The Antarctic Treaty

Measures adopted at
the Thirty-third Consultative Meeting
held at Punta del Este, Uruguay, 3 May – 14 May 2010

Presented to Parliament
by the Secretary of State for Foreign and Commonwealth Affairs
by Command of Her Majesty
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Cm 8197 £33.00

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Any enquiries regarding this publication should be sent to us at Treaty Section, Foreign and Commonwealth Office, King Charles Street, London, SW1A 2AH

This publication is available for download at www.official-documents.gov.uk

ISBN: 9780101819725

Printed in the UK by The Stationery Office Limited
on behalf of the Controller of Her Majesty's Stationery Office

ID: 2456607 10/11 15235 19585

Printed on paper containing 30% recycled fibre content minimum.

MEASURES ADOPTED AT THE THIRTY-THIRD ANTARCTIC TREATY CONSULTATIVE MEETING

Punta del Este, Uruguay, 3–14 May 2010

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

In accordance with Article IX, paragraph 4, of the Antarctic Treaty, the Measures adopted at Consultative Meetings become effective upon approval by all Contracting Parties whose representatives were entitled to participate in the meeting at which they were adopted (i.e. all the Consultative Parties). The full text of the Final Report of the Meeting, including the Decisions and Resolutions adopted at that Meeting and colour copies of the maps found in this command paper, is available on the website of the Antarctic Treaty Secretariat at www.ats.aq/documents /ATCM33/fr/ATCM33_fr001_e.pdf.

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 I to 14 (2010). The approval procedures set out in Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty apply to Measure 15 (2010).

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

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

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

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

Note: The above page numbers have been produced for this command paper and do not correspond to the page numbering used on the original Final Report of the meeting.

ACRONYMS AND ABBREVIATIONS

ACAP Agreement on the Conservation of Albatrosses and Petrels
ASOC Antarctic and Southern Ocean Coalition
ASMA Antarctic Specially Managed Area
ASPA Antarctic Specially Protected Area
ATS Antarctic Treaty System or Antarctic Treaty Secretariat
ATCM Antarctic Treaty Consultative Meeting
ATCP Antarctic Treaty Consultative Party
CAML Census of Antarctic Marine Life
CCAMLR Convention on the Conservation of Antarctic Marine Living Resources and/or Commission for the Conservation of Antarctic Marine Living Resources
CCAS Convention for the Conservation of Antarctic Seals
CEE Comprehensive Environmental Evaluation
CEP Committee for Environmental Protection
COMNAP Council of Managers of National Antarctic Programmes
EIA Environmental Impact Assessment
HCA Hydrographic Committee on Antarctica
HSM Historic Site and Monument
IAATO International Association of Antarctica Tour Operators
ICG Intersessional Contact Group
ICSU International Council for Science
IEE Initial Environmental Evaluation
IHO International Hydrographic Organization
IMO International Maritime Organization
IOC Intergovernmental Oceanographic Commission
IP Information Paper
IPCC Intergovernmental Panel on Climate Change
IPY International Polar Year
IPY-IPO IPY Programme Office
IUCN International Union for Conservation of Nature and Natural Resources
RFMO Regional Fishery Management Organisation
SATCM Special Antarctic Treaty Consultative Meeting
SCAR Scientific Committee on Antarctic Research
SCALOP Standing Committee for Antarctic Logistics and Operations
SC-CAMLR Scientific Committee of CCAMLR
SP Secretariat Paper
SPA Specially Protected Area
UNEP United Nations Environment Programme
UNFCCC United Nations Framework Convention on Climate Change
WG Working Group
WMO World Meteorological Organization
WP Working Paper
WTO World Tourism Organization

Antarctic Specially Protected Area No. 101
(Taylor Rookery, Mac.Robertson Land):
Revised Management Plan

The Representatives,

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

Recalling

- Recommendation IV-I (1966), which designated Taylor Rookery, Mac.Robertson Land as Specially Protected Area ("SPA") No. 1;

- Recommendation XVII-2 (1992), which adopted a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 1 as ASPA 101;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 101;

Recalling that Recommendation XVII-2 (1992) has not become effective, that the Management Plan for ASPA 101 attached to it was withdrawn by Measure 2 (2005) and that the other Management Plans attached to it (in respect of ASPA 102, 103 and 116) have also already been withdrawn (by Measure 2 (2005) and Measure 1 (2006));

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 101;

Desiring to replace the existing Management Plan for ASPA 101 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 101 (Taylor Rookery, Mac.Robertson Land), which is annexed to this Measure, be approved;

2) the Management Plan for ASPA 101 annexed to Measure 2 (2005) shall cease to be effective; and Recommendation XVII-2 (1992), which is not yet effective, be withdrawn.

Management Plan for Antarctic Specially Protected Area No. 101

TAYLOR ROOKERY, MAC.ROBERTSON LAND

Introduction

Taylor Rookery is an emperor penguin (*Aptenodytes forsteri*) colony located on the east side of Taylor Glacier, Mac.Robertson Land (67°27'S; 60°53'E, Map A). The site was originally designated as Specially Protected Area No. 1, through Recommendation IV-I (1966), after a proposal by Australia. In accordance with Resolution XX-5 (1996) the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 101. A management plan for the Area was adopted under Recommendation XVII-2 (1992) and revised under Measure 2 (2005). Taylor Rookery is designated as an ASPA to protect the largest known colony of emperor penguins located entirely on land.

1. Description of values to be protected

Of the 40-plus known emperor penguin colonies around Antarctica only three are land-based while all others are located on fast ice. For many years, the only known land-based colonies were at Emperor Island, Dion Islands, Antarctic Peninsula (67°52'S, 68°42'W) and at Taylor Glacier. Because of this uncommon characteristic both colonies were designated as Specially Protected Areas in 1966. A third land-based colony was discovered in Amundsen Bay, East Antarctica, in 1999.

The emperor penguin colony at Taylor Glacier was discovered in October 1954. It is the largest known land-based colony (Map B) and as such is of outstanding scientific importance. The Australian Antarctic program has carried out population monitoring at the Taylor Glacier colony since 1957, including annual photographic censuses since 1988 which have resulted in counts with high levels of accuracy. The number of adults 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. Similar long term records are available only for one other location, the colony near Dumont d'Urville (Pointe-Géologie Archipelago, ASPA 120, 66º40'S, 140º01'E) and a number of colonies in the Ross Sea region. However, the records of the latter are not continuous. Only a limited number of visits are made each year to Taylor Glacier, and the colony is ideal for census work, being surrounded by small rocky hills which make it possible to observe the penguins without entering the breeding area. Thus, the disturbance to the colony, especially since 1988, has been very low and direct human interference can be excluded as a potential factor influencing the health of this population.

