition that the actions permitted will not jeopardize the scientific and environmental values of the Area and will not interfere with ongoing scientific studies.

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

The following activities may be conducted within the Area:

- Scientific research programmes consistent with the Management Plan for the Area, including the values for which the Area has been designated; which cannot be carried out elsewhere and which will not jeopardize the ecosystem of the Area.
- Essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a permit. Any equipment should not be installed if it is not essential for scientific research or for management activities, and it must be authorized in a permit. All scientific equipment installed in the Area must be clearly identified by country, name of principal investigator, year of installation and expected date of completion of the study. Details are to be included in the visit report. All such equipment should be made of materials that pose minimum risk of contamination and must be removed at the completion of the study. Removal of specific equipment for which the permit has expired shall be a condition of the permit.

7(iv) Location of field camps

Camping is not allowed in the Area. The field parties can camp either east of "Lake Kalika" at "VK-Ground" or beyond the western limit of the Area.

7(v) Restriction on materials and organisms, which can be brought into the Area

No living animals, plant material or microorganism shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions.

No pesticides, herbicides, chemicals, radio-isotopes shall be brought into the Area, other than those permitted for scientific or management purposes. And these authorized agents shall be removed from the Area at the conclusion of the activity.

Fuel is not to be stored in the Area unless connected with authorized activity. Permanent depots are not to be built in the Area.

All material taken into the Area shall be for a stated period only and shall be removed at or before the conclusion of that stated period.

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

Any interference with the native flora and fauna of the Area shall be in accordance with the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, 1991, Annex II, Article 3. Where taking or harmful interference with animals is involved, SCAR Code of Conduct for Use of Animals for Scientific Purposes in Antarctica should be used as a minimum standard.

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

Material may only be collected or removed from the Area as specified in the permit and should be limited to the minimum necessary to meet scientific or management requirements.

7(viii) Disposal of Waste

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

7(ix) Measures that are necessary to ensure that the aims and objectives of the management plan can continue to be met

Permits may be granted to enter the Area to carry out biological monitoring and area inspection activities.

Specific sites of long-term monitoring shall be appropriately marked and GPS positions will be obtained for records with the Antarctic Data Directory System through the appropriate national authority.

8. Requirements for Reports

The principal permit holder for the permit issued shall submit to the appropriate national authority a visit report describing the activities undertaken. Reports are due and shall be submitted as soon as possible after the expiration of the permit, and include the types of information contained in SCAR visit report form or as required by national laws. The authority will maintain a record of such activities and make this accessible to interested Parties.

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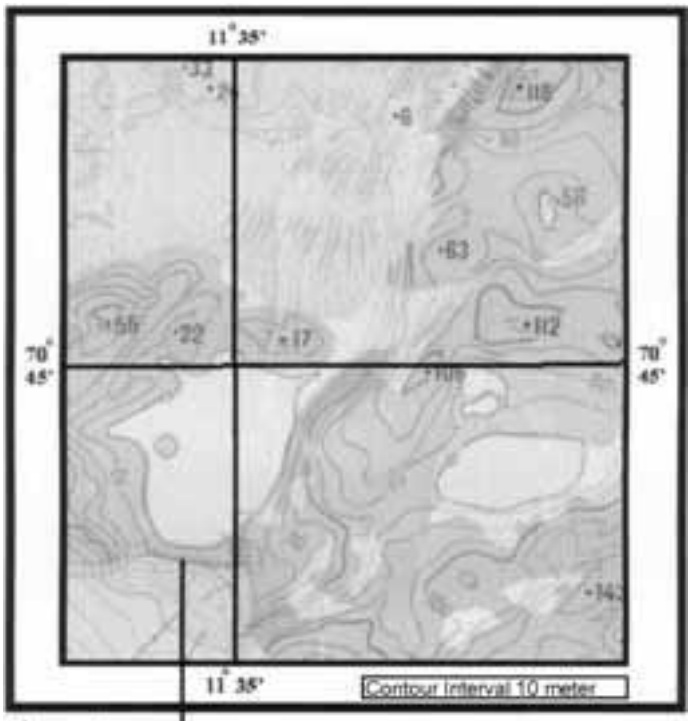
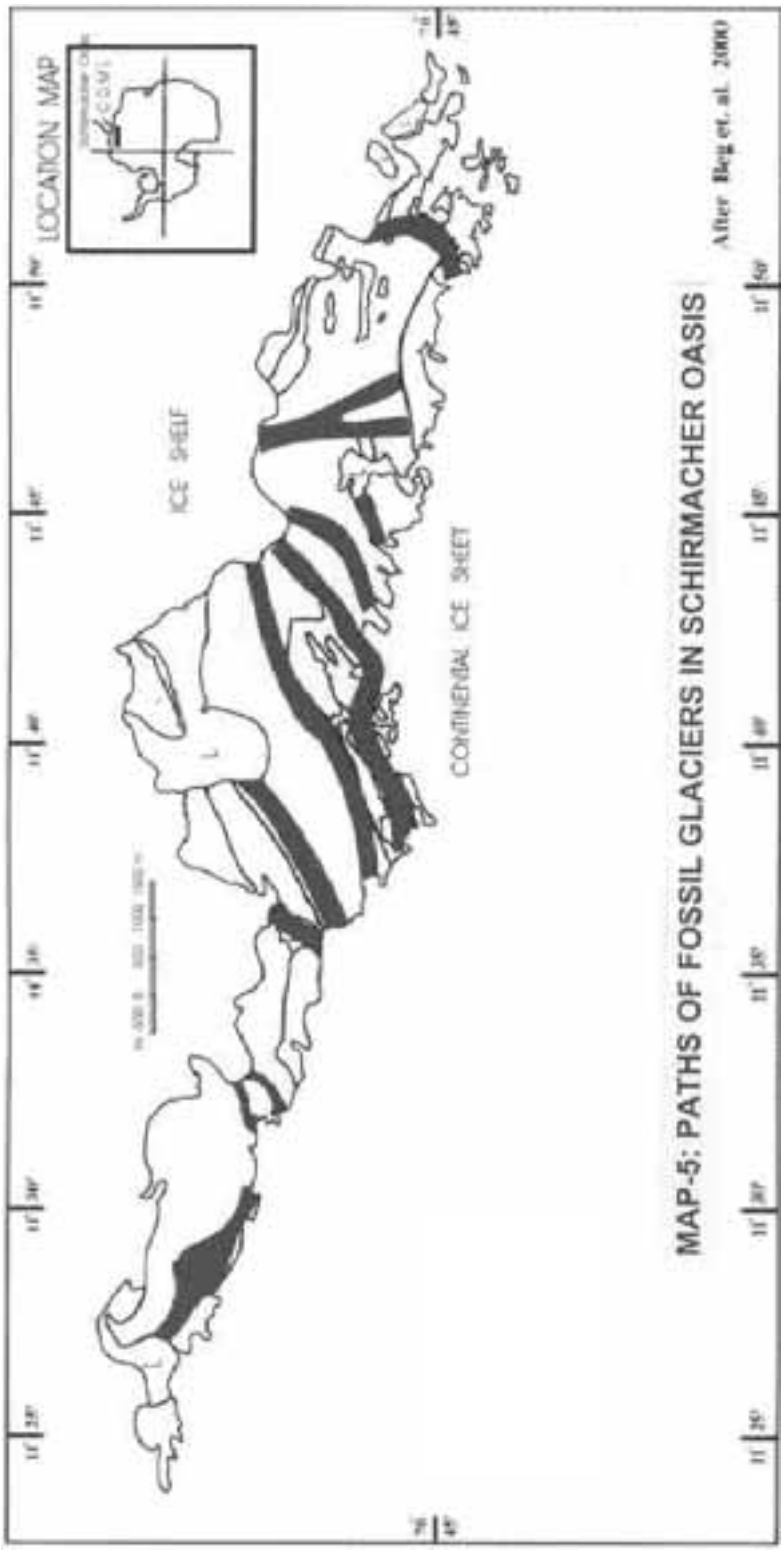
MAP-1: LOACTION MAP OF SCHRIMACHER OASIS

MAP-2: MAP SHOWING LOCATION OF MAITRI (INDIA) & NOVOLAZAREVSKAYA RUSSIA

ICE SHELF
CONTINENTAL ICE SHEET
MAP-3: CLASSIFICATION & NUMBERING OF LAKES
After Jawahara et.al. 2003
Pro-Glacial Lake
Land locked Lake
Small Land locked Lake
Epi-shelf Lake



MAP-4: TOPOGRAPHIC MAP OF THE AREA


LOCATION MAP
ICE SHELF
CONTINENTAL ICE SHEET
MAP-5; PATHS OF FOSSIL GLACIERS IN SCHIRMACHER OASIS
After Berg et. al. 2003

Management Plan for Antarctic Specially Protected Area No. 164

SCULLIN AND MURRAY MONOLITHS, MAC ROBERTSON LAND, EAST ANTARCTICA

1. Description of Values to be Protected

Scullin and Murray Monoliths (67° 47'S 66° 42'E and 67° 47'S 66° 53'E) hold the greatest concentration of breeding seabird colonies in East Antarctica, including the second largest colony of Antarctic petrels *Thalassoica antarctica.* The Scullin and Murray Monoliths ASPA is a breeding locality for at least 160,000 pairs of Antarctic petrels from a minimum estimated global total of approximately half a million pairs (van Franeker *et al.* 1999). Scullin Monolith was recently recognised as a candidate Important Bird Area (IBA) using IUCN/BirdLife International criteria on known breeding populations by the SCAR Bird Biology subcommittee in mid-2002 (SCAR unpubl. data).

Adélie penguin colonies occupy the lower slopes of both monoliths, extending almost to the foreshore. Approximately 50,000 pairs nest on Scullin Monolith and a further 20,000 pairs on Murray Monolith. This represents approximately 10% of the Adélie penguin breeding population for East Antarctica and approximately 3% of the global population.

Many of the ocean-facing slopes of both monoliths are used for breeding by petrels. Extensive breeding colonies of four species of petrels occupy many of the steeper, higher-altitude slopes of both monoliths. The Antarctic petrel colony on Scullin Monolith is second in population only to the colony at Svarthameren in the Mühlig Hofmannfjella, in Dronning Maud Land. South Polar skuas nest throughout the ASPA, making use of the high density of breeding seabirds as prey during their breeding season. (See Figure A and Photograph A).

While larger colonies of seabirds are known from elsewhere in East Antarctica (e.g. the Rauer Group), it is the extensive populations (total known breeding population conservatively estimated at 230,000 pairs equivalent to a minimum of 460,000 individual breeding seabirds) and rich species diversity (seven breeding species) within the very small ice-free areas of Scullin and Murray Monoliths (estimated ice free area of 1.9 and 0.9 km^2, respectively, total of 2.8 km^2) that make these the greatest concentration and one of the most diverse seabird breeding localities known from East Antarctica (Appendix 1).

There are no data on population trends available, and the census and survey data collected in 1986/87 serve as baseline data for all future ornithological work in the Area. Some limited census data were collected from Reference Breeding Groups (RBGs) established in the mid 1980s to monitor the Antarctic petrel population; there have been no surveys of these RBGs for more than a decade. Many Adélie penguin breeding populations throughout East Antarctica have increased in the last 20 or so years, and it is likely that the Adélie penguin population within the Scullin and Murray Monoliths ASPA is greater than the 70,000 pairs reported from 1986/87. Further, it is likely that the 1986/87 census under-estimated the breeding population of Antarctic petrels, given the census occurred late in the breeding season.

Aesthetic and wilderness values

In addition to the outstanding ecological and scientific values already identified, the Area possesses outstanding aesthetic values in the geomorphology of the two Monoliths and the spectacular nature of the glaciers descending from the Continental plateau that flow around the Monoliths ending in

calving glaciers. The near-vertical aspects of both Monoliths dropping to the sea, used by a high number of seabirds for nesting, represent an unique landscape in the Antarctic. The very large breeding assemblage of undisturbed seabirds in a setting of high aesthetic and wilderness values warrants the highest level of protection.

Human history

Recorded visits to Scullin and Murray Monoliths are few. Scullin and Murray Monoliths were first visited during the second BANZARE voyage in 1930-31, on 13th February 1931 (Grenfell Price 1962, Fletcher 1984). A brief landing was made at Scullin Monolith on 26 February 1936 from the R.R.S. *William Scoresby,* when an ascent was made to a height of several hundred metres (Rayner 1940). A landing by the Norwegian, Lars Christensen was made on 30 January 1937, when Scullin Monolith was visited (Christensen 1938, 1939). Australian National Antarctic Research Expeditions (ANARE) personnel have made few visits to the Area from Mawson station, approximately 160 km to the west. The only recorded stay within the Area was a six-day visit (1 - 6 February 1987), when comprehensive ornithological surveys were conducted (Alonso *et al*. 1987). A fibreglass 'Apple' refuge was established within the ASPA for this visit, and as of 13 October 2002, was intact. The first visit by a commercial tourist vessel to the Area was made on 10 December 1992, when passengers were landed at Scullin and Murray Monoliths. Brief tourist visits were made to Scullin Monolith on 7 December 1997, to Scullin and Murray Monoliths on 8 January 1998 and, Scullin and Murray Monoliths on 18 December 2002. Compared to many sites in East Antarctica, Scullin and Murray Monoliths have been visited infrequently, and with the one known exception, all visits have been brief (less than a day). Further, with little activity conducted during those visits, the Area, and in particular the avifauna, is of particular value as a relatively undisturbed area suitable for use in the future as a reference site for other areas that experience a greater level of human visitation and extent of activities.

Nomenclature

Mawson named both Monoliths during the second BANZARE voyage. Murray Monolith was named after Sir George Murray, Chief Justice of South Australia, Chancellor of the University of Adelaide and a patron of the Expedition, while Scullin Monolith was named after James H. Scullin, Prime Minister of Australia from 1929-31.

2. Aims and Objectives

The high concentration and diversity of the ASPA's avifauna requires management strategies that will limit the potential for human activities within the Area to affect the values to be protected. All human activities within the Scullin and Murray Monoliths ASPA will be managed and coordinated to:

- preserve Scullin and Murray Monoliths henceforth as a restricted Area with the goal of ensuring ecosystem integrity and the concomitant minimisation of environmental impacts of human activities;
- avoid degradation to, or substantial risk to, the values of the ASPA by preventing unnecessary human disturbance and activities within the ASPA, and maintain the undisturbed nature of the ASPA to permit its use in future as a reference area;
- permit and facilitate scientific research activities within the ASPA, in particular on the avifauna, while ensuring that the breeding populations are protected through the restriction on the frequency of visits and the types of activities undertaken. Research proposed for the ASPA will be on the basis that it can not be undertaken elsewhere. Non-ornithological research or

activities within the Area must not affect the ornithological values of the ASPA and should be limited to areas outside breeding colonies or nesting sites whenever possible;

- prohibit non-research visits to the ASPA during the summer seabird breeding season;
- prohibit the construction or installation of semi-permanent accommodation in the ASPA (i.e. extending beyond the end of one seabird breeding season);
- prohibit flying of any aircraft within the ASPA during the summer breeding season (1 October to 31 March for the purposes of this Management Plan);
- accord high priority to the collection of seabird census data from representative sample areas, reference breeding colonies (RBGs) or of whole breeding populations. These census data will be major determinants in, and contributions to, future revisions of the management strategy for the ASPA;
- accord high priority to the collection of biological survey data, in particular flora and invertebrate surveys. These survey data will be incorporated into future revisions of the management strategy for the Antarctic Specially Protected Area No. 164;
- minimise the potential for introduction of alien plants, animals and micro-organisms to the ASPA reducing the potential for the introduction of avian pathogens is a primary concern.

3. Management Activities

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

- allow visits for management purposes that address the conservation and ongoing assessment of values, including the identification of new values or the recognition of values no longer present (ie incorporating a dynamic set of values that reflect biological processes within the Area);
- permit research visits to conduct censuses of seabird breeding populations, including mapping of colonies and nest sites. Visits to assess populations or to undertake aerial photography of the colonies shall be undertaken as necessary (preferably no less than one visit every five years);
- markers, signs and other indicators of the Area's extent shall not be erected, maintaining the aesthetic values and undisturbed nature of the Area;
- clothing (and in particular all footwear) and field equipment shall be cleaned before and after entering the Area. Research equipment shall be disinfected where possible and appropriate, to prevent possible introductions to, or contamination of, the Area;
- information on the Scullin and Murray Monoliths ASPA, including restrictions, shall be produced and displayed prominently at Davis and Mawson stations. Copies of this Management Plan will be made available at both stations and via the internet. Copies of the Management Plan will be made available for all visitors;
- visits will be permitted as necessary to facilitate research activities in accordance with the stated aims of the management of the ASPA;
- national Antarctic programs operating in the vicinity or intending to visit the Area shall consult together to ensure that the ASPA is not visited more than once every five (5) years, or that research projects do not overlap or conflict;
- permit visits to remove fuel, grey water, the Apple refuge and associated materials currently stored within the ASPA.

4. Period of Designation

The Area is designated for an indefinite period.

5. Maps and Photographs

- Map A: East Antarctica, Mac. Robertson Land, Location of Antarctic Specially Protected Area Scullin and Murray Monoliths, ASPA No. 165.

  Inset Map: indicates the location in relation to the Antarctic continent.

  Map Specifications: Projection: Lambert Conical Conformal; Horizontal Datum: WGS84;Vertical Datum: Mean Sea Level.
- Map B: Antarctic Specially Protected Area Scullin and Murray Monoliths, ASPA No. 165. Showing protected area at Scullin Monolith.

  Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level.
- Map C: Antarctic Specially Protected Area, Scullin and Murray Monoliths, ASPA No. 165. Showing protected area at Murray Monolith.

  Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level.
- Map D: Antarctic Specially Protected Area, Scullin and Murray Monoliths, ASPA No. 165, Showing Helicopter Approach for Scullin Monolith.

  Map Specifications: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level.
- Photograph A: Oblique aerial photograph of Scullin Monolith with seabird colonies shown, 2003.

6. Description of the Area

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

Scullin Monolith (67° 47'S, 66° 42'E) and Murray Monolith (67° 47'S, 66° 53'E) are situated on the coast of Mac. Robertson Land approximately 160 km east of Mawson station (Map A). Scullin and Murray Monoliths are approximately 7 km apart and abut the sea at the edge of the continental ice sheet. The coastline to the west and east, and between the Monoliths, consists of ice cliffs 30 - 40 m high; the Antarctic plateau rising steeply from there to the south. Scullin Monolith is a crescent-shaped massif whose highest point is 433 m ASL. It encloses a broad north-facing cove with an entrance approximately 2 km wide. The upper slopes of the Monolith are everywhere precipitous, but in the lower 100 m the slope eases in many parts and these areas are strewn with boulders and large stones. Elsewhere in the lower parts the rock face falls sheer to the sea, and there are some scree slopes.

The walls of Murray Monolith rise at between 70° and 80° from the sea to a dome-shaped summit at 243 m ASL. On the western side of the Monolith, the lower slopes drop to a coastal platform. There are several other rock outcrops inland of the Monolith, and these are included in the ASPA. The protected area extends over all ice-free areas associated with the two Monoliths, including a few small islets and rocks.

The Scullin and Murray Monoliths ASPA comprises two sectors:

- Scullin Monolith: the boundary commences at a coordinate on the coastline at 67°47'01"S, 66°40'31"E (A), then in a southerly direction to a coordinate at 67°48'03"S, 66°40'26"E (B),

east to a coordinate at 67°48’06"S, 66°44’33"E (C) then north to a coordinate on the coast at 67°46’41"S, 66°44’37"E (D), then west following the coast line at the low tide mark to the coordinate 67°48’03"S, 66°40’26"E (A). See Map B.