2. Aims and Objectives

Management of Taylor Rookery aims to:

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

- allow research on the ecosystem and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;

- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;

- minimise the possibility of introduction of alien plants, animals and microbes to the Area;

- allow for the gathering of data on the population status of the emperor penguin colony on a regular basis and in a sustainable manner; and

- allow visits for management purposes in support of the aims of the management plan.

3. Management Activities

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

- visits shall be made to the Area as necessary (preferably not less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure that management activities are adequate; and

- the Management Plan shall be reviewed at least every five years and updated as required.

4. Period of Designation

Designated for an indefinite period.

5. Maps

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

Map B: Antarctic Specially Protected Area No. 101, Taylor Rookery: Topography and Emperor Penguin Colony.

Map C: Antarctic Specially Protected Area No. 101, Taylor Rookery: Vehicle and Helicopter Approach and Landing Site.

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

6. Description of the Area

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

The Taylor Rookery ASPA consists of the whole of the northernmost rock exposure on the east side of Taylor Glacier, Mac.Robertson Land (67°27'S, 60°53'E, Map B). There are no boundary markers delimiting the site.

The emperor penguin colony is located on a low lying rock outcrop in the south-west corner of a bay formed by Taylor Glacier to the west, the polar ice cap to the south and the islands of the Colbeck Archipelago to the east. 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. A couple of small melt lakes form in late spring and a small stream 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 1cm and 1m across. It slopes upwards from the shoreline to a well defined platform several metres broad and 3 to 6m above sea level. The Area is readily defined by its natural features.

Climate

Limited data exist for the meteorology of the Area. Conditions are probably similar to those of the Mawson station area, approximately 90km to the east, 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 10.9m per second with frequent prolonged periods of strong south-easterly katabatic winds from the ice cap with mean wind speeds over 25m per second and gusts often exceeding 50m per second. Local sections of the coast vary in their exposure to strong winds and it is possible that slightly lower mean wind speed 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.

Environmental domains analysis

Based on the Environmental Domains Analysis for Antarctica (Resolution 3(2008)) Taylor Rookery is located within Environment D East Antarctic coastal geologic.

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 60m altitude.

Vegetation

The flora of 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. Twenty six species of lichen and three species of moss can be found in the region, 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

Emperor penguins

The breeding site of the emperor penguins is a north-facing amphitheatre formed by the tongue of the Taylor Glacier to the west and rocky hills to the east. The penguins 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 snow.

First hatchlings have been observed in mid July which suggests mid May as the onset of laying. Fledglings depart the colony from mid December to mid January, usually leaving during the day when the weather is the warmest and the katabatic wind has subsided. Adult birds and fledglings head in a N-NE direction towards a polynya about 62km from the colony. This ice edge reduces to approximately 25km 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 2002. Data obtained from more recent census work will be analysed and published within the term of this management plan.

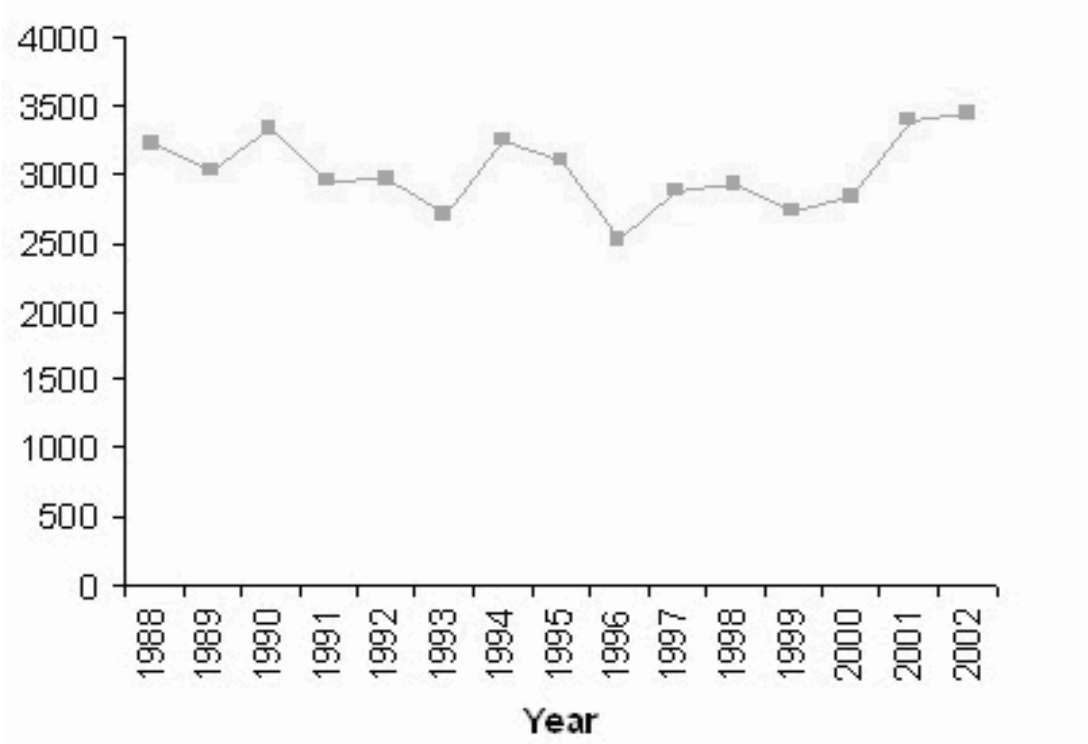

Figure 1: Numbers of adult emperor penguins present in the colony during winter at Taylor Glacier, 19882002. Vertical axis shows number of individual birds. Horizontal axis shows bird count year.

Skuas

Skuas are often observed near the penguin colony. It is not known whether these birds breed in this location.

6(ii) Access to the Area

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

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

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

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

ASPA 102 Rookery Islands, Mac.Robertson Land (67°36'36.7" S and 62°32'06.7" E) is located approximately 80 kilometres east of Taylor Rookery.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General permit conditions

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

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

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

Travel to the Area may be by vehicle over sea ice, which is generally only possible during the period 1 May to 25 December, or by aircraft.