- Murray Monolith: the boundary commences at a coordinate on the coastline at 67°46’29"S, 66°51’01"E (A), then in a southerly direction to a coordinate at 67°48’03"S, 66°50’55"E (B), east to a coordinate at 67°48’05"S, 66°53’51"E (C) then north to a coordinate on the coast at 67°46’42"S, 66°53’59"E (D), then west following the coast line at the low tide mark to the coordinate 67°46’29"S, 66°51’01"E (A). See Map C.

Geology

The geology of the two Monoliths is poorly known, as they have been neither the subject of dedicated study (but see Tilley 1940) nor specific geological mapping. What is known is summarised briefly in Tingey (1991). The geology of the Monoliths appears to be similar in general terms to that of the region around Mawson. The rocks consist dominantly of high grade-granulite facies gneisses of metasedimentary origin, including some sapphirine bearing rocks. The metamorphism occurred in anhydrous conditions probably at about 1000Ma. Arriens (unpublished data; see Tingey 1991) determined ages of 1075 and 829Ma for the metamorphic age of the gneisses from Scullin Monolith but ages elsewhere as great as 1254Ma and as young as 625Ma have been documented. Metamorphism involved sedimentary rocks initially of Proterozoic age. These metamorphic basement rocks were intruded at about 920-985Ma by the Mawson Charnockite a form of granite characterised by presence of orthopyroxene, and common in this region. It forms the faces of the monoliths. Takigami *et al.* (1992) recorded an age of 433 and 450Ma which may reflect a later influence of the ‘500 Ma or Pan-African event’ recorded widely throughout Gondwana. The margins of the Monoliths contain some sediment carried by the icesheet and deposited by melting ice. The source cannot be specified but it may contain recycled material from farther inland and could perhaps provide evidence of some of the geology beneath the ice.

Vegetation

The flora reported from Scullin Monolith is given in Appendix 3, based on visits in 1972 and 1987. All species of lichens and moss found on Scullin Monolith occur elsewhere in Mac. Robertson Land (Filson 1966, Bergstrom and Seppelt 1990). Vegetation on Scullin Monolith is restricted mainly to the western plateau and associated nunataks. The coastal slopes are generally devoid of vegetation due to high levels of seabird guano. The distribution of vegetation on the western plateau is influenced by microtopography that controls the extent of exposure and moisture availability.

Other biota

No invertebrates have been recorded from Scullin and Murray Monoliths. A leopard seal *(Hydrurga leptonyx)* was sighted during the 1936 visit (Rayner 1940) and several Weddell seals *(Leptonychotes weddellii)* were observed during the 1997 and 1998 visits (PG Quilty, pers. comm.); no further observations of biota have been reported. Appendix 2.

6(ii) Restricted and managed zones within the Area

During the summer breeding season (1 October to 31 March), access to all areas occupied by, or adjacent to, colonies or nesting sites of seabirds shall be restricted. Ornithological research as authorised by permit may be conducted within the seabird colonies. Non-ornithological research may be conducted in the Area during the summer breeding season if it does not disturb nesting birds. Non-scientific visits and landings within the Area are prohibited during the summer breeding season.

6(iii) Structures within and near the Area

As of 13 October 2002, a fibreglass 'Apple' refuge is situated on the southwestern summit ridge of Scullin Monolith. There are four (4) 200-litre drums of helicopter fuel and one (1) empty 200-litre drum as well as the (reported) remains of a food cache (1985/86 vintage). It is intended that all of this material be removed from the Area at the first opportunity.

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

There are two ASPAs located to the west of Scullin and Murray Monoliths; Rookery Islands Antarctic Specially Protected Area No. 102 is approximately 180 km to the west (c.20 km west of Mawson), and Taylor Rookery Antarctic Specially Protected Area No. 101 approximately 75 km further west of the ASPA No. 102.

7. Permit conditions

Entry to the Area is prohibited except in accordance with a Permit issued by an appropriate national authority. Any Treaty Party wishing to conduct research within the Area should contact the Australian Antarctic Division to ensure that the frequency of visits does not exceed that permitted in the Management Plan (the current level deemed to be appropriate is no more than one visit every five (5) years). Permits to enter the Area may be issued during the non-breeding period, specifically from 1 April to 30 September, for compelling scientific research that cannot be undertaken elsewhere, or for essential management purposes consistent with the objectives and provisions of the Management Plan. Permits are only to be issued for research that will not jeopardise the ecological or scientific values of the Area, interfere with existing scientific studies, or impact on the ecological integrity of the Area.

Activities permitted within the Area include those addressing management needs such as inspection and the review of the Management Plan.

Restrictions listed within this document must be incorporated into permit conditions.

Conditions that must be included in the Permit are provisions that the issuing authority may include additional conditions, consistent with the objectives and provisions of the Management Plan. The Principal Permit Holder for each Permit issued shall submit to the Permit issuing authority a visit report detailing all activities undertaken within the Area.

Permits issued to enter the Area shall include the following requirements:

- the Permit or an authorised copy shall be carried at all times when within the Area;
- a Visit Report shall be supplied to the appropriate national authority at the conclusion of the permitted activity;
- the types of activities and specific periods for which they are authorised shall be specified. Activities not detailed on the Permit are prohibited. Permits shall be issued for a single season only, and will not allow entry to the Area for more than 120 days; and
- specification of the minimum number of people required to undertake the permitted activities within the Area. No more than 10 people are to be within the Area at any time during the breeding season, and no more than 15 for the remainder of the year.

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

- vehicles are prohibited within the Area during the summer breeding season;

- access to the Area for researchers and management-related visits shall be by inflatable rubber boats, over-snow/ice vehicles or by helicopters. Movement by visitors within the Area shall be by foot only;
- access to the Area for all other (non-research, non-management) visits is restricted to shoreline approaches by inflatable rubber boats, with no landings permitted;
- inflatable boats used to approach the Area must be operated at or below five (5) knots within 500 m of the shore. No approach within fifty (50) metres from shore shall be permitted;
- any movement within the Area shall observe the minimum specified approach distances for nesting birds (Appendix 4); closer approach may be allowed specifically under permit;
- to reduce disturbance to wildlife, noise levels including verbal communication are to be kept to a minimum. The use of motor-driven tools and any other activity likely to generate loud noise and thereby cause disturbance to nesting birds shall not be allowed within the Area during the summer seabird breeding season (1 October to 31 March).

Aircraft may be used to enter the Area subject to the following conditions:

- there shall be no overflights of the Area below 1500 m (twin-engine aircraft) and below 750 m (single-engine) during the breeding season (1 October to 31 March);
- refuelling is not to take place within the Area;
- landings within the period 1 October to 31 March shall only occur at the designated landing site and only by single-engine aircraft;
- helicopter overflights for aerial photography are permitted subject to overflight altitude conditions specified above;
- helicopters shall approach the landing site from the south-west (as shown by the approved flight corridor in Appendix 5). Under no circumstances are aircraft to fly within the Scullin Monolith amphitheatre during the breeding season;
- there are no restrictions on the operation of aircraft outside the breeding season (1 October to 31 March).

Exemptions from any or all of the above conditions are only permitted in emergency.

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

The following activities may be conducted within the Area between 1 October and 31 March as authorised by permit:

- scientific research and essential management activities consistent with this Management Plan that do not affect the values of the Area or its ecosystem integrity;
- compelling scientific research that cannot be undertaken elsewhere, including the initiation or continuance of ongoing monitoring programmes.

The following activities may be conducted within the Area between 1 April and 30 September as authorised by permit:

- scientific research that does not impact or interfere upon the values identified in the Management Plan, either in the short term or the long term;
- management activities consistent with the aims of this Management Plan.

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

No permanent structures are to be erected within the Area.

7(iv) Location of field camps

Temporary camps for field parties are permitted within the Area, but must be placed as far from seabird colonies and nesting sites as is practicable without compromising visitor safety. Camps shall be established for the minimum time necessary to undertake approved activities and shall not be allowed to remain from one seabird breeding season to the next.

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

- A small amount of fuel is permitted within the Area for field parties for cooking purposes. Fuel is not to be stored unattended within the Area. Aircraft and IRB refuelling within the Area is prohibited.
- No poultry products, including dried foods containing egg powder, are to be taken into the Area.
- No herbicides or pesticides are to be taken into the Area.
- All chemicals required for research purposes must be approved by Permit, and shall be removed at or before the conclusion of the permitted activity to which they relate. The importation and use of radio-nucleides and stable isotopes within the Area is prohibited.
- The highest level precautions shall be employed to prevent the introduction to the Area of micro-organisms, including pathogens. No living organisms shall be deliberately introduced to the Area. Clothing (and in particular all footwear) and field equipment shall be cleaned before entering the Area. Research equipment shall be disinfected where possible and appropriate, to prevent possible contamination of the Area.

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

Taking of, or harmful interference with, native flora and fauna are prohibited unless specifically authorised by permit issued in accordance with Article 3 of Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Disturbance to wildlife should be avoided at all times.

7(vii) Collection or removal of anything not brought into the Area by the Permit Holder

Material of human origin likely to compromise the values of the ASPA, which was not brought into the Area by the Permit Holder or was otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material *in situ*. If such material is found the Australian Antarctic Division and the Permit Issuing Authority (if different) shall be notified if possible while the field party is present within the Area.

Specimens of natural material may only be collected or removed from the ASPA as authorised in a Permit and should be limited to the minimum necessary to meet scientific or management needs.

7(viii) Disposal of waste

No wastes, including human wastes, are to be left within the Area. Wastes from field parties shall be stored in such a manner to prevent wildlife (e.g. skuas) scavenging until such time as the wastes can

be disposed or removed. Wastes are to be removed no later than the departure of the field party. Human wastes and grey water may be disposed into the sea.

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

- The maximum number of people within the Area at any time during the breeding season (1 October to 31 March) is 10. There will be a maximum of 15 people for all other times of the year.
- Ornithological research shall be limited to activities that are non-invasive and non-disruptive to the breeding seabirds present within the Area. Surveys, including aerial photographs for the purposes of population census, shall have a high priority.
- All GPS, survey and census data collected by field parties visiting the Area shall be made available to the Permit Issuing Authority and the Australian Antarctic Division (if different).
- These data shall be lodged in the Antarctic Master Data Directory through the Australian Antarctic Data Centre.

7(x) Requirements for reports

All visit reports shall provide detailed information on all census data, locations of any new colonies or nests not previously recorded, as texts and maps; a brief summary of research findings, copies of all photographs taken of the Area, and comments indicating measures taken to ensure compliance with permit conditions. Where appropriate, the report may make recommendations relevant to the management of the Area, in particular, as to whether the values for which it was designated are being adequately protected and whether management measures are effective.

The report should be submitted as soon as practicable after the visit to the Area has been completed, but no later than six months after the visit has occurred. A copy of the report should be made available to the Permit Issuing Authority and the Australian Antarctic Division (if different) for the purposes of reviewing the Management Plan in accordance with the Antarctic Treaty system requirements. Reports should include a completed SCAR Visit Report, or such information as required by national laws. The Permit Issuing Authority should maintain a record of the report for an indefinite period and shall make it available to SCAR, CCAMLR, COMNAP, and to interested parties if requested.

8. Supporting documentation

Alonso J.C., Johnstone G.W., Hindell M., Osborne P. & Guard R. (1987): Las aves del Monolito Scullin, Antártida oriental (67° 47'S, 66° 42'E). In: *Castellvi J (ed) Actas del Segundo symposium Espanol de estudios antarcticos, pp. 375-386, Madrid.*

Christensen L. (1938): My last expedition to the Antarctic 1936 - 1937. JG Tanum, Oslo. Christensen L 1939. *Charting the Antarctic. Polar Times 8, 7-10.*

Filson R.B. (1966): The lichens and mosses of Mac. Robertson Land. *ANARE Scientific Reports B(II) Botany.*

Takigami Y., Funaki M. & Tokieda K. (1992): ^{40}Ar-^{39}Ar geochronological studies on some paleomagnetic samples of East Antarctica. *in Y.* Yoshida *et al.* (editors) *Recent Progress in Antarctic Earth Science,. pp 61-66, Tokyo, Terra Scientific Publishing Co.*

Tilley C.E. (1940): Rocks from Mac. Robertson Land and Kemp Land, Antarctica. *Discovery Reports, XIX, 165-184.*

Tingey R.J. (1991): The regional geology of Archaean and Proterozoic rocks in Antarctica. *in* Tingey RJ (ed) *The Geology of Antarctic,. pp 1-73, Oxford, Oxford Science Publications.*

van Franeker J.A., Gavrilo M., Mehlum F., Veit R.R. & Woehler E.J. (1999): Distribution and abundance of the Antarctic Petrel. *Waterbirds 22, 14-28.*

Appendix 1. Breeding populations (pairs) of seabirds at Scullin and Murray Monoliths

Species	Scullin Monolith	Murray Monolith
Adélie penguin *Pygoscelis adeliae*	49,500	20,000
Southern fulmar *Fulmarus glacialoides*	1,350	150
Antarctic petrel *Thalassoica antarctica*	157,000	3,500
Cape petrel *Daption capense*	14	ND
Snow petrel *Pagodroma nivea*	1,200	ND
Wilson's storm petrel *Oceanites oceanicus*	ND	ND
South polar skua *Catharacta maccormicki*	30	ND
Note: ND indicates no census data are available		

Appendix 2. Seals recorded at Scullin and Murray Monoliths

Leopard seal *Hydrurga leptonyx*

Weddell seal *Leptonychotes weddellii*

Appendix 3. Flora recorded at Scullin Monolith

The following taxa were collected at Scullin Monolith in 1972 (R Seppelt) and in 1987 (D Bergstrom), and were published in Bergstrom and Seppelt 1990).

LICHENS	
Acarosporaceae	**Teloschistaceae**
Biatorella cerebriformis (Dodge) Filson	*Caloplaca citrina* (Hoffm.) Th. Fr.
Acarospora gwynii Dodge & Rudolph	*Xanthoria elegans* (Link.) Th. Fr.
Lecanoraceae	*Xanthoria mawsonii* Dodge
Lecanora expectans Darb	**Candelariaceae**
Rhizoplaca melanophthalma (Ram.) Leuck. et Poelt	*Candellariella hallettensis* Murray
Lecideaceae	**Umbilicariaceae**
Lecidea phillipsiana Filson	*Umbilicaria decussata* (Vill.) Zahlbr.
Lecidea woodberryi Filson	**Usneaceae**
Physciaceae	*Usnea antarctica* Du Rietz
Physcia caesia (Hoffm.) Hampe	*Pseudophebe miniscula* (Nyl. Ex Arnold) Brodo et
Buellia frigida Darb	Hawksw.
Buellia grimmiae Filson	
Buellia lignoides Filson	**BRYOPHYTES**
Rinodina olivaceobrunnea Dodge & Baker	**Grimmiaceae**
	Grimmia lawiana Willis
	Pottiaceae
	Sarconeurum glaciale (C. Muell.) Card. Et Bryhn

Appendix 4. Approach distances guide: minimum distances (m) to maintain when approaching wildlife without permit

Species	People on foot/ski	Quad/skidoo	Hagglunds
Southern Giant Petrel	100	150	250
Emperor penguins in colonies	30		
Other penguins in colonies Moulting penguins Seals with pups Seal pups on their own Prions and petrels on nest South Polar Skua on nest	15		
Penguins on sea ice Non-breeding adult seals	5		

Notes:

1. These distances are a guide, and should you find that your activity is disturbing wildlife, a greater distance is to be maintained.

2. Watercraft and aircraft operations must comply with the minimum approach distances and other requirements outlined in the ANARE Small Boat Operations Manual and Flight Paths for Helicopter Operations in the Australian Antarctic Territory, respectively.

These are available at:

http://www.aad.gov.au/goingsouth/expeditioner/manuals/default.asp

http://www.aad.gov.au/goingsouth/sao/Heli flight paths.asp

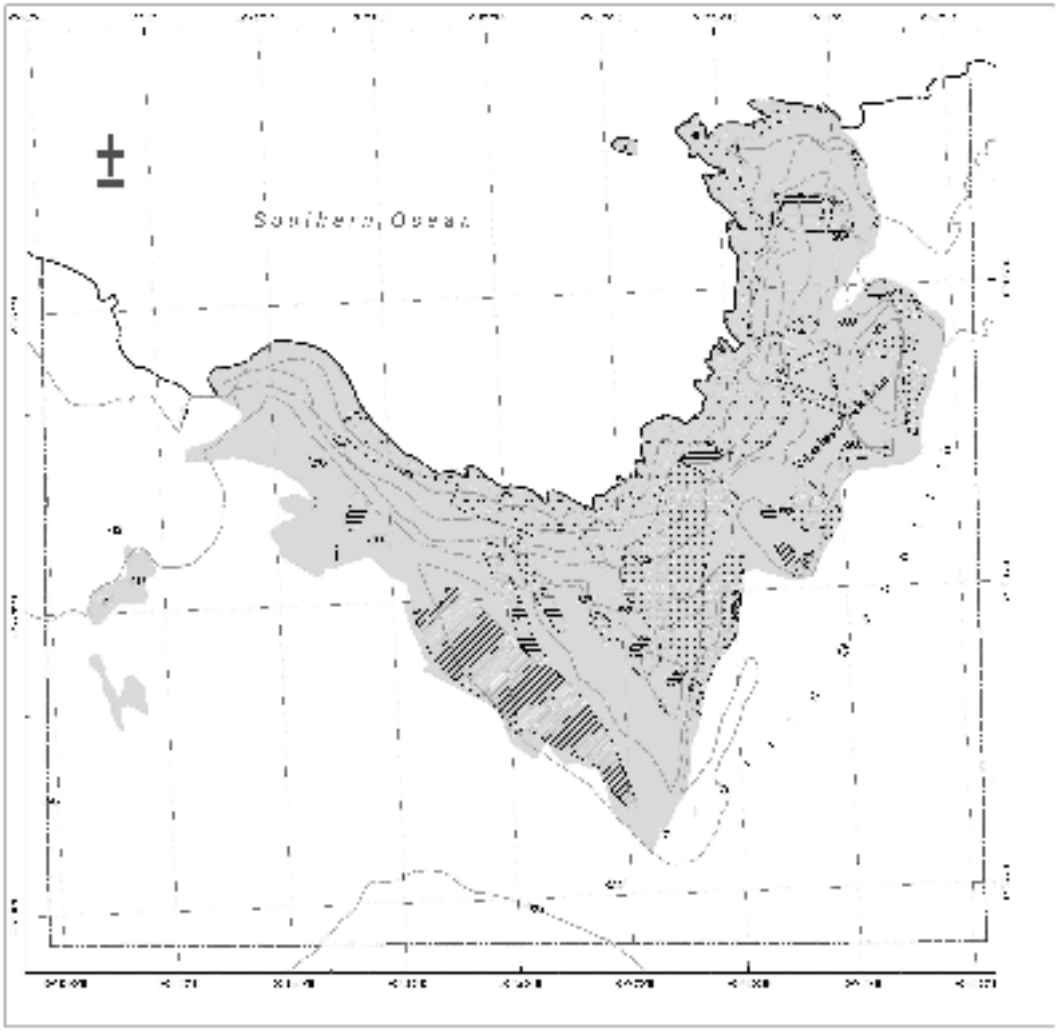
3. 'Prions and petrels' comprises Cape petrels, Antarctic petrels, Wilson's storm petrels, snow petrels and southern fulmars.