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

The following conditions apply to the use of aircraft:

- disturbance of the colony by aircraft shall be avoided at all times;
- overflights of the colony are prohibited, except where essential for scientific or management purposes. Such overflights are to be at an altitude of no less than

930m (3050ft) for single-engined helicopters and fixed-wing aircraft, and no less than 1500m (5000ft) for twin-engined helicopters;

- fixed wing aircraft are not permitted to land inside the Area;
- fixed wing aircraft used to approach the Area shall not land or take off within 930m (3050ft) or fly within 750m of the colony;
- helicopters shall approach the Area from the east over the sea ice and preferably, where sea ice conditions permit, land outside the Area, with access to the Area being by foot (see Map C);
- when landing outside the Area, single-engined helicopters should not land or take off within 930m (3050ft) or fly within 750m of the colony, and twin-engined helicopters should not land, take off or fly within 1500m (5000ft) of the colony;
- if landing inside the Area is essential due to unsuitable sea ice conditions, only singled-engined helicopters may land in the north-east of the Area at the point marked "H" on Map C, where a headland to the south obscures the colony from view and noise;
- single-engined helicopters approaching to land in the Area should fly at the lowest safe height over the sea ice to avoid disturbing the colony; and
- refuelling of aircrafts is not permitted 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 colony area and give way to departing and arriving penguins. Pedestrians moving in and around the Area should avoid crossing the access routes of the birds if possible, or cross quickly without obstructing penguin traffic.

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

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-September, when adults are brooding chicks.

As penguins may be in the area in most months, restrictions shall apply year-round.

The Area may be accessed to conduct censuses of the emperor penguin colony. The colony is ideal for census work because it can be done without any disturbance to the birds. The best vantage point for viewing and photographing the penguins in winter is a rocky headland which runs adjacent to Taylor Glacier, on the western side of the

colony. The ideal time for a census of adults is from 22 June to 5 July, since during this time most birds present are incubating males, each representing one breeding pair.

Other activities which may be conducted in the Area:

- compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the avifauna or the ecosystem of the Area;

- essential management activities, including monitoring; and

- sampling, which should be the minimum required for the approved research programmes.

7(iv) 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 temporarily left in situ (GPS locations, description, tags, etc. and expected "use by date") shall be reported to the permitting authority.
Temporary field huts, if permitted, should be placed well away from the penguin colony at the point to the north-east of the Area, where a headland to the south obscures the colony from view.

7(v) Location of field camps

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

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.

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.

- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.

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

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

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

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

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

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

7(ix) Disposal of waste

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

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

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

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

7(xi) Requirements for reports

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 relevant photographs taken of the Area; 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 Area was designated are being adequately protected and whether management measures are effective.

The report shall 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 shall be made available to the permit issuing authority and the Party responsible for development of the Management Plan (if different) for the purposes of reviewing the management plan in accordance with the Antarctic Treaty system requirements. Such reports should include, as appropriate, the information identified in the Visit Report form contained in Appendix 4 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas appended to Resolution 2 (1998). 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.

7(xii) Emergency provision

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

8. Supporting Documentation

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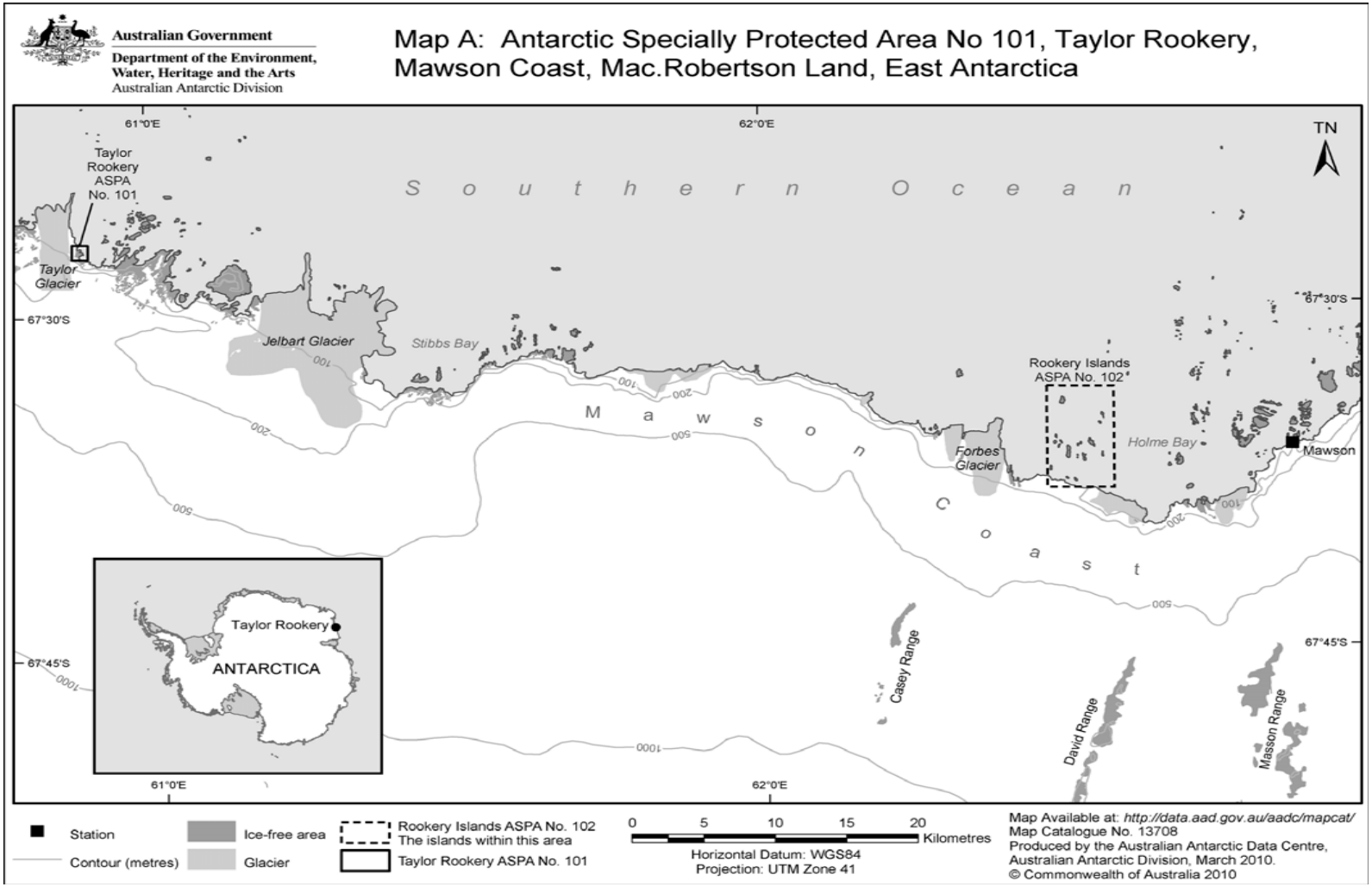
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map A: Antarctic Specially Protected Area No 101, Taylor Rookery, Mawson Coast, Mac.Robertson Land, East Antarctica
61°0'E
62°0'E
TN
Southern Ocean
Taylor Rookery ASPA No. 101
Taylor Glacier
67°30'S
Jelbart Glacier
Stibbs Bay
Rookery Islands ASPA No. 102
Mawson Coast
Forbes Glacier
Holme Bay
Mawson
67°45'S
Taylor Rookery
ANTARCTICA
Casey Range
David Range
Masson Range
Station
Contour (metres)
Ice-free area
Glacier
Rookery Islands ASPA No. 102
The islands within this area
Taylor Rookery ASPA No. 101
0 5 10 15 20 Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13708
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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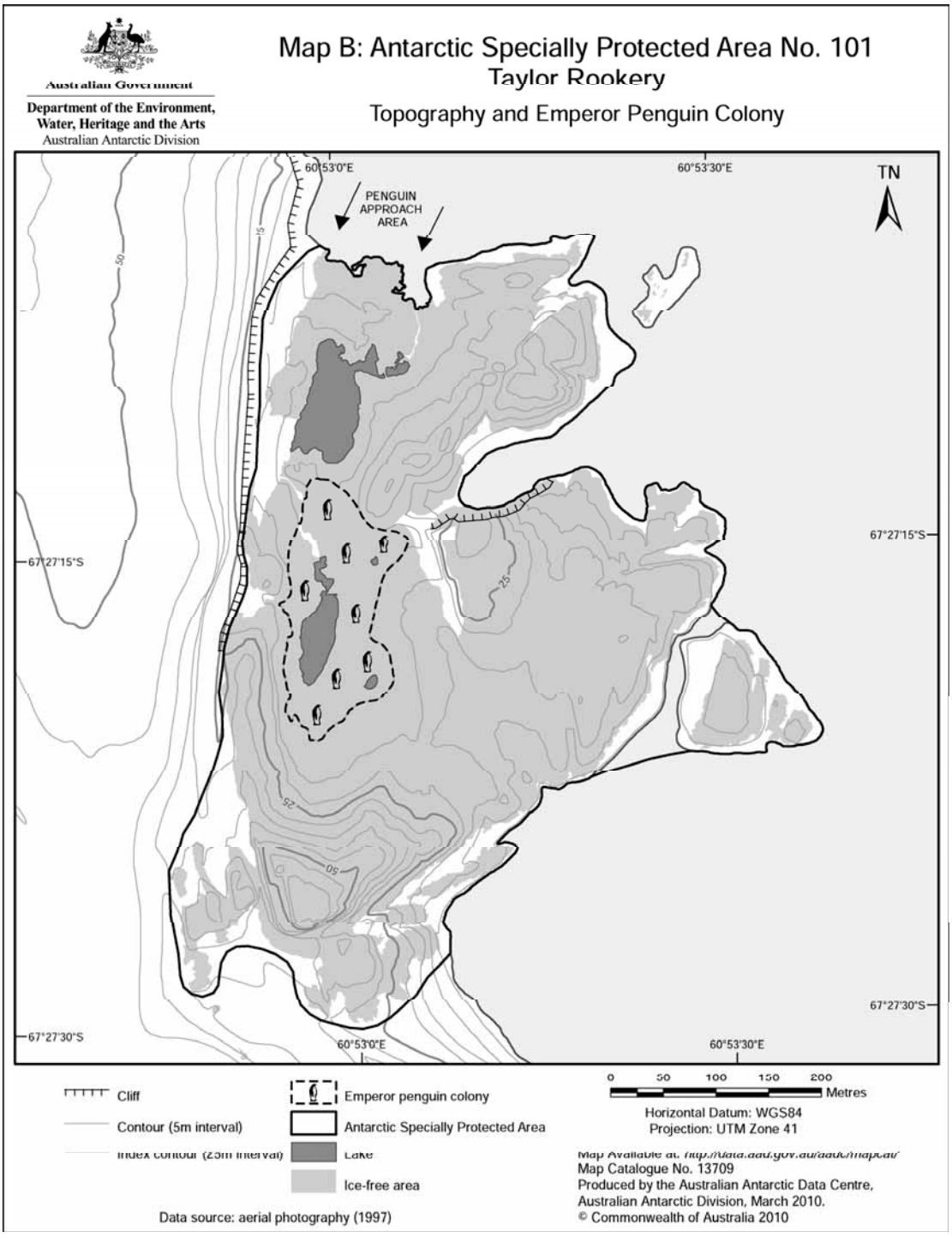
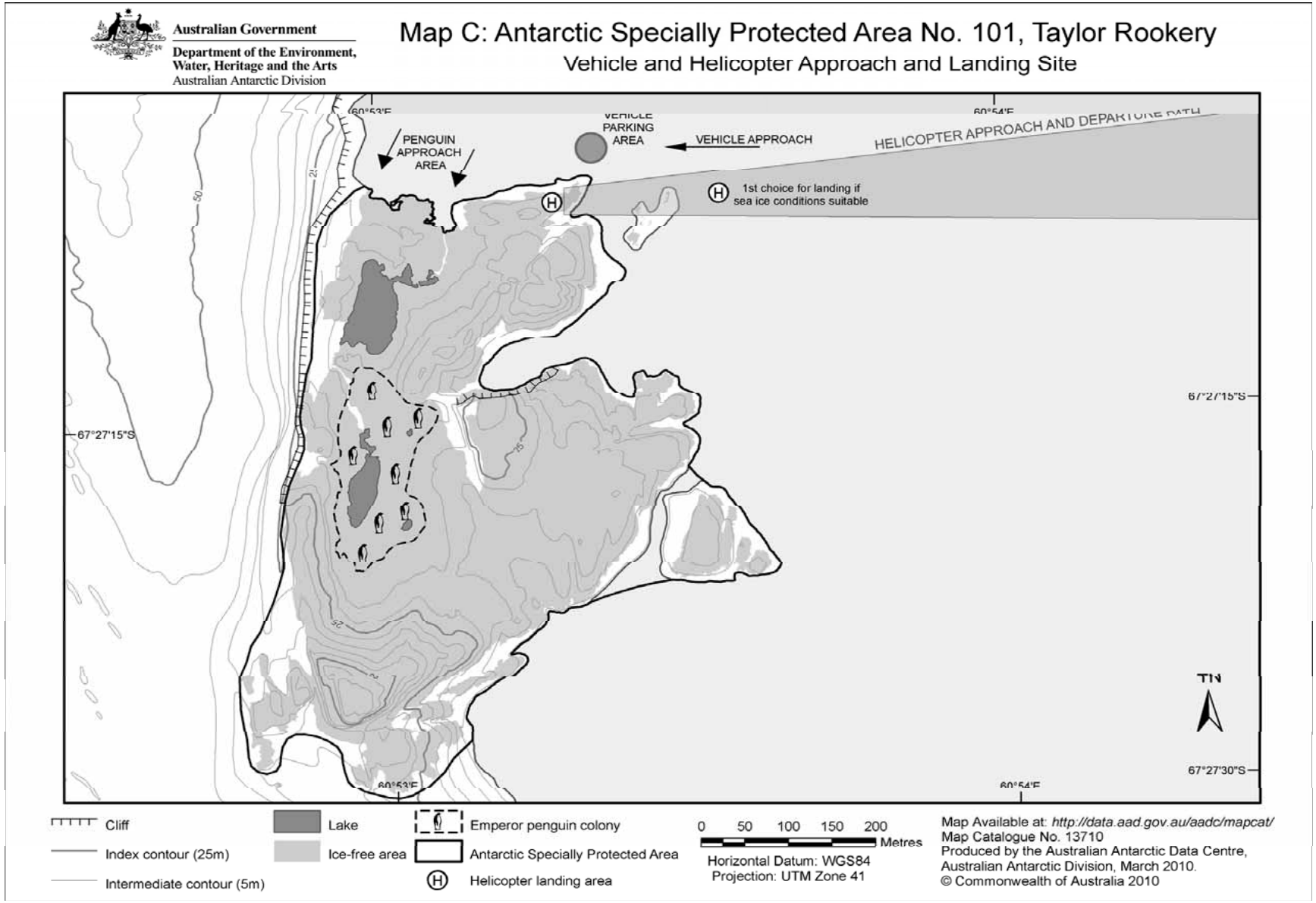