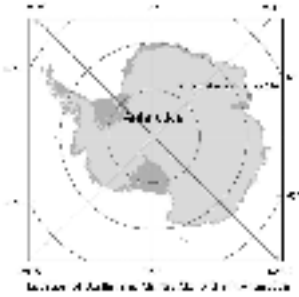
Appendix 5. Vehicular activities permitted in the vicinity of Scullin and Murray Monoliths ASPA during the breeding and non breeding season

Activity	Breeding season	Non-breeding season
Helicopter operations (single engine)	750 m horizontal and vertical buffer zone. Landing permitted only at designated site (see map).	Landing permitted only at designated site (see map).
Helicopter operations (twin engine)	1500 m horizontal and vertical buffer zone. No landings permitted.	Landing permitted only at designated site (see map).
Boating operations	No approach closer than 100m from shore, no landings. Boats to be operated at less than 5kn between 500m and 100m from shore.	Landings permitted.

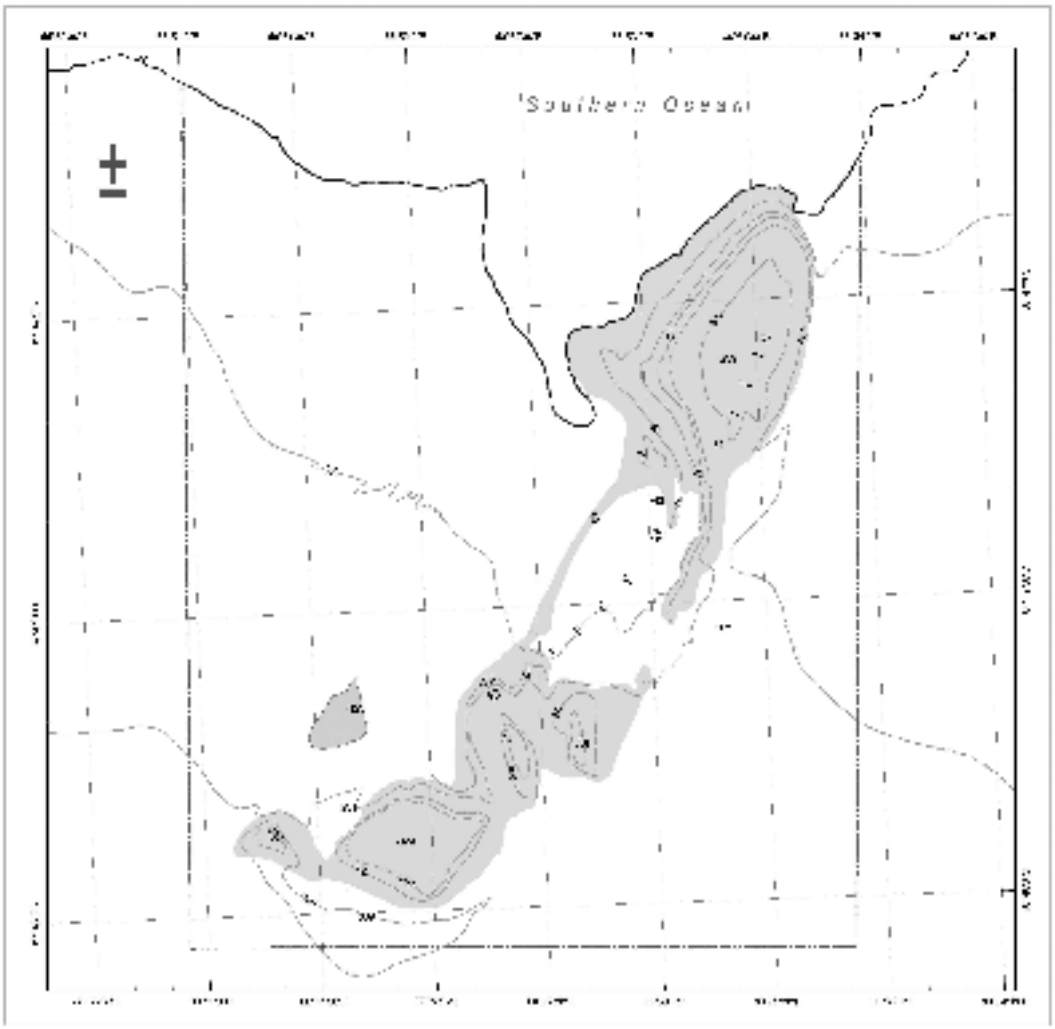
Map A: Antarctic Specially Protected Area No 164
Mac.Robertson Land, East Antarctica
Legend

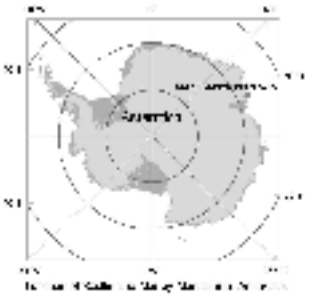
Map B: Antarctic Specially Protected Area: No 164
Scullin and Murray Monoliths, Mawson Coast,
Mac.Robertson Land, East Antarctica
Detail Scullin Monolith: Topography and Bird Distribution



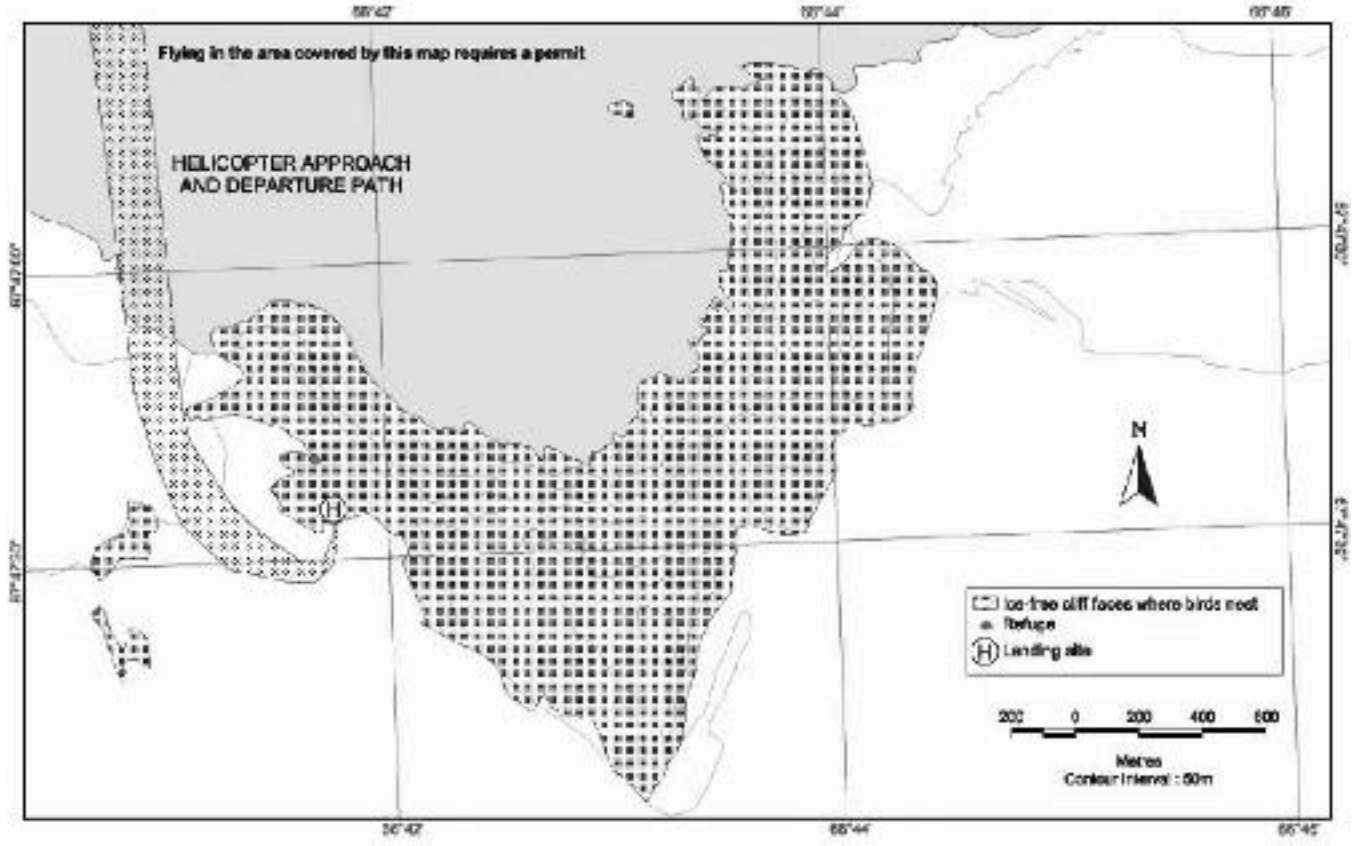


Map C: Antarctic Specially Protected Area: No 164 Scullin and Murray Monoliths, Mawson Coast, Mac.Robertson Land. East Antarctica
Detail Murray Monolith: Topography





Map D: Antarctic Specially Protected Area No 164, Scullin and Murray Monoliths, Mawson Coast, East Antarctica. Helicopter Approach to Scullin Monolith



Photograph A: Antarctic Specially Protected Area No 184, Scullin and Murray Monoliths, Mawson Coast, East Antarctica. Oblique Aerial Photograph of Scullin Monolith.
[unreadable] and Antarctic Division Map Catalogue No. 15160.

Measure 3 (2005)

Antarctic Specially Managed Area and Antarctic Specially Protected Areas: Designation and Management Plans: Deception Island

The Representatives,

Recalling Articles 3, 4, 5 and 6 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty (the Protocol), providing for the designation of Antarctic Specially Protected Areas (ASPA) and Antarctic Specially Managed Areas (ASMA) and the approval of Management Plans for those Areas;

Recalling Article 8 of Annex V to the Protocol regarding Historic Sites and Monuments (HSM);

Recalling Recommendation XIII-8 (1985) which designated Shores of Port Foster, Deception Island as Site of Special Scientific Interest (SSSI) No. 21 and annexed a Management Plan for it; and Decision 1 (2002) which renamed and renumbered it as ASPA No. 140: Parts of Deception Island;

Recalling Recommendation XIV-5 (1987) which designated Port Foster, Deception Island as SSSI No. 27 and annexed a Management Plan for it; and Decision 1 (2002) which renumbered it as ASPA No. 145;

Recalling Measure 3 (2003) which revised and updated the "List of Historical Sites and Monuments" in which HSM No. 71: Whalers Bay, Deception Island, and HSM No. 76: Base Pedro Aguirre Cedra Station, are listed;

Noting that the Committee for Environmental Protection has advised that Deception Island be designated as an ASMA and has endorsed the Management Plan annexed to this Measure;

Recognising that Deception Island is an area where activities are being conducted, in which it is desirable to plan and co-ordinate activities, avoid possible conflicts, improve co-operation between Parties and avoid possible environmental impacts;

Desiring to designate Deception Island as an ASMA, within which ASPA No. 140, ASPA No. 145, HSM No. 71 and HSM No. 76 are located, and to approve a Management Plan for the Area;

Desiring also to amend the Management Plans for ASPA No. 140 and ASPA No. 145, to revise the boundaries of ASPA No. 140 and to update the content of both Plans;

II. Measures

Noting that Deception Island contains marine areas and that the Commission for the Conservation of Antarctic Marine Living Resources approved the Management Plan for this area at its 23rd meeting;

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. Deception Island, South Shetland Islands be designated as Antarctic Specially Managed Area No. 4;
2. the Management Plan for Antarctic Specially Managed Area No. 4: Deception Island, South Shetland Islands, contained in the Annex to this Measure, be approved;
3. the revised Management Plan for ASPA No. 140: Parts of Deception Island, contained in Appendix 1 to the Annex to this Measure, be approved;
4. the revised Management Plan for ASPA No. 145: Port Foster, Deception Island, contained in Appendix 2 to the Annex to this Measure, be approved;
5. the Management Plan for ASPA No. 140: Parts of Deception Island, annexed to Recommendation XIII-8 (1985), shall cease to be effective;
6. the Management Plan for ASPA No. 145: Port Foster, Deception Island, annexed to Recommendation XIV-5 (1987), shall cease to be effective.

Deception Island

Management Package

Introduction

Deception Island is a unique Antarctic island with important natural, scientific, historic, educational, aesthetic and wilderness 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 Dirreción 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, this 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 this Management Package for Deception Island.

Management Plan for Antarctic Specially Managed Area No. 4

DECEPTION ISLAND, SOUTH SHETLAND ISLANDS

Latitude 62°57'S, longitude 60°38'W

1. Values to be protected and activities to be managed

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

i. Natural value

- Deception Island is one of only two volcanoes in the Antarctic at which 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 at the South Pole. The volcano erupted during two short periods during the 20th century, most recently between 1967-1970. It contains a restless caldera that is actively deforming. It is therefore likely that Deception Island will witness further eruptions in the future.
- The Area has an exceptionally important flora, 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*).
- Eight species of seabird breed on the island, including the worlds largest colony 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 seismological and biological data-sets have been collected at Decepción Station (Argentina) and Gabriel de Castilla Station (Spain).

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 whaler 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 an unique Antarctic landscape.

iv. Educational and Tourism activities

- Deception Island is the only place 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.

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;
- 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;
  - 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 the Code of Conduct for the Facilities Zone (Appendix 4), and the Code of Conduct for Visitors (Appendix 5). These Codes of Conduct 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;
- 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. General description, including geographical co-ordinates, boundary markers and natural featuresthat delineate the area.

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 km^3 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 18^{th} and 19^{th} centuries, when numerous eruptions occurred. By contrast, 20^{th} 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 coast. 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 monthly temperatures range from 11°C to – 28 °C. Precipitation, which falls on more than 50% of summer days, is high, 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 an 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.

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 detail 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).

Birds

Eight species of bird breed within the Area. The most numerous is the chinstrap penguin (*Pygoscelis antarctica*), with an estimated 140,000 to 191,000 breeding pairs. The largest rookery is at Baily Head, with an estimated 100,000 breeding pairs. Macaroni penguins (*Eudyptes chrysolophus*) occasionally nest in small numbers on the island, their southernmost breeding limit. Brown skuas (*Catharacta antarctica lonnbergi*), kelp gulls (*Larus dominicanus*), cape petrels (*Daption capensis*), Wilson's storm-petrels (*Oceanites oceanicus*), Antarctic terns (*Sterna vittata*) 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.

ii. Structures within the Area

Decepción Station (Argentina) (latitude 62º58' 20"S, longitude 60º 41'40"W) is situated on the southern shore of Fumarole Bay. Gabriel de Castilla Station (Spain) (latitude 62º58'40"S, longitude 60º40'30"W) is located approximately 1km 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 (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 unnamed 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. 7, 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;
- Three further sites requiring special management provisions are also located at Pendulum Cove, Baily Head and an unnamed beach at the eastern end of 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)

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 compelling circumstances.

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.

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;

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.

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 high 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 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).

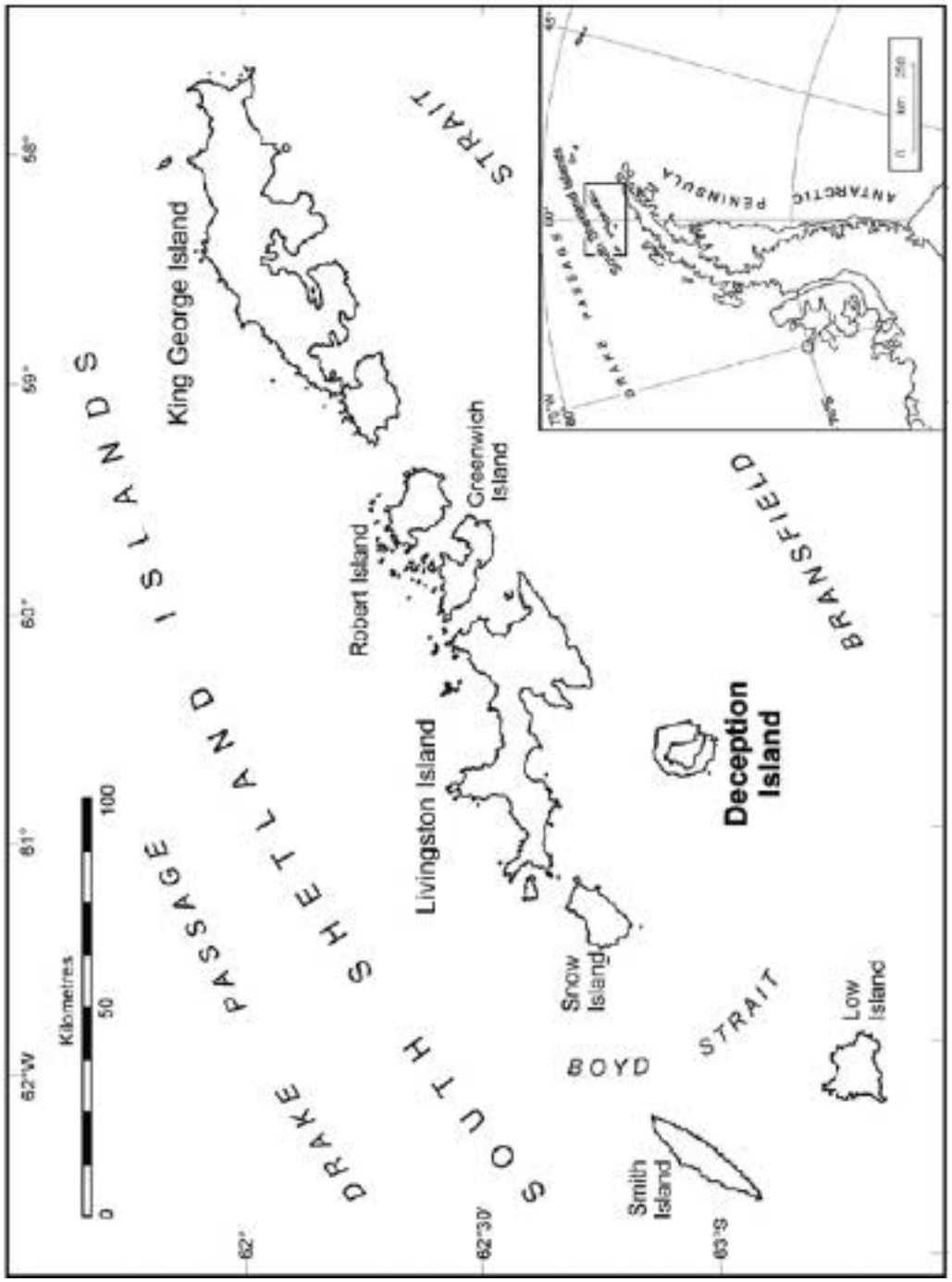
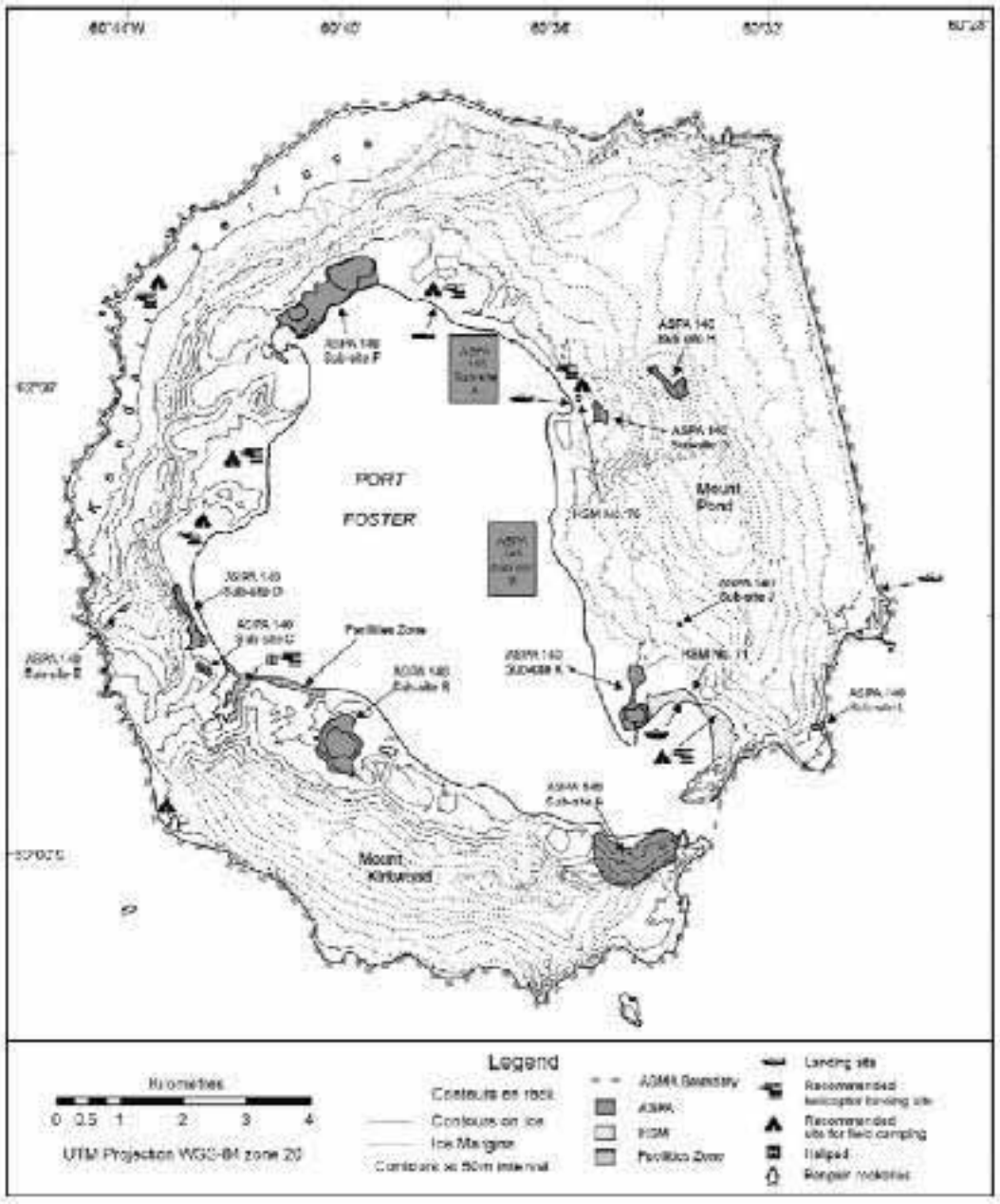