Map B: Antarctic Specially Protected Area No. 101
Taylor Rookery
Topography and Emperor Penguin Colony
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
60°53'0"E
60°53'30"E
TN
PENGUIN APPROACH AREA
67°27'15"S
67°27'30"S
Cliff
Contour (5m interval)
Index contour (25m interval)
Emperor penguin colony
Antarctic Specially Protected Area
Lake
Ice-free area
0 50 100 150 200
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Catalogue No. 13709
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, March 2010.
© Commonwealth of Australia 2010
Data source: aerial photography (1997)


Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map C: Antarctic Specially Protected Area No. 101, Taylor Rookery
Vehicle and Helicopter Approach and Landing Site
PENGUIN APPROACH AREA
VEHICLE PARKING AREA
VEHICLE APPROACH
HELICOPTER APPROACH AND DEPARTURE PATH
1st choice for landing if sea ice conditions suitable
67°27'15"S
67°27'30"S
60°53'E
60°54'E
TN
Cliff
Index contour (25m)
Intermediate contour (5m)
Lake
Ice-free area
Emperor penguin colony
Antarctic Specially Protected Area
Helicopter landing area
0 50 100 150 200
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13710
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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Antarctic Specially Protected Area No. 102
(Rookery Islands, Holme Bay, Mac.Robertson Land):
Revised Management Plan

The Representatives,

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

Recalling

- Recommendation IV-2 (1966), which designated Rookery Islands, Holme Bay as Specially Protected Area ("SPA") No. 2;

- Recommendation XVII-2 (1992), which adopted a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 2 as ASPA 102;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 102;

Recalling that Recommendation XVII-2 (1992) has not become effective, that the Management Plan for ASPA 102 attached to it was withdrawn by Measure 2 (2005) and that the other Management Plans attached to it (in respect of ASPA 101, 103 and 116) have also already been withdrawn (by Measure 2 (2005) and Measure 1 (2006));

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 102;

Noting that Measure 1 (2010) withdraws Recommendation XVII-2 (1992);
Desiring to replace the existing Management Plan for ASPA 102 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 102 (Rookery Islands, Holme Bay, Mac.Robertson Land), which is annexed to this Measure, be approved; and the Management Plan for ASPA 102 annexed to Measure 2 (2005) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area No. 102

ROOKERY ISLANDS, HOLME BAY, MAC.ROBERTSON LAND

Introduction

The Rookery Islands are a group of small islands and rocks in the western part of Holme Bay, lying to the north of the Masson and David Ranges in Mac.Robertson Land, East Antarctica (67°36'36.7" S, 62°32'06.7" E, Map A and Map B). The Rookery Islands were originally designated as Specially Protected Area No. 2 through Recommendation IV-II (1966), after a proposal by Australia. In accordance with Resolution XX-5 (1996), the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 102. A management plan for the Area was adopted under Recommendation XVII-2 (1992) and revised under Measure 2 (2005). The Area is designated to protect breeding colonies of possbly six bird species resident in the region, including the southern giant petrel (*Macronectes giganteus*) and the Cape petrel (*Daption capensis*) which are not known to occur elsewhere in the region. The Area is one of only four known southern giant petrel breeding colonies on continental Antarctica.

1. Description of values to be protected

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

The southern giant petrel is not known to breed elsewhere in the region, and the colony located on Giganteus Island in the Rookery Islands group is one of only four known breeding sites on continental Antarctica. The other three continental colonies are located near the Australian stations of Casey (Frazier Islands, ASPA 160, 66°14’S 110°10’E, approximately 250 pairs), and Davis (Hawker Island, ASPA 167, 68º35’S, 77º50’E, approximately 25 pairs), and near the French station Dumont d’Urville (Pointe-Géologie Archipelago, ASPA 120, 66º40’S, 140º01’E, 12-15 pairs).These four breeding colonies comprise less than one per cent of the global breeding population, which is approximately 54,000 breeding pairs, approximately 11,000 of which are found south of 60oS, mostly in the Antarctic Peninsula region.

Currently there are relatively few published data available that allow robust analyses of southern giant petrel population trends. Some locations have experienced a decrease that appears to be stabilising or to have reversed in recent years. Small increases have occurred at other locations.

Southern giant petrels are widespread in more northerly latitudes, breeding on islands in the north-west region of the Antarctic Peninsula and on islands of the Scotia Ridge. However, it is important that the species is protected at the southern limit of its breeding range and the Antarctic Treaty parties have committed to minimise human disturbance and encourage regular population counts at all breeding sites in the Antarctic Treaty area.

2. Aims and Objectives

Management of the Rookery Islands aims to:

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

3. Management Activities

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

- information on the location of the Area (stating special restrictions that apply), and a copy of this Management Plan shall be kept available at adjacent operational research/field stations and will be made available to ships visiting the vicinity;

- where practicable the Area shall be visited as necessary (preferably no less than once every five years), to assess whether it continues to serve the purposes for which it was designated and to ensure that management activities are adequate;

- where practicable, at least one research visit should be conducted to census the southern giant petrels at Giganteus Island and other seabird populations in each five year period, to enable assessment of breeding populations.

- the Management Plan shall be reviewed at least every five years.

4. Period of Designation

Designation is for an indefinite period.

5. Maps

Map A: Antarctic Specially Protected Area No 102, Rookery Islands, Holme Bay, Mac.Robertson Land. The inset map indicates the location in relation to the Antarctic continent.

Map B: East Antarctica, Mac.Robertson Land, Rookery Islands Antarctic Specially Protected Area No 102. Distribution of nesting seabirds on the Rookery Islands

Map C: East Antarctica, Mac.Robertson Land, Rookery Islands Antarctic Specially Protected Area No 102. Topography and distribution of nesting seabirds on Giganteus Island (Restricted Zone).

Specifications for all Maps: Horizontal Datum: WGS84 Projection: UTM Zone 49.

6. Description of the Area

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

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

There are no boundary markers delimiting the site. The Rookery Islands range in size from small rocks which barely remain above water at high tide to the larger 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.

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.

Environmental domains analysis

Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) the Rookery Islands are located within Environment D East Antarctic coastal geologic.

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.

Vegetation

No mosses or lichens have been recorded from any of the Rookery Islands. There are some terrestrial algae but no taxonomic identifications have been made. Most of the smaller islands and rocks are covered with sea spray in summer 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 are thought to breed on the Rookery Islands: Adélie penguin (*Pygoscelis adeliae*), Cape petrel (*Daption capensis*), snow petrel (*Pagodroma*

nivea), southern giant petrel (*Macronectes giganteus*), Wilson's storm petrel (*Oceanites oceanicus*) and the south polar skua (*Catharacta maccormicki*).

The southern giant petrels nest on Giganteus Island (Map C). The colony is currently marginal but has been stable at 2-4 breeding pairs since the 1960s. A total of 16 incubating birds were recorded in 1958 and 13 in 1967. However, only two nests were present in 1972, four in 1973, two in 1977, one in 1981, two in 1982, and three in 2001. During the most recent count in 2007, four nests were counted on two separate occasions, with two pairs and two lone birds at first count (27th November) and three pairs and one lone bird on an egg (therefore assumed to have an absent partner) at second count (10th December). The nests are shallow mounds of stones and are built on broad gravel patches on the raised beaches. The area has many old nests and several may be rebuilt each year but there is no evidence that each regularly contains eggs.

Cape petrels breed on Rookery Island and a small island known as Pintado Island, located 300 m north-west of Rookery Island. There were seven nests on Rookery Island and 12 nests on Pintado Island in 1958. No systematic 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. On 24 December 2007, there were at least 123 nests observed on Pintado Island many with eggs but these were not systematically assessed.

Approximately 10 nests were observed on Rookery Island. Larger breeding colonies of Cape petrels occur along the rock outcrops near Forbes Glacier 8km to the west, and on Scullin and Murray Monoliths (ASPA 164) approximately 100km to the east.

Snow petrels nest throughout the Rookery Islands and in greatest concentration on Rookery Island. Wilson's storm petrels are frequently seen flying around the islands and probably breeds on a number of the larger islands in the group, although no nests have been recorded.

Adélie penguins breed on 14 of the islands. The largest populations occur on Rookery and Giganteus Islands (4850 pairs in December 1971). On 17 December 1972, 33,000 adults were present on 10 of the islands. In December 2007, a population survey for all 14 islands with Adelie penguin colonies estimated a breeding population of 78,682 to 104,420 nests. Of these, approximately 31,800 nests were counted on Rookery Island and approx 10,000 nests on Giganteus Island.

6(ii) Access to the Area

The Area can be accessed by oversnow vehicles or boats (depending on sea ice conditions). There are no designated landing sites (also see 7(ii)).

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

There are no structures within or adjacent to the Area.

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

ASPA 101 Taylor Rookery, Mac.Robertson Land (67°26'S; 60°50'E) is located approximately 80 kilometres to the west.

6(v) Special zones within the Area

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

7. Terms and conditions for entry permits

7(i) General conditions

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

- it is issued only for compelling scientific that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or for essential management purposes consistent with plan objectives, such as inspection, maintenance or review;
- the actions permitted will not jeopardise the values of the Area;
- the actions permitted are in accordance with the management plan;
- the permit, or an authorised copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the permit;
- permits shall be issued for a stated period;
- the appropriate national authority shall be notified of any activities/measures undertaken that were not included in the authorised permit. Entry to the Giganteus Island Restricted Zone is only permitted in accordance with conditions outlined below.
- Permits to enter the Giganteus Island Restricted Zone during the southern giant petrel breeding period (1 October to 30 April) may only be issued for the purpose of conducting censuses. Other research may be conducted outside the breeding period in accordance with a permit.
- Wherever practicable, censuses should be conducted from outside the southern giant petrel colony using vantage points from which the nesting birds may be counted.