Figure 1. The location of Deception Island in relation to the South Shetland Islands and the Antarctic Peninsula

Figure 2. Deception Island - Topography

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



Management Plan for Antarctic Specially Managed Area No. 140

PARTS OF DECEPTION ISLAND, SOUTH SHETLAND ISLANDS

1. Description of values to be protected

Deception Island (latitude 62º57'S, longitude 60º38'W) 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, Lewis Smith 1984*a*, *b*). There are a number of sites of geothermal activity, some with fumaroles (Smellie *et al*. 2002).

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 which provide known-age habitats for the study of colonisation and other dynamic ecological processes by terrestrial organisms (Lewis Smith 1988).

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 a detailed botanical survey of the island in 2002, the values specified in the original designation were reaffirmed and considerably augmented. The survey identified 11 sub-sites of unique botanical interest.

Those interests were:

- The island has the greatest number of rare[1] and extremely rare[2] plant species of any site in the Antarctic. 28 of the 54 mosses recorded on the island, 4 of the 8 liverworts and 14 of the *ca*. 75 lichen are considered to be rare or extremely rare. Appendix A 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 *ca*. 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.* in press, Øvstedal & Lewis Smith 2001). 13 species of moss (including two endemics), 2 species of liverwort and 3 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 becomes established only where favourable germinating conditions prevail (e.g. the heat and moisture provided around fumaroles) (Lewis Smith 1984*a*, *b*). Such sites are unique in the Antarctic Treaty Area.

[1] Known to grow at a few localities in the Antarctic and often in small quantity.

[2] Known to grow at only one or two localities in the Antarctic.

- 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 30ºC to 50ºC, 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 re-colonisation.
- 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 within and beyond the original site. This correlates with the current trend in regional climate change, particularly increasing temperature.

2. Aims and objectives

Management of the Area aims to:

- preserve each site for its potential scientific research value, particularly monitoring floristic and ecological change, colonisation processes and community development;
- avoid degradation of the botanical, vulcanological, or geomorphological values of the Area by preventing unnecessary human disturbance;
- minimise potential conflicts of interest within the Area between scientists of different disciplines (e.g. biologists and vulcanologists), and between scientists and tourists;
- minimise the possibility of the introduction of alien plants and other biota to the Area by human activities;
- ensure that the flora is not adversely affected by excessive sampling within the Area;
- allow research within the Area of a compelling scientific nature which cannot be served elsewhere, and which is consistent with the objectives of this Management Plan;
- allow visits for management purposes and to resurvey the state of the botanical values for which each site has been designated, in support of the aims of this Management Plan.

3. Management activities

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

- each of the botanical sub-sites shall be clearly marked with signs and boundary markers, where practicable;

- 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 erected within each site for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer necessary;
- equipment or materials shall be removed from the sites once no longer required;
- a map showing the location of each sub-site on Deception Island (stating any special restrictions that apply) shall be displayed prominently 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.

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 sub-sites A – L (Scale 1:100 000).

Figures 1a–d: Topographic Maps of Antarctic Specially Protected Area No.140 showing sub-sites A – L (Scale 1: 25000).

6. Description of the Area

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

The Area comprises 11 sub-sites, shown in Maps 1 and 1a-1d. 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 very disjunct distribution and is consequently restricted to widely scattered, and often very small, habitats.

The sub-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.

Site A - Collins Point: The north-facing slopes between Collins Point and the unnamed point 1.15 km to the east (0.6 km west of Entrance Point), directly opposite Fildes Point, and extending from the back of the beach to a ridge from 0.5 and 1 km inland from the shoreline. The eastern boundary of Site A runs due south from the shore, following the outline of a ridge to an elevation of 184 m. The western boundary extends from Collins Point, following a ridge due south to an elevation of 145 m. The southern boundary follows the arcuate ridge crest running from east to west, following a line of summits (172, 223 and 214 m) joining points 184 and 145 m. The beach area, including the Collins Point light beacon (maintained by the Chilean Navy), to the 10 m contour is excluded from the site.

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 very recently become established, while the large liverwort *Marchantia berteroana* is a fairly recent and spreading colonist.

Site B - Crater Lake: This site extends from the foot of the northern slope of the broad valley *ca*. 300 m north of Crater Lake to the slope *ca*. 300 m south of the south side of the lake, including the lake, to the ridge lines of the crater *ca*. 50 m to the west and east of the lake, and lower scree *ca*. 10 m south of the shoreline at the south-west corner of the Site. The principal area of botanical interest lies on a scoria-covered lava tongue above the south-east of the lake, up to the 50 m contour. The site was unaffected by the recent eruptions.

The extensive, virtually monospecific, moss carpet (*Sanionia uncinata*), on the floor of the northern valley, is one of the largest continuously vegetated stands on the island. 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.

Site C - Unnamed hill, southern end of Fumarole Bay: A narrow line of fumaroles extending *ca*. 30-40 x 3 m along the gently sloping summit ridge at *ca*. 105-107 m elevation on the unnamed hill above the north-west side of the unnamed intertidal lagoon northwest of Decepción Station (Argentina) at the southern end of Fumarole Bay. Commencing 10 m WNW of the summit cairn, the site extends in a rectangular strip along the ridge crest 5 m beyond the outermost fumaroles all around the Site. Access to the cairn is not restricted.

Several rare species of moss, some unique to the island, colonise the heated soil crust close to the line of vents.

Site D - Fumarole Bay: 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. 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.

The southern boundary of the site extends from a prominent massive yellow tuff boulder at the back of the beach above a shallow pool, westwards to the foot of the southernmost yellowish tuff cliff face above central Fumarole Bay. The eastern boundary runs northwards along the break-of-slope at the back of the beach for 1 km to a prominent outcrop of grey lava just north of a crimson lava cliff. The northern boundary extends from this point westwards to the foot of the Stonethrow Ridge cliffs. The western boundary follows the 75 m contour. The flat beach area from the shore, including a prominent inter-tidal fumarole, to the break-of-slope is excluded from the site.

Site E - West Stonethrow Ridge: The site is a red scoria cone lying at *ca*. 270 m altitude, *ca*. 600 m south-south-west of the highest point on Stonethrow Ridge (330 m), west of central Fumarole Bay. It comprises two parts, each with fumaroles, the total area covering about 400 m^2. The boundary extends to 5 m beyond all evidence of geothermal activity.

This 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 (also noted in 1993) occupies the main site. These birds may be responsible for introducing some of the plants from Tierra del Fuego, notably the dominant liverwort.

Site F - Telefon Bay: The site extends from the north shore of the lagoon at the south-west of Telefon Bay to the south of the "new island" hill, northwards to the north shoreline of the large unnamed lake at the northern end of Telefon Bay, and thence to the shore of the bay following approximately the 10 m contour of a low north-south trending ridge. The north-western boundary is 20 m from the break-

of-slope below the prominent low cliff of crimson lava; this allows an access route skirting around the west and southern end of the larger of the two lakes.

This site incorporates several features created during the 1967 eruption in Telefon Bay, and includes the low flat land extending from the prominent hill on the south-eastern side to the steep slopes and lava outcrops *ca*. 0.5 km inland to the steep slope and lava cliffs below the north-eastern end of Stonethrow Ridge. The hill was created as a new island in 1967, but is now joined to the main island by the aforementioned ash plain. About 0.5 km north of the lagoon in the south-west of Telefon Bay there is a small shallow lake, while at the northern end of the plain there is a large deep lake. This lake is separated from the sea in Port Foster by a *ca*. 50 m long isthmus barely 2 m high and 2 m wide. It has been used as the main pedestrian access along this part of coastline, and is extremely vulnerable to erosion. If it is breached it will be quickly eroded further by high tides and storms, allowing the lake to become inter-tidal and profoundly altering its geochemistry and microbiota. The shoreline of Telefon Bay is excluded to allow access past the site.

The main feature 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: The site comprises the very uneven gentle slope of very coarse grey, crimson, red scoria and occasional disintegrating blocks of yellowish tuff overlying a dead glacier, due east of Crimson Hill and *ca*. 0.5-0.8 km south-east of Pendulum Cove. It extends *ca*. 500 m uphill, from west to east and from *ca*. 50 to 100 m altitude, and is *ca*. 500 m wide. It was created largely by the 1969 eruption. 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.

The Site boundary encloses the undulating "plateau", an area of *ca*. 0.25 km^2. There are no natural features to delineate this area, but the boundary follows the break-of-slope between the plateau and the steep slopes rising to it.

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: Lying *ca*. 1.25-1.5 km north-north-west of Mount Pond summit, this extensive area of geothermal activity extends *ca*. 150 x 50 m on the gently sloping upper part of a broad ridge at *ca*. 485 to 500 m elevation (Lewis 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 upper, southern, part of the site is close to a large rime dome at 512 m, in the lee of which (at *ca*. 500-505 m) 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 which is extremely vulnerable to pedestrian damage. There are several stands of dense, thick (up to 10 cm) bryophyte vegetation associated with these areas. The adjacent yellowish tuff outcrops support a different community of mosses and lichens.

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 occur 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 - 'Perchue Cone': The boundary includes all of the ash and cinder cone referred to as 'Perchue Cone'. This ash cone lies *ca*. 0.5 km east-north-east and comprises a very narrow line of fumaroles and adjacent heated ground on the west-facing slope at *ca*. 160-170 m elevation. The geothermal area covers *ca*. 25 x 10 m, and the fine ash and lapilli surface of the entire slope is very vulnerable to pedestrian damage.

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: 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 gulley 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 gulley, 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. The boundary surrounds the crater basin, valley and Kroner Lake. A corridor below Ronald Hill, from the break-of-slope to the lowermost massive boulders about 10-20 m beyond, remains outside the boundary to allow access past the Area.

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

Site L - South East Point: An east-west trending rocky ridge *ca*. 0.5 km north of South East Point, extending from the top of the sea cliff (*ca*. 20 m altitude) westwards for *ca*. 250 m, to a point about 30 m 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. The site extends 50 m north and south of the lava outcrop.

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 *ca*. 300 m^2, 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 *ca*. 2 ha. 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) Restricted and managed zones within the Area

In Site F, the narrow isthmus separating the large unnamed lake from Port Foster shall be avoided. Pedestrians should use the beach to bypass the isthmus. The isthmus is friable and extremely vulnerable to erosion. If it is breached it will be quickly eroded further by high tides and storms, allowing the lake to become inter-tidal and profoundly altering its geochemistry and microbiota.

6(iii) Structures within or near to the Site

At Site A, there are six 50 x 50 cm plots marked with wooden corner stakes, although not all of the four stakes per plot remain. 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.

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

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

ASPA 145 comprises 2 sub-sites of benthic importance within Port Foster.

7. 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 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 aims and 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;
- a visit report shall be supplied to the authority named in the Permit, and to the Chair of the Deception Island Management Group;
- 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 the Area

Helicopter landings or the use of vehicles are prohibited within ASPA 140. The Management Plan for Deception Island ASMA shows recommended helicopter landing sites on Deception Island. Access to the sites shall be by foot or small boat. Access to Site F (Telefon Bay) shall avoid the isthmus referred to in section 6 (ii). Movement within the sites shall also be on foot. Rowing boats are permitted for sampling purposes in the lakes in Sites B (Crater Lake) and F (Telefon Bay), and the lagoon in Site J (Kroner Lake).

All movement shall be undertaken carefully so as to minimise disturbance to soil and vegetation.

II. Measures

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

- compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the flora and ecology of the Area.
- essential management activities, including monitoring.

7(iii) 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.

At Site A (Collins Point), the existing staked plots should be maintained to allow continued monitoring of vegetation change since 1969. At Site K, any wind-blown debris from the Hektor Whaling Station and Base B shall be removed.

7(iv) 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.

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radionuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted.

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 sterilised. 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.

Fuel, food and other materials are not to be deposited within the site, unless authorised 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(vi) 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(vii) Collection and removal of anything 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.

7(viii) Disposal of waste

All wastes shall be removed from the Area. 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(ix) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

- Permits may be granted to enter the Area to carry out biological, vulcanological or seismic monitoring and site inspection activities. Biological activities may involve the collection of small amounts of plant or soil material or small numbers of invertebrate animals for analysis or review.
- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.

7(x) Requirements for reports

The principal Permit Holder for each issued Permit shall submit to the appropriate authority a report describing the activities conducted in the Site.

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

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

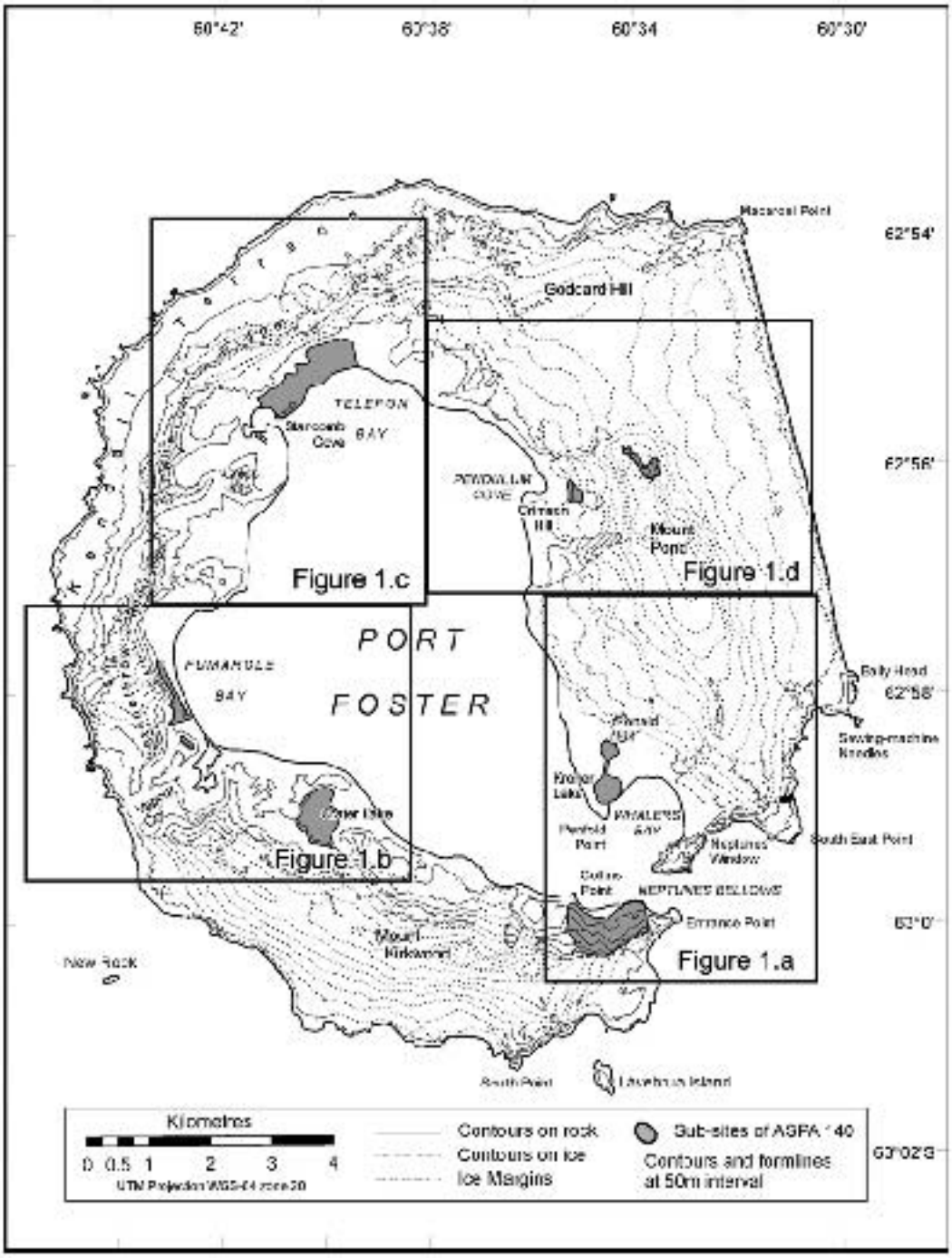
A. Bryophytes (L = Liverwort)

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

B. Lichens

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

Figure 1 - Antarctic Specially Protected Area No. 140, Sites of Exceptional Botanical Importance, Deception Island, South Shetland Islands