- Access to the Restricted Zone should be limited to the minimum amount of time reasonably required to undertake the census.

- Visits to conduct censuses should be made by a team including at least one bird biologist associated with a national Antarctic program or someone with relevant scientific skills and experience. Other personnel should remain at the shoreline.

- 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.

- Overflights of Giganteus Island are prohibited.

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

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

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

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

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

- disturbance of the colonies by aircraft shall be avoided at all times

- sea ice landings shall be encouraged (where practicable);

- aircraft landings on Giganteus Island during the breeding season are prohibited;

- as aircraft may provide the only viable access to the other islands when sea and sea ice access is not possible, single-engined helicopters may land on the islands during the breeding season where it is possible to maintain a distance of at least 500m from bird colonies. Permission to land an aircraft may be granted for essential scientific or management purposes only if it can be demonstrated that disturbance will be minimal. Only personnel who are required to carry out work in the Area should leave the helicopter;

- when accessing Giganteus Island by aircraft outside the breeding season sea ice landings are preferred, following separation distances mentioned below;

- at all other times, single-engined helicopters and fixed wing aircraft must not land or take off within 930 m (3050 ft) or fly within 750m of bird colonies, and

twin-engined helicopters must not land, take off or fly within 1500 m of bird colonies;

- overflights of the islands during the breeding season is prohibited, except where essential for scientific or management purposes. Such overflights are to be at an altitude of no less than 930m (3050ft) for singleengined helicopters and fixed-wing aircraft, and no less than 1500m (5000ft) for twin-engined helicopters;

- refuelling of aircraft is prohibited within the Area.

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

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

- scientific research consistent with the Management Plan for the Area which cannot be undertaken elsewhere and which will not jeopardise the values for which the Area has been designated or the ecosystems of the Area;

- essential management activities, including monitoring; and

- sampling, which should be the minimum required for approved research programmes.

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

- Permanent structures or installations are prohibited.

- Other structures or installations shall not be erected within the Area except as specified in a permit.

- Small temporary refuges, hides, blinds or screens may be constructed for the purpose of scientific study of the avifauna.

- Installation (including site selection), removal, modification or maintenance of structures shall be undertaken in a manner that minimises disturbance to breeding birds.

- All scientific equipment or markers installed within the Area must be clearly identified by country, name of the principal investigator and year of installation.

- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required. All such items should be made of materials that pose minimal risk of harm to bird populations or of contamination of the Area. Permits will require the removal of specific structures, equipment or markers before the permit expiry date.

7(v) Location of field camps

- Camping is prohibited within the Area except in an emergency.

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

- 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 as far as possible at or before the conclusion of the activity for which the permit was granted.

- Fuel is not to be stored in the Area unless required for essential purposes connected with the activity for which the permit has been granted. Permanent fuel depots are not permitted.

- All material introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so as to minimise the risk of environmental impact.

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

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

- Ornithological research shall be limited to activities that are non-invasive and non-disruptive to the breeding seabirds present within the Area. Surveys, including aerial photographs for the purposes of population census, shall have a high priority.

- Disturbance of southern giant petrels shall be avoided at all times.

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

- Material may only be collected or removed from the Area as authorised in a permit and shall be limited to the minimum necessary to meet scientific or management needs.

- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material in situ. If such material is found, the appropriate Authority must be notified and approval obtained prior to removal.

7(ix) Disposal of waste

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

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

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

- 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.

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

- To reduce disturbance to wildlife, noise levels including verbal communication is to be kept to a minimum. The use of motor-driven tools and any other activity likely to generate noise and thereby cause disturbance to nesting birds is prohibited within the Area during the breeding period (1 October to 30 April).