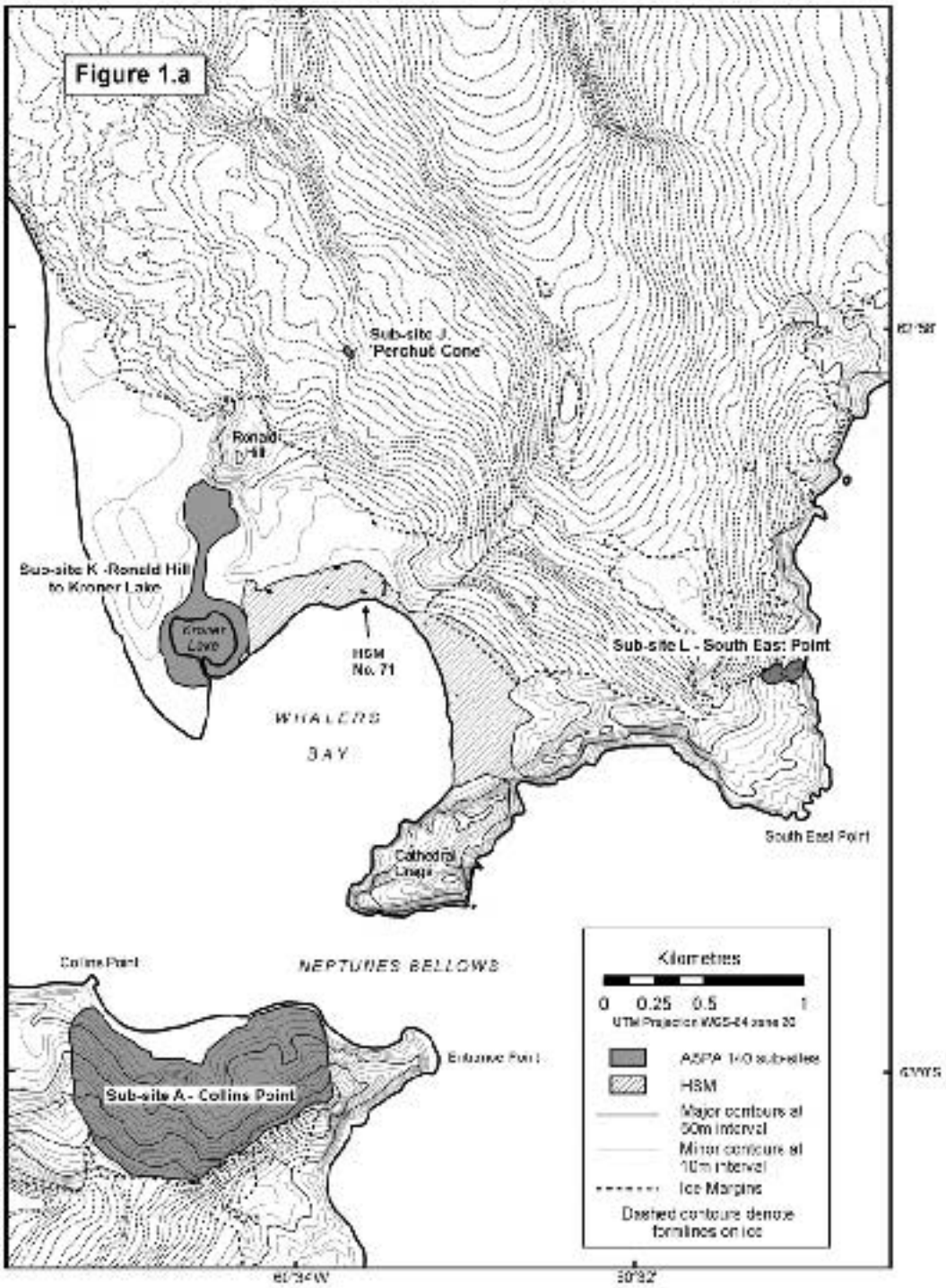


Figure 1.a
Sub-site J
'Perchut Cone'
Ronald Hill
Sub-site K -Ronald Hill to Kroner Lake
Kroner Lake
HSM No. 71
WHALERS BAY
Sub-site L - South East Point
South East Point
Cathedral Crags
Collins Point
NEPTUNES BELLOWS
Entrance Point
Sub-site A - Collins Point
Kilometres
0 0.25 0.5 1
UTM Projection WGS-84 zone 20
ASPA 149 sub-sites
HSM
Major contours at 50m interval
Minor contours at 10m interval
Ice Margins
Dashed contours denote formlines on ice
62°58'
62°55'
60°34'W
60°32'

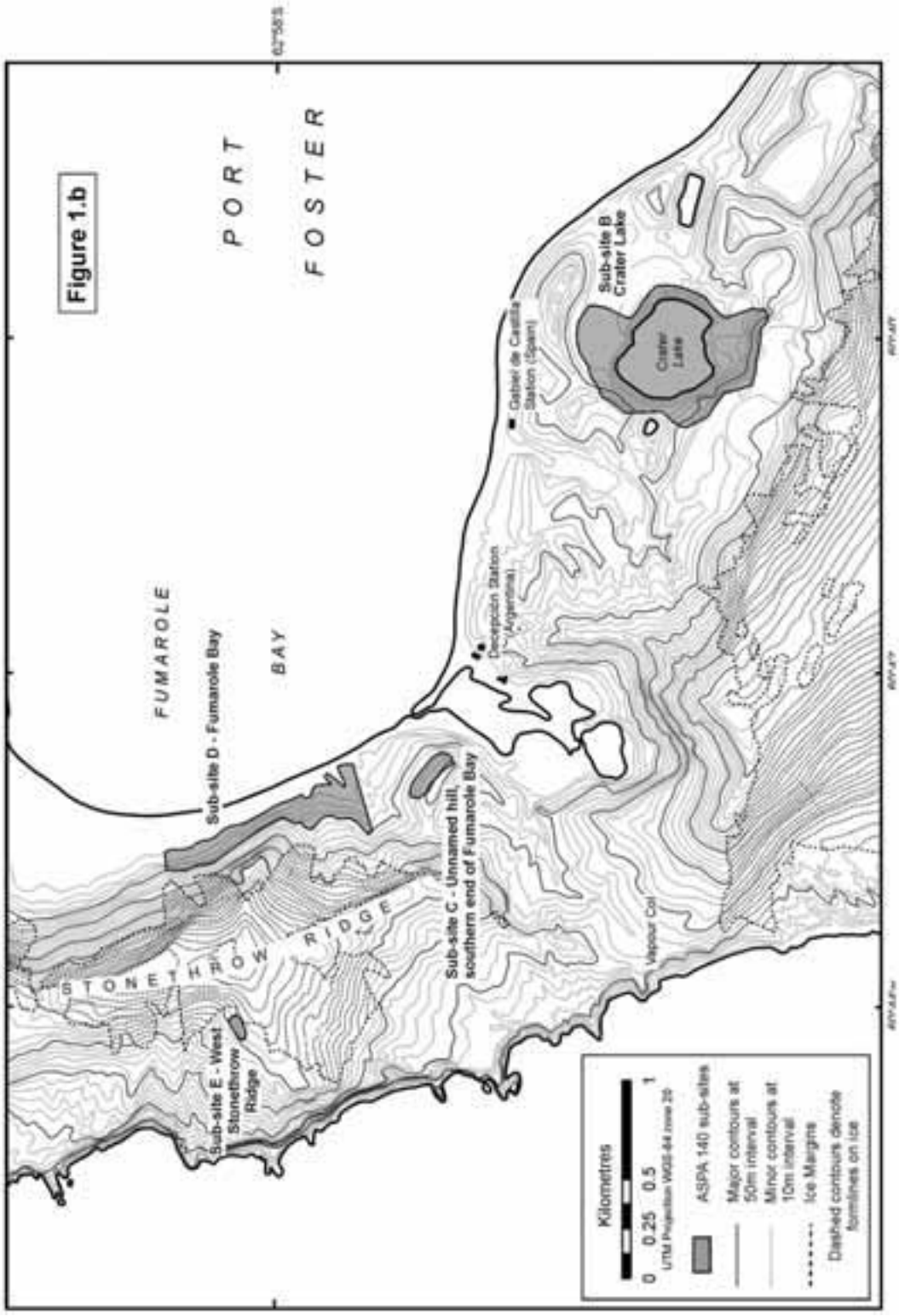
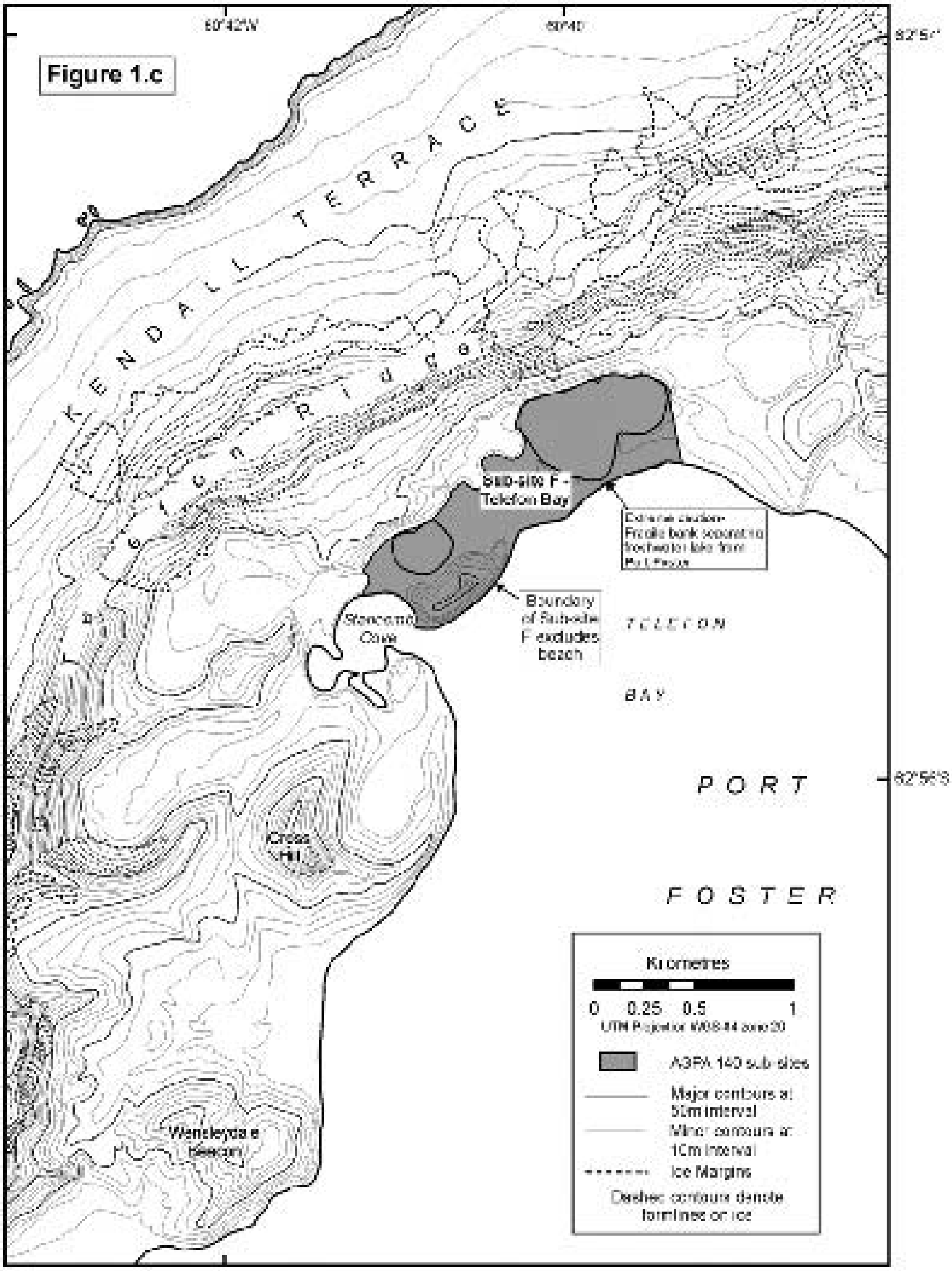


Figure 1.b
PORT FOSTER
FUMAROLE BAY
Sub-site D - Fumarole Bay
Sub-site E - West Stonethrow Ridge
STONETHROW RIDGE
Sub-site C - Unnamed hill, southern end of Fumarole Bay
Vapour Col
Deception Station (Argentina)
Gabriel de Castilla Station (Spain)
Sub-site B Crater Lake
Crater Lake
Kilometres
0 0.25 0.5 1
ASPA 140 sub-sites
Major contours at 50m interval
Minor contours at 10m interval
Ice Margins
Dashed contours denote hummines on ice


60°42'W
60°40'
Figure 1.c
KENDALL TERRACE
Sub-site F - Telefon Bay
Extreme caution - Fragile bank separating freshwater lake from Port Foster
Stancomb Cove
Boundary of Subsite F excludes beach
TELEFON
BAY
PORT
FOSTER
62°56'S
Cross Hill
Wensleydale Beacon
Kilometres
0 0.25 0.5 1
ASPA 140 sub-sites
Major contours at 50m interval
Minor contours at 10m interval
Ice Margins
Dashed contours denote formlines on ice

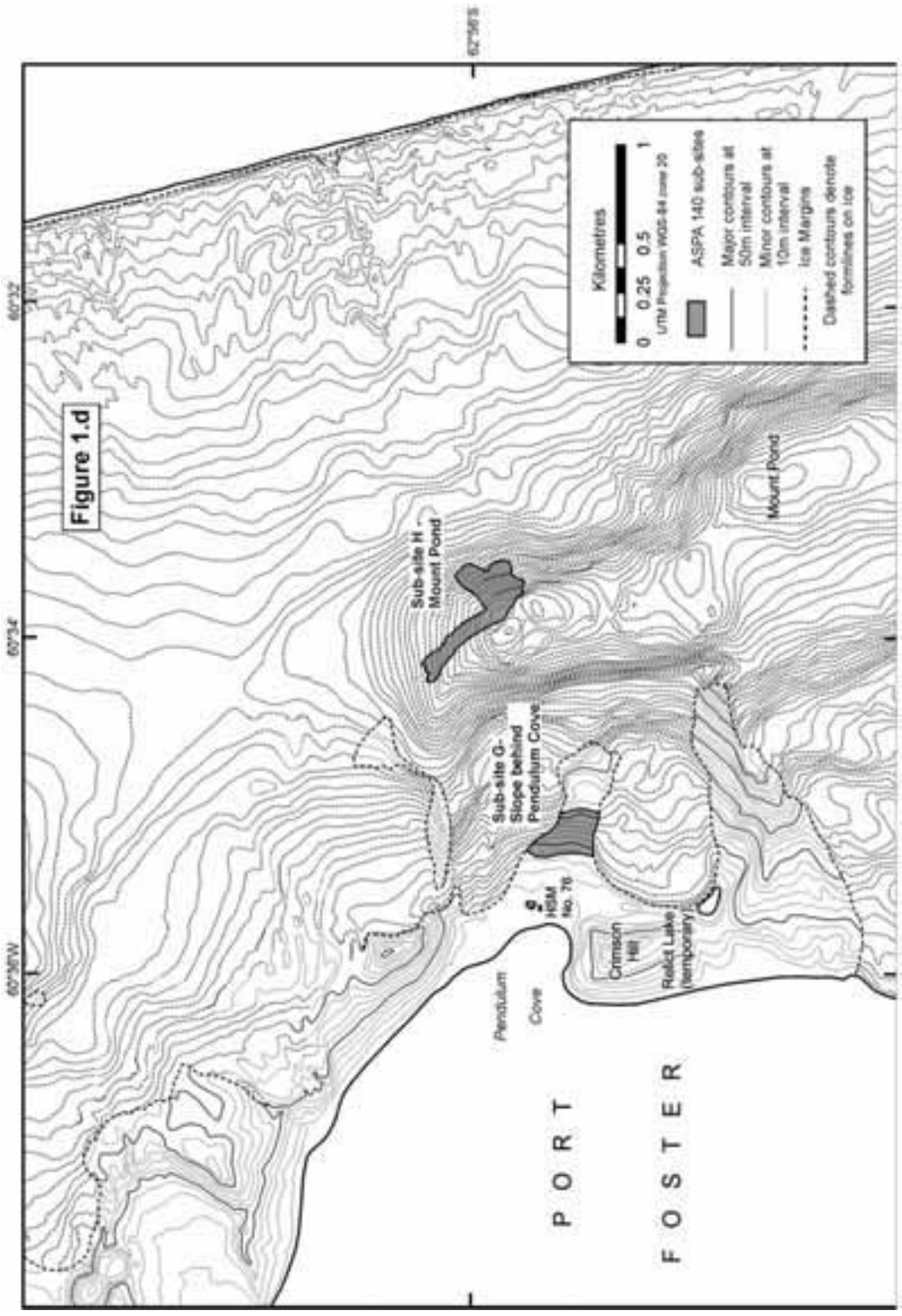


Figure 1.d
Kilometres
0 0.25 0.5 1
ASPA 140 sub-sites
Major contours at 50m interval
Minor contours at 10m interval
Ice Margins
Dashed contours denote formlines on ice
Sub-site H - Mount Pond
Sub-site G - Slope behind Pendulum Cove
Mount Pond
HSM No. 76
Crimson Hill
Relict Lake (temporary)
Pendulum Cove
PORT FOSTER

II. Measures

Management Plan for Antarctic Specially Managed Area No. 145

PORT FOSTER, DECEPTION ISLAND, SOUTH SHETLAND ISLANDS

1. Description of values to be protected

These two sub areas were originally designated as SSSI N° 27 by Rec. XIV-5 of October 6, 1987 after a proposal by Chile.

Values protected under original designation included the diversity of benthic fauna on two different kinds of sea bottom substrates. The original research about the ecological process of recolonization after volcanic eruption needed protection from the risk of undue interference.

Deception Island is a caldera formed by subsidence of a group of Cenozoic volcanoes superimposed along radial faults. Port Foster is an almost entirely enclosed body of water, receiving large volumes of fresh water during periods of melt. In several places there is geothermal activity.

The area is of exceptional ecological interest because of its actively volcanic character. The two habitat areas are subject to long-term research programs and the purpose in designating them is, as far as possible, to reduce the risk of accidental interference that could jeopardize these scientific investigations.

2. Aims and objectives

The management of Port Foster aims to:

- Avoid degradation or substantial risk to the values of the area by preventing unnecessary human disturbance.
- Allow scientific research on the marine benthic system, ensuring protection from interference.

3. Management activities

The following management activities shall be undertaken to ensure the protection of the values of the area:

- Preparation and distribution of a map showing the location of the area, with explicit statement of the special restrictions that apply. This map shall be available at the Deception Island Stations and to visitors.
- Periodical visits and assessment of the effectiveness of the protection.
- Sampling of benthic fauna to verify that the values for which the site was originally designated remain valid.

4. Period of designation

Designated for two years.

5. Maps

Map 1: Port Foster, showing bathymetry, and the location of sub-sites A and B.

6. Description of the area

6(i) Geographical coordinates

Benthic habitat A: between 50 and 150 m depths and the coordinates: lat 62°55.5'S long 60°38'00"W, lat 62°56.2'S long 60°37'00"W.

Benthic habitat B: between 100 and 150 m depths and the coordinate: lat 62°57.2'S long 60°37'20"W, lat 62°57.9'S long 60°36'20"W.

6(ii) Physical features

The bottom of habitat A consists of coarse to medium-sized, poorly sorted volcanic sediments including scoria and lapilli, and that of habitat B of medium to fine, better sorted volcanic ash. Volcanic sediments are at least 30 cm thick, on both habitats. Soft bottom habitats are low on water dissolved oxygen.

Water temperature, near Benthic habitat A, may fluctuate widely depending on circulation and due to under-water hot springs in the neighboring area.

6(iii) Biological features

Benthic fauna was severely impacted by the volcanic eruption of 1967, due to volcanic ash and high concentrations of dissolved toxic compounds.
Following the volcanic eruption of December 1967 at Deception Island, a long-term program of research was initiated at Port Foster to study the mechanism and paths of the re-establishment of the benthic communities. Community studies to observe biota changes, including other relevant studies to meet the requirements of long-term biological monitoring programs, are performed periodically.

The most conspicuous macrofauna in dredge samples include the nemerteans *Lineus* sp and *Paraborlasia corrugatus*, the isopod *Serolis kemp*: the bivalve *Yoldia eightsii*, the echinoids *Abatus agassizizi* and *Sterechinus neumayeri*, the asteroids *Lysasterias perrieri* and *Odontaster validus*, the ophiuroid *Ophionotus victoriae* and the holothurian *Ypsilothuria* sp. The composition of the benthic assemblages has varied greatly since the volcanic eruption of December 1967.

Soft bottom habitat predominant groups are: *Polichaeta, Bivalvia, Nemertina, Cumacea* and *Amphipoda.*

Hard bottom habitat predominant groups are: *Echinoderms, Amphipoda* and *Tunicata.*

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

ASPA 140 comprises eleven small sub-sites of unique and important vegetation on Deception Island. Also, in the vicinity of Pendulum Cove is HSM 76, the remains of Pedro Aguirre Cerda Station. HSM 71 at Whalers Bay comprises the remains of Hektor Whaling station, other artefacts which predate the whaling station, and the remains of 'Base B' (UK).

Other protected areas in the vicinity are ASPA Nº 126 Byers Peninsula approximately 40 km northwest and ASPA Nº 149 Cape Shirreff, both on Livingston Island.

7. Permit conditions

Conditions for issuing a sampling permit:

- It is issued only for scientific study of the marine benthic system and geology of the area, or for compelling scientific reasons that cannot be served elsewhere.
- It is issued for essential management purposes consistent with management plan objectives such as inspection or review.
- The actions permitted will not jeopardize the ecological or geological scientific values of the area.
- A visit report shall be supplied to the authority named in the Permit, as well as to the Chair of the Deception Island Management Group.
- Permits shall be issued for a stated period.

7(i) Access to and movement within the area

Although access points as such are not designated, free passage of ships through these areas is not in any way prejudiced. Movement in shallow waters should be undertaken carefully so as to minimize the probability of disturbing bottom fauna and flora.

7(ii) Activities that may be conducted

- Scientific research other than that disturbing benthic habitats and communities.
- Essential management activities, including monitoring.

7(iii) Scientific sampling

Samples from benthic habitats should be taken only for compelling scientific purposes.

7(iv) Other restrictions

The dumping of waste from ships and bottom trawling shall be avoided. Anchoring shall be avoided except in compelling circumstances. Siting of bottom devices should be avoided.

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

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

7(vi) Waste disposal

Disposal of all waste, including human waste, is prohibited in this area.

7(vii) Measures that are necessary to ensure that the aims and objectives of the management plan can continue to be met

Access to the area by permit to carry out site inspection and monitoring; this may involve collection of benthos samples for analysis and review of protective measures.

7(viii) Requirements for reports

Parties should ensure that the principal holder for each Permit issued submits to the appropriate authority, and to the Chair of the Deception Island Management Group, a report of the activities undertaken. This report shall be submitted no later than six months after the visit. Such reports should be stored and made available to interested parties, SCAR, CCAMLR and COMNAP if requested, to ensure good management.

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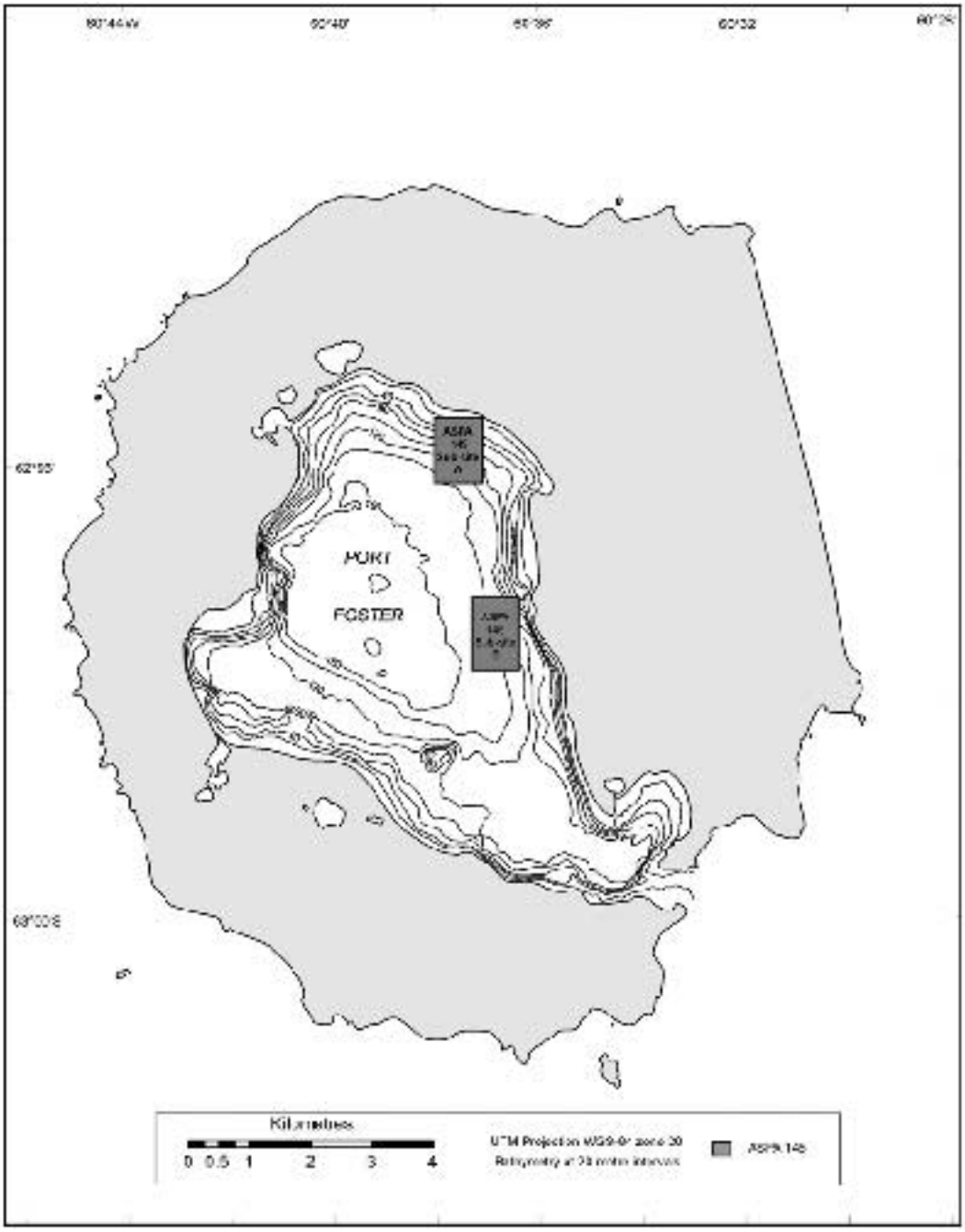
Figure 1. Antarctic Specially Protected Area No. 145, Port Foster, Deception Island, South Shetland Islands.



II. Measures

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– 931, 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 *Hektor* 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.

The 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.
- ***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 environment of the site.*** Whalers Bay is an integral part of the unique natural environment of Deception Island. Activities at the site should be undertaken in such a way that minimises any environmental impact.

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

#[1]	Structure	Map 1[2]
Whaling period		
WB1	Various remains from the whaling period at Deception Island (1906-1931), including: - 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)	Cross
WB3	Magistrate's residence	3
WB4	Hospital/storage building	2
WB5	Boilers	7
WB6	Cookers and associated equipment, including: - cooking grills - driving wheel - steam winch	7
WB7	Foundation of kitchen/mess building (subsequently reused as the foundations	4
	for Priestley House) and piggery	
WB8	Fuel storage tanks[3]	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	1
WB13	Massey Ferguson tractor	6

[1] Reference number is cross-referenced with the information in Attachment B.

[2] Reference to map location (Figure 1).

[3] A de Havilland DHC-3 Single Otter was removed from the site in April 2004 by BAS for safe-keeping. The intention is to return it to Whalers Bay once it is safe to do so.

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. Geologically important, and fragile fluvial terraces are located to the north of the whaling station.

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*) 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

- The recommended landing site is directly in front of the whalers' boilers (see Figure 1).
- Motorized vehicles are only to be used within the HSM for scientific, conservation or clean-up activities (e.g. removal of waste).
- Access to buildings or other structures including boilers and tanks, is prohibited unless for management purposes, or for shelter in an emergency.
- 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.

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 general guidelines, outlined in Code of Conduct for Visitors to Deception Island, apply to all visitors, including visits by commercial tour operators (IAATO and non-IAATO affiliated), private expeditions and National Antarctic Programme staff when undertaking recreational visits. In addition, the following site-specific guidelines apply:

- Stay on the seaward side of the station remains, the water boats, and the piles of barrel staves, in order to avoid the geologically important, and fragile, fluvial terraces located to the north of the whaling station.
- Do not go beyond the western end of the airplane hangar in order to avoid entry into ASPA 140 (Site K).
- Do not enter buildings or tanks or sit or climb on the boats.
- Approach oil and fuel tanks with caution. The foundations are vulnerable to erosion and the tanks are at risk of collapse.
- Beware of flying debris in windy conditions.
- Visitors to Neptunes Window should proceed along the beach on the seaward side of the waterboats. They should then walk up the slope towards the 'window' in single file and remaining on existing paths. Extreme caution should be exercised along the steep and friable edge of Neptunes Window. Follow existing paths back down to the beach. Visitors should not attempt to traverse the scree slope to the south, below Cathedral Crags, which is susceptible to rockfalls.

4.4 Information

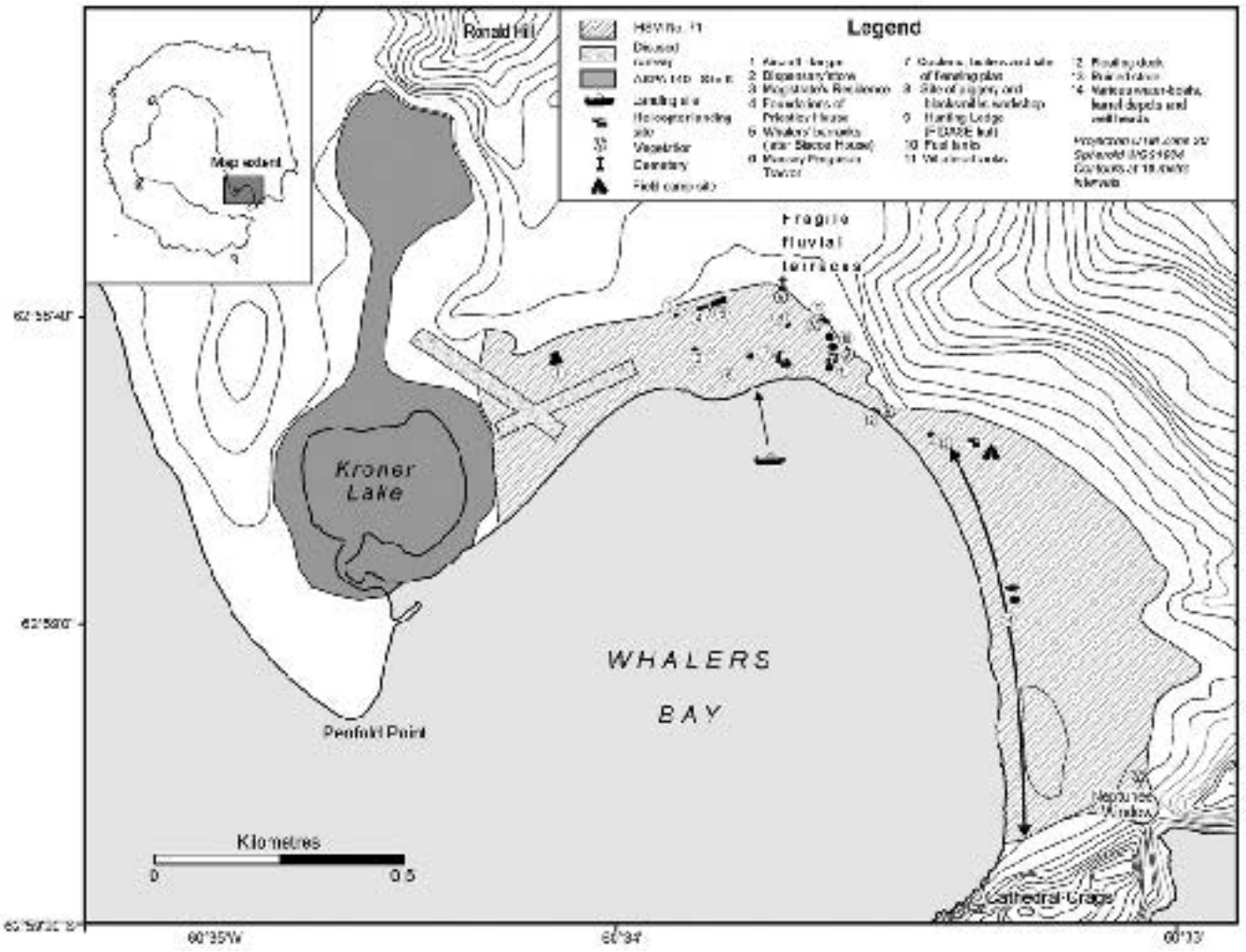
- An informative sign, agreed by the Parties undertaking management, will be located at the recommended landing site. Appropriate and necessary signs advising visitors of any health and safety issues will also be considered.
- Memorial plaques (e.g. listing the names of those buried in the cemetery, 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.

4.5 Reporting

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 B: Figure 1 - Historic Site and Monument No. 71 - Whalers Ball Deception Island



Attachment A: Brief historic overview of Whalers Bay, Deception Island

Deception Island was first visited by British and United States sealers in the austral summer 1820-21.

In 1905 the Norwegian Adolfus Amandus Andresen established the Chilean whaling company *Sociedad Ballenera de Magallanes* in Punta Arenas, having moved there from Norway in 1894. During the 1906-07 season he anchored his floating factory ship *Gobernador Bories* in Whalers Bay and thereby started an extensive use of the bay for whale processing.

In 1908, a cemetery was established for those who lost their lives at, or near to, Deception Island.

The processing method used by the factory ships was inefficient and wastage was high. In the 1912-1913 season, the Stipendiary Magistrate reported 3,000 rotting carcasses in the harbour. In an attempt to reduce this wastage, a 21 year licence was issued to the whaling company Hvalfangerselskabet *Hektor A/S* of Tønsberg for the establishment of a shore-based whaling station at Whalers Bay. The land station was established for processing the carcasses that had already been flensed and discarded from the floating whale factories. As part of the agreement, the company brought a prefabricated wooden house from Norway for the British magistrate, which was of the same type as the barracks used by the factory workers.

The global slump in whale oil prices, and the introduction of pelagic whaling factory ships, heralded the end of shore-based operations at Deception Island. The station was abandoned as it stood on 26 April 1931, after which it was used as a source of materials for other expeditions and bases on the Antarctic Peninsula (e.g. Port Lockroy).

In November 1928, the Australian Sir Hubert Wilkins and the Canadian Carl Ben Eielson undertook the first powered flight in the Antarctic, taking off from the flat beach at Whalers Bay. In 1934-35 Lincoln Ellsworth (USA) assembled his aircraft the *Polar Star* there, but was frustrated by bad weather and moved his plane to Dundee Island for his successful trans-Antarctic flight.

In January 1936, the British Graham Land Expedition, led by John Rymill, visited Deception Island on the schooner *Penola*. Timber collected from the abandoned whaling station was used for the construction of the expedition's winter headquarters at Debenham Islands.

In 1941, the Royal Navy's HMS *Queen of Bermuda* destroyed remaining fuel stocks at the station to deny them to enemy ships that were attacking and capturing Norwegian whaling vessels in the Southern Ocean.

During the 1943-1944 austral summer, the Royal Navy, as part of the British Government's secret "Operation Tabarin", established a small permanent British base in part of the abandoned whaling station. "Operation Tabarin" was terminated in 1945 and the station was handed over to the organisation that is now the British Antarctic Survey (BAS).

During the summers of 1955-56 and 1956-57, the UK company Hunting Aerosurveys Ltd. conducted vertical air photography of the South Shetland Islands and the northern Antarctic Peninsula with Canso flying boats based at Whalers Bay. A total of 116,000 km^2 of previously unmapped terrain were photographed.

In 1957, HRH Prince Philip visited Base B, Deception Island, aboard the Royal Yacht *Britannia.*

In 1969, the remains of Hektor Whaling Station, Base B and the Whalers cemetery were partially destroyed and buried by a lahar resulting from a volcanic eruption. The station was abandoned, and Whalers Bay has not been reoccupied since then.

II. Measures

In 1992, a partial clean-up of hazardous and non-hazardous waste was carried out by BAS. In 2004, BAS carried out a further clean-up of Base B and removed the wreck of the BAS de Havilland DHC-3 Single Otter from beside the aircraft hanger for safe keeping.

Whalers Bay is currently one of the most visited sites in the Antarctic.

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Attachment A: Description of the historic elements in HSM No. 71

WB1	
Remains:	**Various remains from the whaling period at Deception Island, including:** • Water boats • Well houses • Storage building • Barrel depots • Rowing boats • Wells • Rampart dams
Location:	Item 14 on the map of the site (Appendix B). Along the beach, east of the whaling station, on the east side of Whalers Bay.
Function and Description:	Both the shore station and the floating factory ships used steam power. Planks were placed vertically in the sand as a dam to collect melt water from the glacier in the valley behind. Wells were used to supply fresh water. The many water boats were used to transport fresh water to the factory ships. Rowing boats were used for various tasks, mainly for transporting flensers to strip the blubber off the whales beside the floating factories. In the earliest phase of whaling, wood and later iron barrels were used to store and transport the oil. The use of barrels continued at the shore stations until the late 1920s.
Present state (2003):	Over a distance of approximately 1 km, there are 5 water boats, 2 rowing boats, 6 well houses, 1 storage house, 5 wooden barrel depots, 1 iron barrel depot and a number of dams. Between the two easterly pump houses, a well remains intact.

Rowing boat (in the water) and water boat (on deck) used in the whaling industry. From the factory ship "Sir James Clark Ross". Photographer unknown (NPI Archives).

One of the remaining water boats at Whalers Bay (1996). Photo: Birgit Njåstad (NPI).

The remains of the wooden barrels at Whalers Bay. Photo: Rod Downie (BAS).

WB2	
Structure:	**Cemetery (1908)**
Location:	Marked with cross on the map of the site (Appendix B)
Function and Description:	In 1908 the whalers established a cemetery. A total of 34 Norwegian, Swedish, Chilean and Russian whalers were buried here in the first half of the century, as well as one member of the organisation that is now BAS, in 1953. A memorial was also erected to commemorate ten men lost at sea (only one body was recovered). The cemetery was a neat and orderly site enclosed by a wire fence and with impressive stone monuments and carved wooden crosses marking the separate graves.
Present state (2003):	In 1969 the site was partly buried and partly swept away when volcanic activity caused a lahar (a mud and ash slide). In February 2002, a cross belonging to Peder Knapstad, a Norwegian carpenter who was buried in the cemetery in 1931, was recovered and re-erected at the site of the cemetery, close to the remains of a coffin that is partially visible.

The cemetery at Whalers Bay (1930-31).
Photo Gunnar Isachsen (NPI Archives)

The remains of the cemetery: one grave and the cross of Peder Knapstad (2002).
Photo: Susan Barr (DCH)

WB3	
Structure:	**The Magistrate's House**
Location:	Item 3 on the map of the site (Appendix B).
Function and description:	This building was the residence of the British magistrate during the operation of *Hektor* Whaling Station. It was constructed of machine planed planks with a tongue, groove and dovetail locking in each corner. The moulding and panelled door are typical of buildings from the World War I period in Norway. The building has a sheltered porch with a decorative baluster as a panel. The fretwork on the porch and the decorative details are characteristic of the Swiss style that was common in Norwegian building practices at that time. The building contained an office, a bedroom and a living room. A 10-meter flagpole was also located by the building.
Present state (2003):	The Magistrate's House was not significantly damaged by volcanic activity, but recently the roof has blown off and lies nearby.

The Magistrate's residence.
From a postcard with photo by A. Th. Larsen (NPI Archives)

The Magistrate's residence in 2002.
Photo: Susan Barr (DCH)

WB4	
Structure:	**Hospital/ laboratory/ storage building/**
Location:	Item 2 on the map of the site (Appendix B).
Function and Description:	This building originally served as the hospital and laboratory and housed the doctor's office. The building was erected by the Norwegian whaling company, as indicated by notes inscribed on one of the panels. It was later used as a storage building by the UK.
Present state (2003):	The building is now half buried in mud and ash.

The hospital/ laboratory in 1946
Photo: Reece, A.W. (BAS archives)

The hospital/storage building/ laboratory in its present condition (2002)
Photo: Susan Barr (DCH)

WB5	
Structure:	**Steam Boilers**
Location:	Item 7 on the map of the site (Appendix B).
Function and Description:	The boilers were used to provide steam for processing of the whale meat and bones.
Present state (2003):	The boiler house has collapsed and is partly disintegrated, but 5 small and 4 large boilers still remain. The large boilers show extensive signs of corrosion.

The boilers in their present condition in the middle of the picture (1996).
Photo: Birgit Njåstad (NPI)

WB6	
Structure:	**Boilers/Cookers**
Location:	Item 7 on the map of the site (Appendix B).
Function and Description:	Boilers/cookers were used to extract oil from the whale meat and bones and to dry guano. The meat and bone boiling took place in two separate buildings - one on each side of the flensing platform. The boilers were arranged in two rows. The meat and bones were loaded into the boilers from a platform (loft) above the boilers. The guano drying took place in a building behind the flensing platform.
Present state (2003):	On the west side of the flensing platform are 10 boilers from the two original boiler rows. Of the smaller boilers with a larger diameter originally to the left of the boilers only two remain. On the east side of the flensing platform, 10 boilers are left in two rows together with a row of four boilers of the lower, wider type. Five settling tanks are found north of the boilers. The remains of the boiler kettles used in the process of drying the guano are sited near the guano factory. A large number of cooking grills are found on the remains of the boiler platforms and are also scattered around the boilers. On the west side of what was the flensing platform there are rail tracks, on which a trolley was used to transport meat and bones from the flensing platform to the boilers.

The Boilers/Cookers protected in buildings (1929-30). Meat and bone cookers to the left and right, guano dryers at the back. Photo by Gunnar Isachsen (NPI Archives)

The Boilers/Cookers in their present condition (1996). Photo: Birgit Njåstad (NPI)

WB7	
Structure:	**Foundation of the kitchen/mess building and piggery**
Location:	Item 4 on the map of the site (Appendix B).
Function and Description:	The kitchen/mess was an essential part of the whaling station. The kitchen/mess building was destroyed by a fire in 1946. A fibreglass hut, Priestley House, was built over the foundations.
Present state (2003):	Only the foundation of the mess still remains today. Although the fibreglass hut was removed, some items, including the stove and fireplace remain.

The fiberglass hut, Priestley House, built on the foundation of the kitchen/mess (1967). Photo by D. R. Gipps (BAS Archives)

The foundation of the kitchen/mess building (2002). Photo: Susan Barr (DCH)

WB8	
Structure:	**Fuel oil and whale oil storage tanks**
Location:	Item 10 and 11 on the map of the site (Appendix B).
Function and Description:	During the early whaling period at Whalers Bay, wooden barrels were used for storage of whale oil. Later these were replaced by iron barrels and following World War I by large steel tanks, also used for storage of fuel.
Present state (2003):	The southerly of the two large fuel storage tanks, which was shot through by the Royal Naval vessel *Queen of Bermuda* in 1941 to prevent enemy raiders from using the fuel, contains approximately 37 m^3 of highly weathered diesel below the shell hole and with oil leakage to the ground outside. The roofs of the smaller tanks are rusting through and collapsing. Entry into the tanks is therefore dangerous. Water erosion is causing the south-westerly tank to lean.

The fuel oil and whale oil tanks as they appeared in 1961. Photo by John Killingbeck (BAS Archives)

The fuel oil and whale oil tanks in their present condition (1996). Photo: Birgit Njåstad (NPI)

WB9	
Structure:	**Floating dock**
Location:	Item 13 on the map of the site (Appendix B).
Function and Description:	The floating dock is U-shaped, and was placed underneath ships to lift either the bow or stern out of the water to enable repairs to the underside of the vessel.
Present state (2003):	The floating dock is partly sunk in the sand, but in relatively good condition, although corroded.

The floating dock in its present state (1996). Photo: Birgit Njåstad (NPI)

WB10	
Structure:	**Whalers Barracks (Biscoe House)**
Location:	Item 5 on the map of the site (Appendix B).
Function and description:	The building was originally a barracks for the workers at Hektor Whaling Station. As with the Magistrate's House, it was constructed of machine planed planks having a tongue, groove and dovetail locking in each corner. The structural interior is comparable to that of the Magistrate's House. The barracks were most likely constructed at the same time, and most likely also delivered by the same lumber supplier as the Magistrate's House. After the UK occupied the barracks, the building was renamed Biscoe House. A room housing a diesel generator was added to the south-west end of the barracks.
Present state (2003):	The building is now half-destroyed and partly filled with mud from the lahar caused by the 1969 eruption.

The barracks (Biscoe House) in the foreground.
From a postcard with photo by A. Th. Larsen (NPI Archives)

Biscoe House in its present condition (1996).
Photo: Birgit Njåstad (NPI)

WB11	
Structure:	**Hunting Lodge (1955)**
Location:	Item 9 on the map of the site (Appendix B).
Function and Description:	Wooden barracks used from 1955 to 57 by the UK-based Hunting Aerosurveys during an early aerial survey expedition and thereafter by the organization that is now BAS. This prefabricated hut was built by the British company *Bolton and Paul*.
Present state (2003):	The building structure is in relatively good repair, but the inside has been gutted. Window and door openings are uncovered. The foundations of the west wall are in danger of collapsing.

Hunting Lodge under construction (1955)
Reproduced with the permission of Simmons Aerofilms

Hunting Lodge in its present condition (2002)
Photo: Rod Downie (BAS)

WB12	
Structure:	**Hangar**
Location:	Item 1 on the map of the site (Appendix B).
Function and Description:	Between 1960-1962, an aircraft hangar was constructed a few hundred metres west of the whaling station to support the British logistical and aerial survey work. The hangar was used for the repair, maintenance and storage of the aircraft.
Present state (2003):	The hangar is stable but in poor condition. A De Havilland DHC-3 Otter was removed from the site in April 2004 for safe-keeping. The intention is to return it to Whalers Bay once it is safe to do so.

The hangar under construction (1961).
Photo by John Killingbeck (BAS Archives)

The hangar in its present condition (2002).
Photo: Susan Barr (DCH)

WB13	
Structure:	**Massey Ferguson Tractor**
Location:	Item 6 on the map of the site (Appendix B).
Function and Description:	The Massey Ferguson tractor was used to tow aircraft, and for other works around Base B.
Present state (2003):	The tractor was mostly buried by the lahar caused by the 1969 eruption. Only the top of the tractor is visible.

Massey Ferguson Tractor at aircraft hangar, Deception Island (1963 or 1964)
Photo: Possibly Mole, L..U, BAS archives)

The Massey Ferguson Tractor on the beach at Whalers Bay (1999).
Photo: Rod Downie (BAS)

II. Measures

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 within which is located Decepción Station (Argentina) and Gabriel de Castilla Station (Spain). 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 to 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 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 parties, except for human wastes (faeces, urine and grey water) will be returned to the stations for safe disposal.
- 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 distance is to be maintained from birds or seals which is safe and avoids causing them disturbance.
- 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.
- 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.

- 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 IAATO of any increase in the 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.

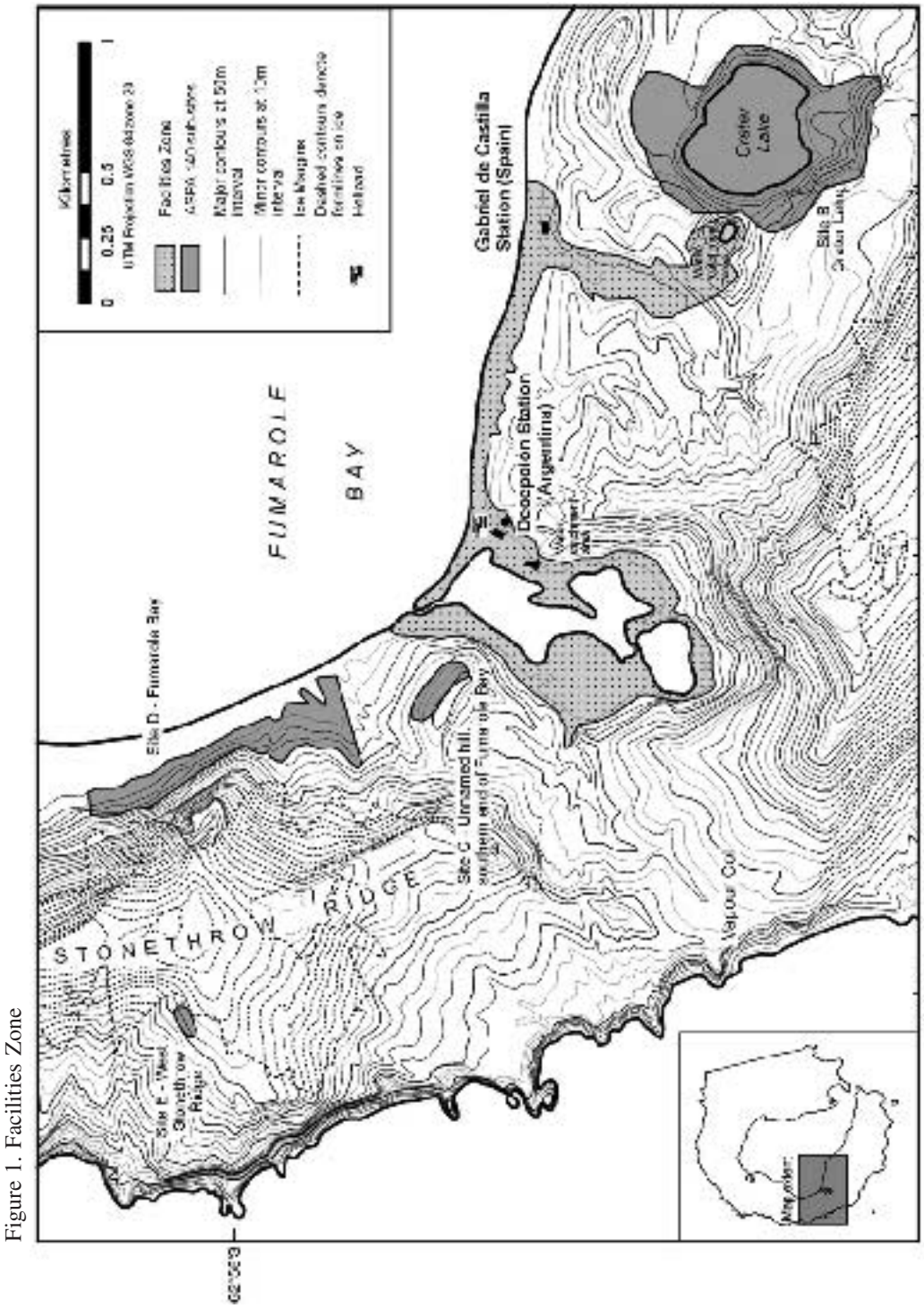


Figure 1. Facilities Zone

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 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 the Conservation Strategy for Whalers Bay Historic Site and Monument No 71.

3.2 Pendulum Cove (latitude 62º56'S, longitude 60º36'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.

- Water temperatures in excess of 70° C have been recorded at Pendulum Cove. Bathers are to be made aware of the potential risk of scalding. Expedition staff should carefully choose a 'bathing area' for passengers where the hot water mixes with the cooler sea-water.
- Shoes or boots should be worn when entering the water to avoid scalding ones feet.
- Educational visits to Historic Site and Monument No. 76 are welcomed. The remains are a dramatic visual representation of the force of a volcanic eruption. At least one member of the expedition staff is to be present at the site during visits. For safety reasons, large groups of visitors are not to approach the site simultaneously. Do not go inland beyond the station ruins.
- Equipment is routinely deployed by the Spanish Antarctic programme for important and necessary seismic monitoring at Pendulum Cove. A distance of 20 metres must be maintained from seismic monitoring equipment, which will be marked with a red flag.
- Do not walk on vegetated areas. Elsewhere, tread gently to avoid disturbing ground surfaces which may host inconspicuous biota.

- The slope to the south east of HSM No. 76 is designated as Site G of ASPA 140 and must not be entered without a permit issued by the appropriate National Authority. This surface, created during the 1969 eruption, is being colonized by numerous moss and lichen species. Two species of moss that grow here are not found anywhere else in the Antarctic.

3.3 Baily Head (latitude 62º58'S, longitude 60º30'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 - it is estimated that 100,000 pairs breed 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.

- No more than 350 visitors are to land at Baily Head in any one day.
- Total visiting time is not to exceed 6 hours in any one day.
- Staff and visitors are to exercise extreme caution when undertaking landings by small boat - such landings may be hazardous due to the swell resulting from the steeply sloping beach.
- Maintain a safe distance from the rock cliffs and the glacier front to avoid falling rock or ice.
- Maintain an appropriate and safe distance from birds or seals which does not cause them disturbance. Remain outside the natural 'boundary' of discrete colonies.
- Walk slowly and carefully when near to penguins, in particular when birds are nesting, moulting, crèching or returning from foraging trips. Give 'right of way' to penguins at all times.
- Hiking between Baily Head and Whalers Bay is discouraged because of environmental and safety concerns.

3.4 Telefon Bay (east) (latitude 62º56'S, longitude 60º40'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.

- Exercise extreme caution when approaching the steep edge of the crater lip. The soil is friable and may collapse underfoot.

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).

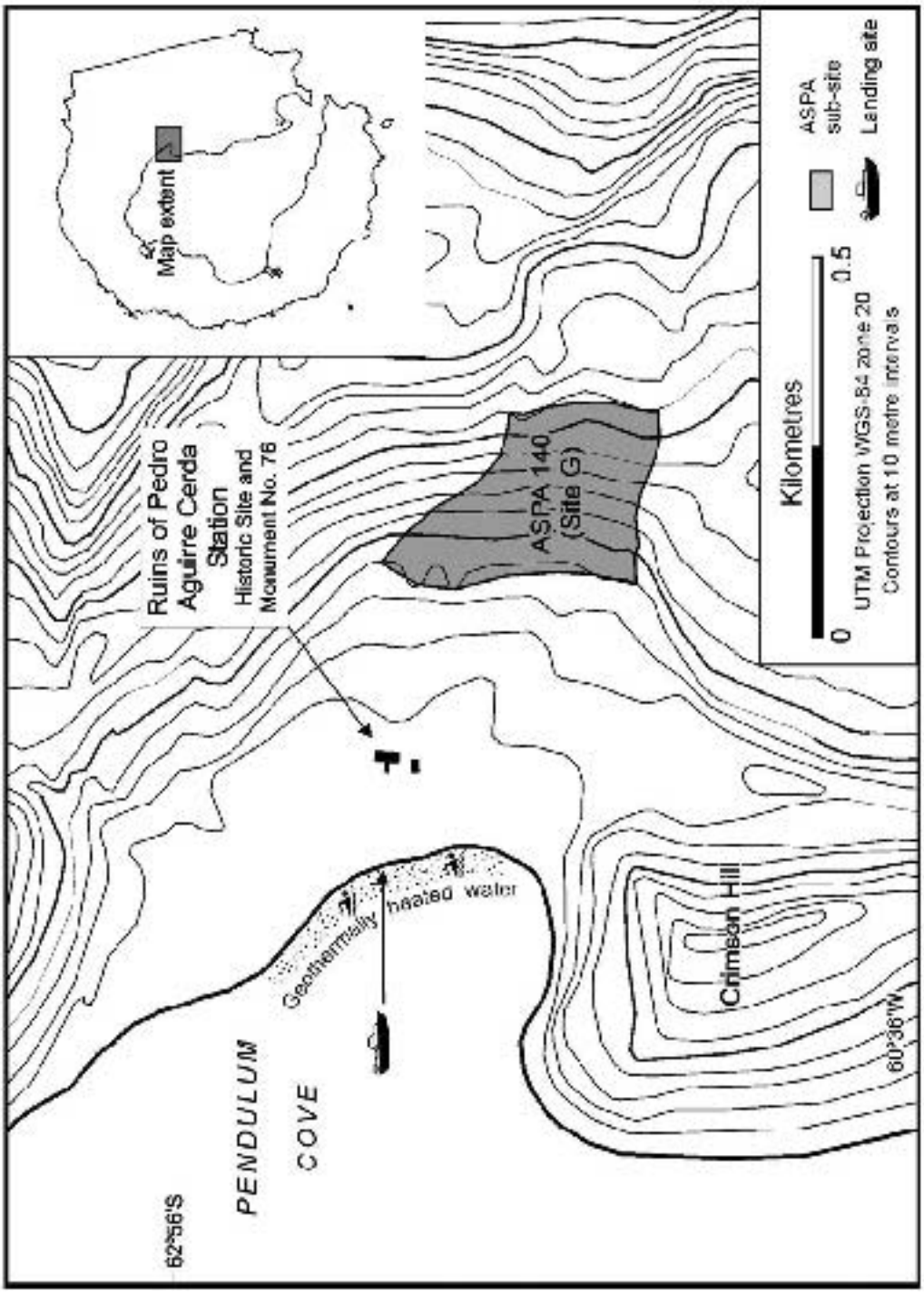
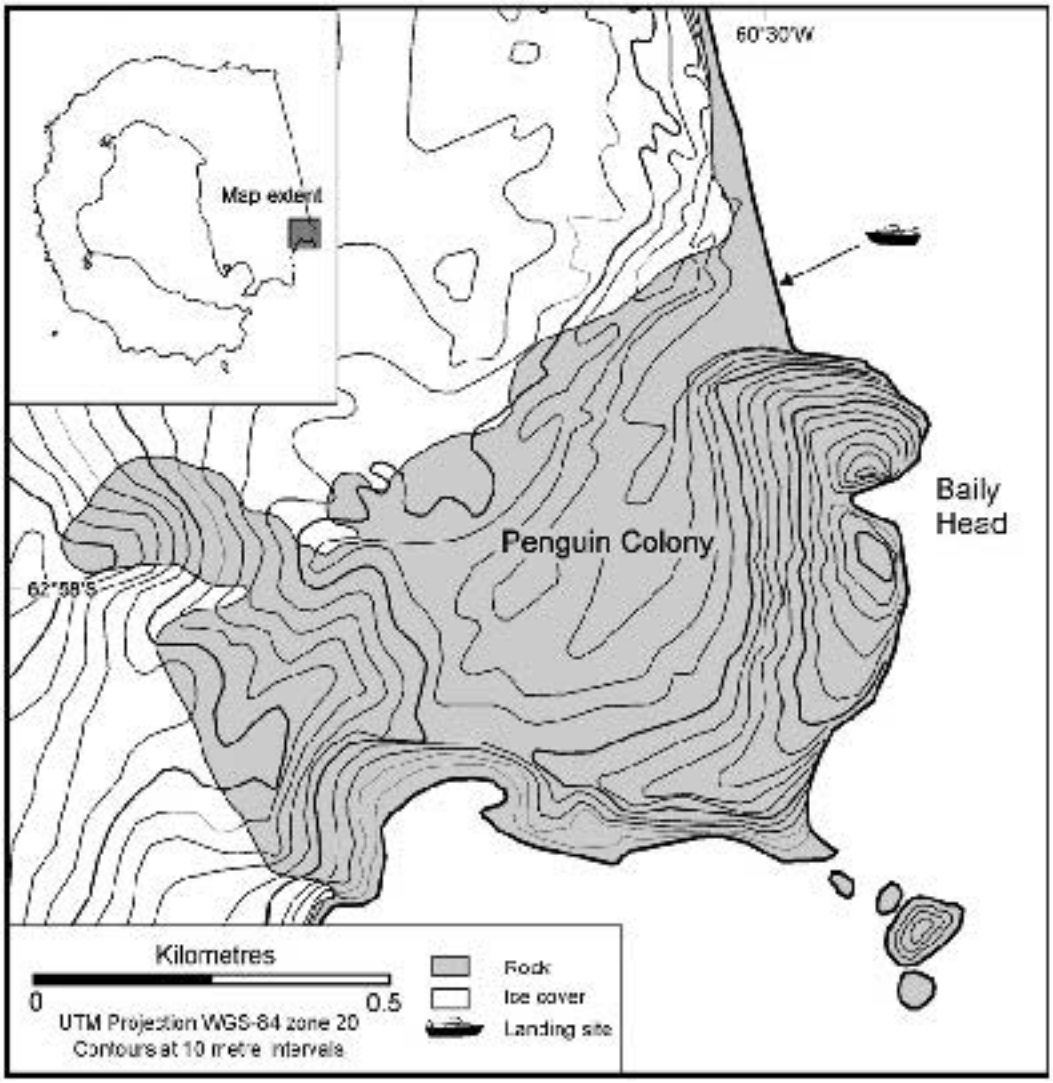


Figure 1. Pendulum Cove

Figure 2. Baily Head



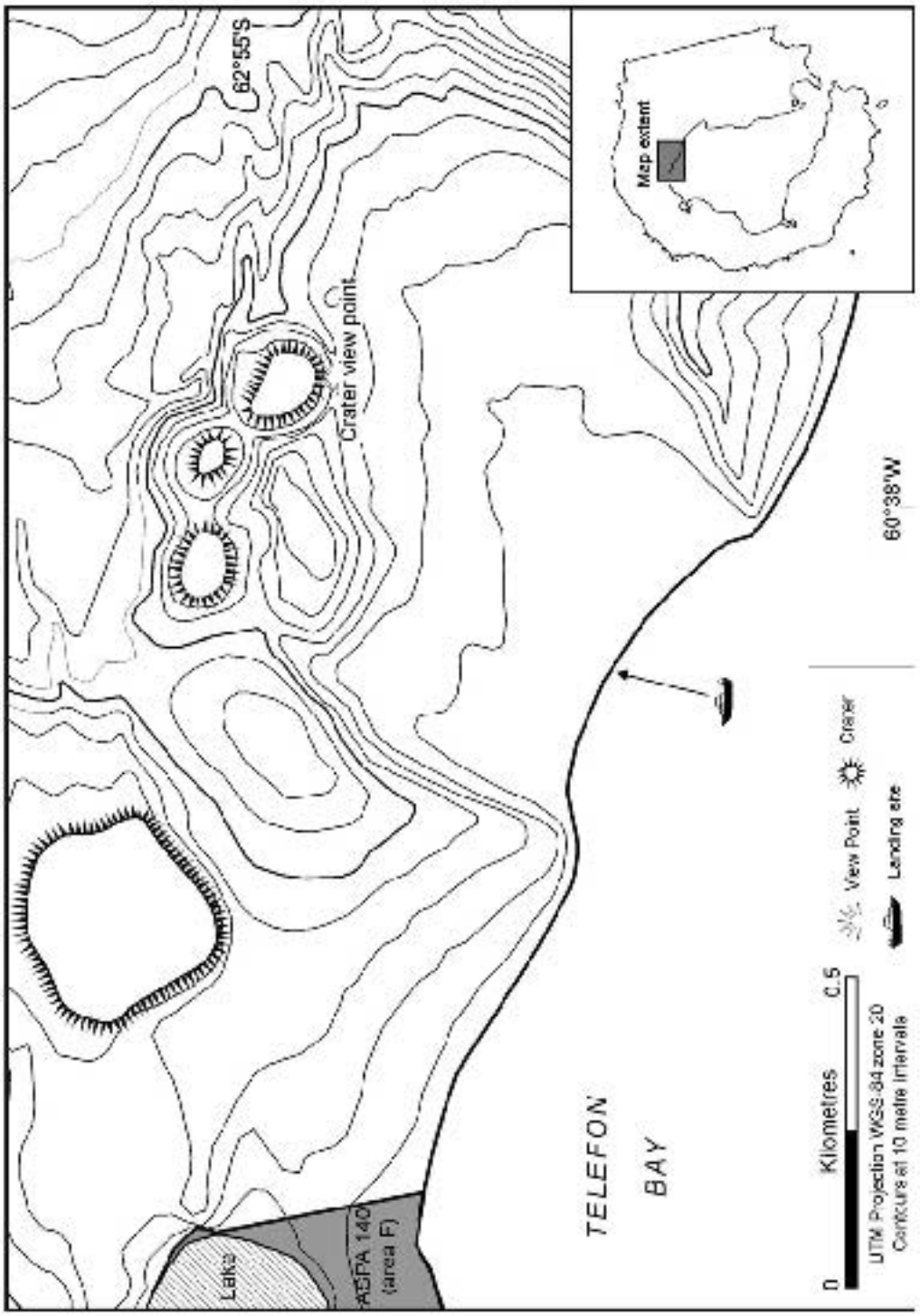


Figure 3. Telefon Bay (East)

II. Measures

Alert Scheme and Escape Strategy for volcanic eruptions on Deception Island[1]

Spanish seismologists monitor seismographs on the island for about three months each year (generally between late November and late February). That period also corresponds to the major period of human activity on the island.

The schematic arrangement presented in Table 1 is adapted from that used by the Alaska Volcano Observatory (United States Geological Survey;

http://www.avo.alaska.edu/avo4/updates/color_code.html).

This type of scheme is well suited to Deception Island.

Masters of vessels intending to enter Deception Island, or pilots of aircraft flying near to the island, should pay attention to any bulletins on the current state of activity of the volcano that are issued from Gabriel de Castilla Station (Spain), or by an appropriate spokesperson representing a national Antarctic programme operating in the Antarctic (e.g. Argentine Antarctic Institute, British Antarctic Survey, National Science Foundation (USA) or Spanish Antarctic Programme).

Table 1. Alert scheme for eruptions on Deception Island (modified after system used by USGS Alaska Volcano Observatory).

Colour code	Alert state	Description
GREEN	No eruption is anticipated.	Volcano is quiet, in dormant state. Normal seismicity and fumarolic activity occurring. This is the normal alert state for Deception Island.
YELLOW	An eruption is possible in the next few weeks and may occur with little or no additional warning.	Volcano is restless; an eruption may occur. Increased levels of small earthquakes detected locally and/or increased volcanic gas emissions.
ORANGE	Explosive eruption occurring or is possible within a few days and may occur with little or no warning. Ash plume(s) not expected to reach 10,000 m above sea level.	Volcano in eruption, or eruption may occur at any time. Increased numbers and/or magnitudes of local earthquakes. Extrusion of lava flows (non-explosive eruption) may be occurring.
RED	Major explosive eruption is in progress or expected within 24 hours. Large ash plume(s) expected to exceed 10,000 m above sea level.	Significant eruption is occurring or major explosive activity expected at any time. Strong earthquake activity detected even at distant monitoring stations.

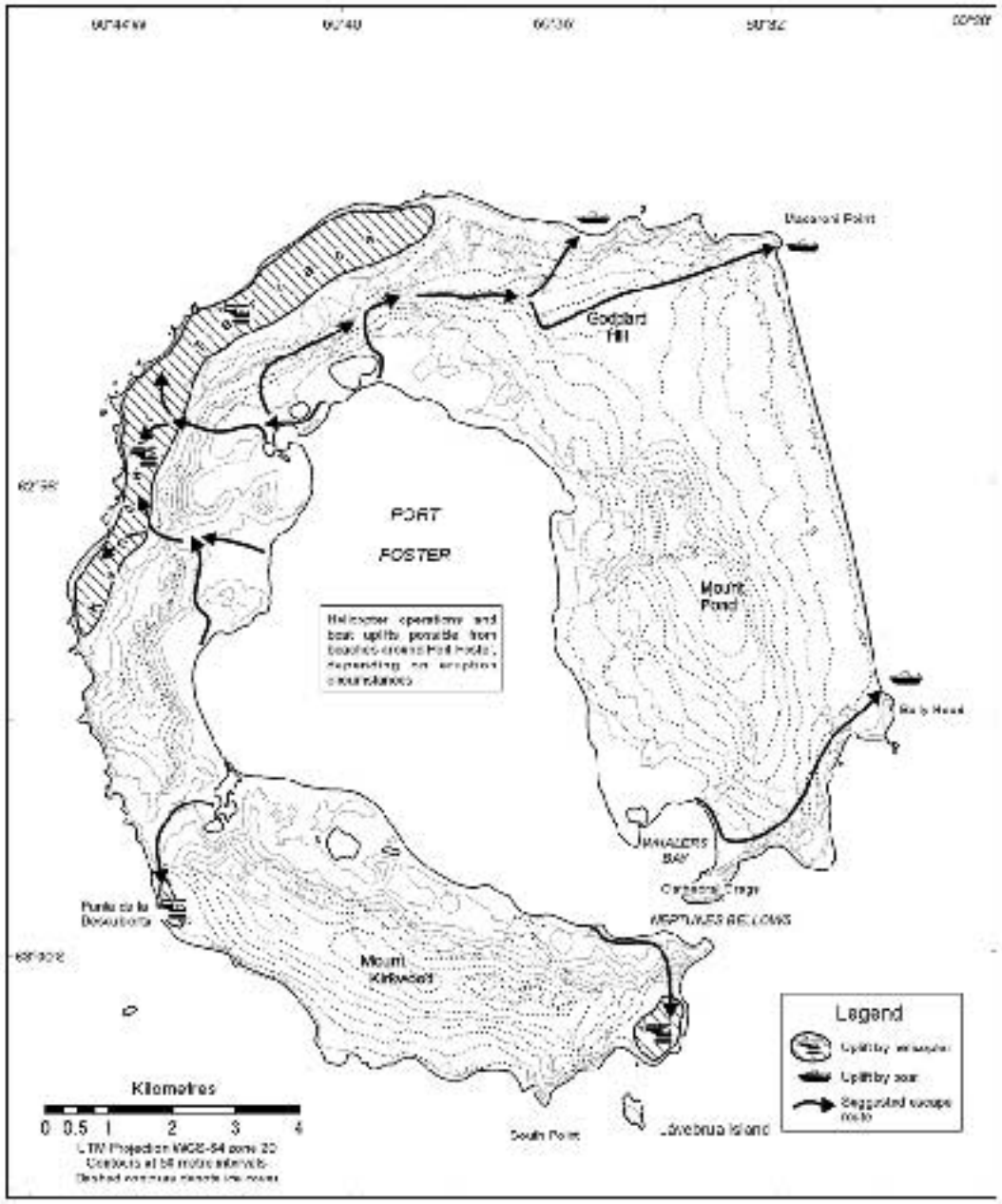
[1] Adapted from Smellie, J.L. (2002) Volcanic Hazard. In: Smellie, J.L., López-Martínez, J., Headland, R.K., Hernández-Cifuentes, Maestro, A., Miller, I.L., Rey, J., Serrano, E., Somoza, L. and Thomson, J.W. 2002. *Geology and geomorphology of Deception Island*, 78 pp. BAS GEOMAP Series, Sheets 6-A and 6-B, 1:25,000, British Antarctic Survey, Cambridge.

Escape strategy in case of a volcanic eruption on Deception Island

This escape strategy is based on the premise that eruptions will be similar to those documented in 1967-1970, i.e. with a limited geographical impact on the island (code orange alert state; Table 1). A sudden collapse of the caldera could result in a much more serious eruption, with potentially devastating effects on anyone on the island at the time. Escape from the island during a caldera collapse eruption is unlikely. However, the probability of this is very low and it would likely be preceded by significant precursory activity, particularly widespread ground inflation and associated earthquakes, during several days or weeks prior to the eruption. However, any eruptions can take place with relatively little immediate warning.

1. Inner coast areas are likely to be hazardous because of ash fall, possible pyroclastic surges (within c. 2 km of an eruption centre), tsunami and irregular rapid tidal oscillations. Tidal effects are likely to be pronounced by water ramping onto beaches, and they may prevent the use of inner coast beaches for boat uplift. People may therefore have to be uplifted from the outer coast.
2. If ships are present within Port Foster when an eruption occurs, they should depart the island immediately, ideally after uplifting all people ashore. Masters of vessels should observe extreme caution whilst departing Neptunes Bellows because of tidal rips and surges, which are enhanced at the narrow shallow entrance channel. Masters of vessels should also be aware of Ravn Rock, which is located at Neptunes Bellows, and the possibility of rockfalls from Cathedral Crags.
3. All rescuing vessels and helicopters should avoid passing through or under the eruption clouds because of the damaging effects of gritty ash particles on machinery.
4. Escape routes to the outer coast of the island are shown in Figure 1 of Appendix 6. All escape routes from the inner bay to the outer coast are strenuous, both climbing up onto the caldera rim and (in most cases) descending again on the outside. The caldera wall is steep (impassable cliff in places) and covered in highly mobile scree. It is impossible to use ground vehicles (e.g. ATVs) to transport people out of the caldera. Although exit routes are passable for ATVs at two places, much skill and local knowledge of the routes are required and the routes are impassable to ATVs carrying a passenger.
5. All routes to the outer coast will take hours to complete, ranging from about 2 hours for the easiest route (Whalers Bay to Baily Head) to 3 or 4 hours (or more) if the unnamed bay on the north coast or at Macaroni Point are the only options. These are minima and based on times likely to be taken by young relatively fit persons. The routes are physically arduous as most surfaces are yielding (mainly composed of coarse ash and lapilli). Exhaustion is likely and should be anticipated, even in fit persons. Descending to beaches on the outer coast is also generally difficult because of steep slopes. Apart from routes shown from Goddard Hill to Macaroni Point and the unnamed bay on the north coast (Figure 1), there are no recommended safe routes over snow and ice. Because of important difficulties peculiar to glaciers (e.g. crevasses, whiteout, slippery surfaces), other glacier travel should be avoided unless with trained guides using suitable equipment (e.g. ice axes, ropes, harnesses). Such equipment is unlikely to be readily available in an emergency.
6. Helicopter uplifts may be the best option as most of the outer coast beaches are narrow, bouldery and shelve steeply into deeper water, causing beach surf even on calm days. Some beaches (e.g. north of Punta de la Descubierta) also have a submerged offshore bar hazardous to small boats. If wind conditions are suitable, it may be possible to uplift people by helicopter from the inner coast. The most appropriate action can be judged at the time. Although helicopter uplifts can probably be effected, with variable difficulty, almost anywhere, the best areas are shown in Figure 1 of Appendix 6.

Figure 1. Suggested escape routes on Deception Island during a volcanic crisis corresponding to no more than a code orange alert state.



II. Measures

Measure 4 (2005)

Antarctic Specially Protected Areas: Extension of Expiry Dates

The Representatives,

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

Recalling Recommendations VIII-4 (1975), XIV-5 (1987) and XVI-2 (1991), Measure 2 (2000) and Measure 3 (2001);

Recalling Decision 1 (2002) which renamed and renumbered Areas and Sites as Antarctic Specially Protected Areas;

Noting that the expiry date for certain Management Plans for Antarctic Specially Protected Areas is 31 December 2005, but wishing to continue to protect these Areas until such time that their respective Management Plans have been revised in accordance with Annex V of the Protocol,

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

that the date of expiry of the following Management Plans be extended until 31 December 2010:

(a) Antarctic Specially Protected Area 125: Fildes Peninsula, King George Island, South Shetland Islands;

(b) Antarctic Specially Protected Area 127: Haswell Island;

(c) Antarctic Specially Protected Area 144: Chile Bay (Discovery Bay), Greenwich Island;

(d) Antarctic Specially Protected Area 146: South Bay, Doumer Island, Palmer Archipelago; and

(e) Antarctic Specially Protected Area 150: Ardley Island, Maxwell Bay, King George Island.

II. Measures

Measure 5 (2005)

Antarctic Historic Sites and Monuments: Lillie Marleen Hut and Amundsen's Tent

The Representatives,

Recalling the requirements of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty (the Protocol) to maintain a list of current Historic Sites and Monuments and that such sites shall not be damaged, removed or destroyed;

Recalling Measure 3 (2003) which revised and updated the "List of Historic Sites and Monuments";

Desiring to add the following two sites to that list;

Recommend to their Governments the following Measure for approval in accordance with paragraph 2 of Article 8 of Annex V to the Protocol:

That the following sites be added to the "List of Historic Sites and Monuments" annexed to Measure 3 (2003):

(a) No. 79: Lillie Marleen Hut, Mt. Dockery, Everett Range, Northern Victoria Land. Lillie Marleen Hut was erected to support the work of the German Antarctic Northern Victoria Land Expedition (GANOVEX I) of 1979/1980. The hut, a bivouac container made of prefabricated fiberglass units insulated with polyurethane foam, was named after the Lillie Glacier and the song "Lillie Marleen". The hut is closely associated with the dramatic sinking of the expedition ship "Gotland II" during GANOVEX II in December 1981.
Location: 71º12'S, 164º31'E
Original proposing Party: Germany
Party undertaking management: Germany

(b) No. 80: Amundsen's Tent
The tent was erected at 90º by the Norwegian group of explorers led by Roald Amundsen on their arrival at the South Pole on 14 December 1911. The tent is currently buried underneath the snow and ice in the vicinity of the South Pole.
Location: In the vicinity of 90ºS
Original proposing Party: Norway
Party undertaking management: Norway

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