7(xi) Requirements for reports

Parties shall 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 contained in Appendix 4 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas appended to Resolution 2 (1998). 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 shall, 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 shall 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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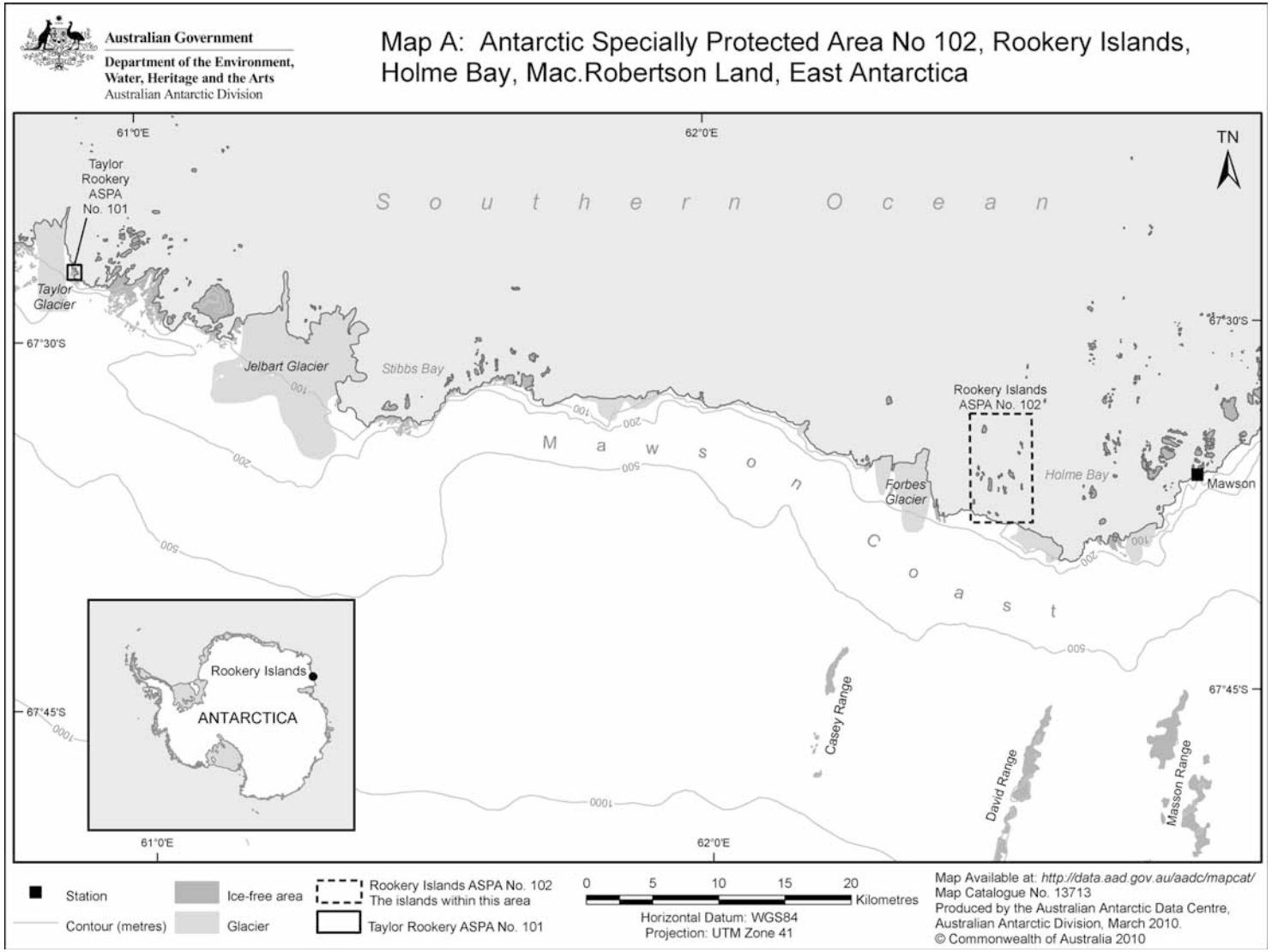
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map A: Antarctic Specially Protected Area No 102, Rookery Islands, Holme Bay, Mac.Robertson Land, East Antarctica
61°0'E
62°0'E
TN
Taylor Rookery ASPA No. 101
Southern Ocean
Taylor Glacier
67°30'S
Jelbart Glacier
Stibbs Bay
Rookery Islands ASPA No. 102
Mawson
Holme Bay
Forbes Glacier
Mawson Coast
Rookery Islands
ANTARCTICA
67°45'S
Casey Range
David Range
Masson Range
Station
Contour (metres)
Ice-free area
Glacier
Rookery Islands ASPA No. 102
The islands within this area
Taylor Rookery ASPA No. 101
0 5 10 15 20 Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13713
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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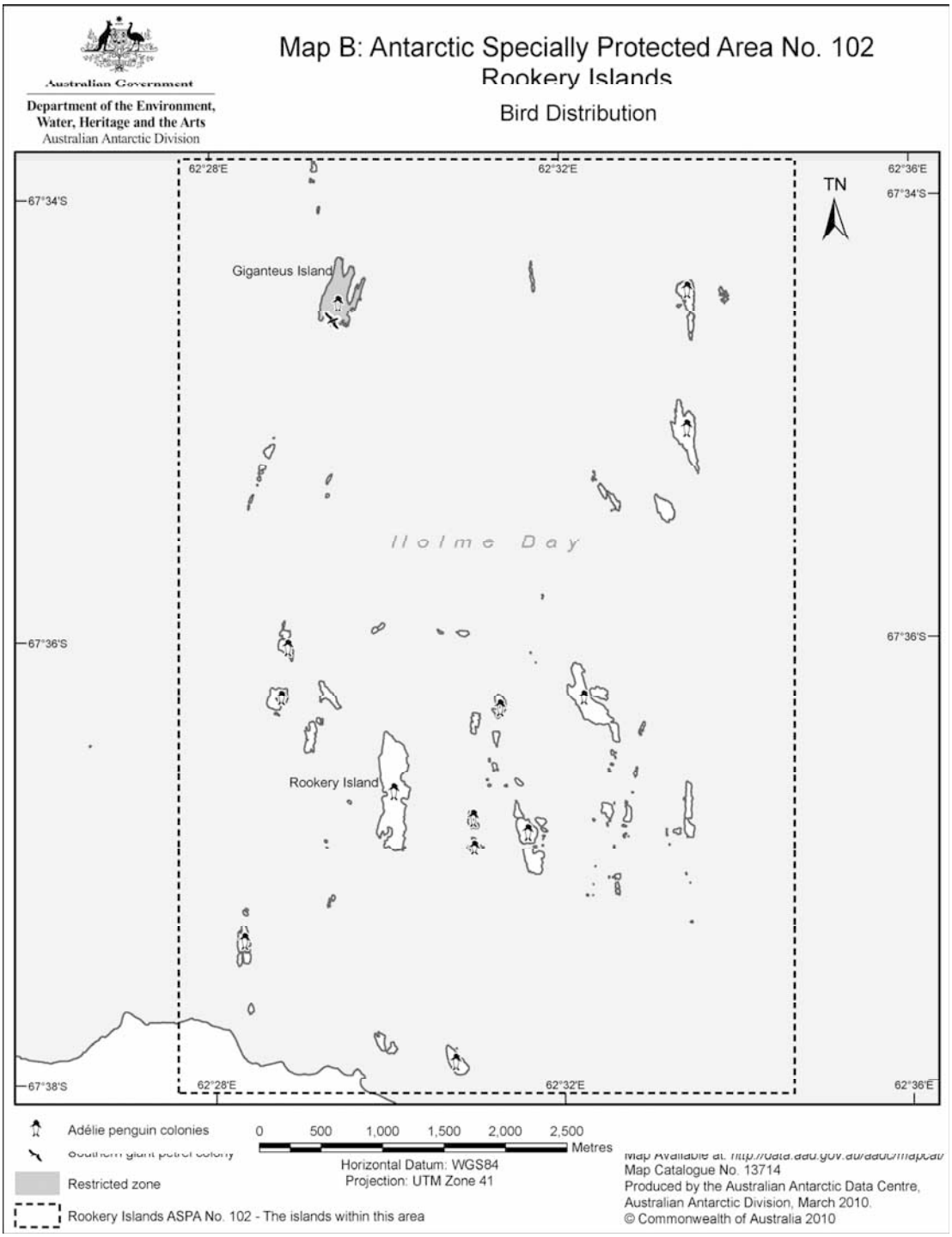
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No. 102
Rookery Islands
Bird Distribution
62°28'E
62°32'E
62°36'E
67°34'S
67°36'S
67°38'S
TN
Giganteus Island
Holme Bay
Rookery Island
Adélie penguin colonies
Restricted zone
Rookery Islands ASPA No. 102 - The islands within this area
0 500 1,000 1,500 2,000 2,500
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Map Catalogue No. 13714
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, March 2010.
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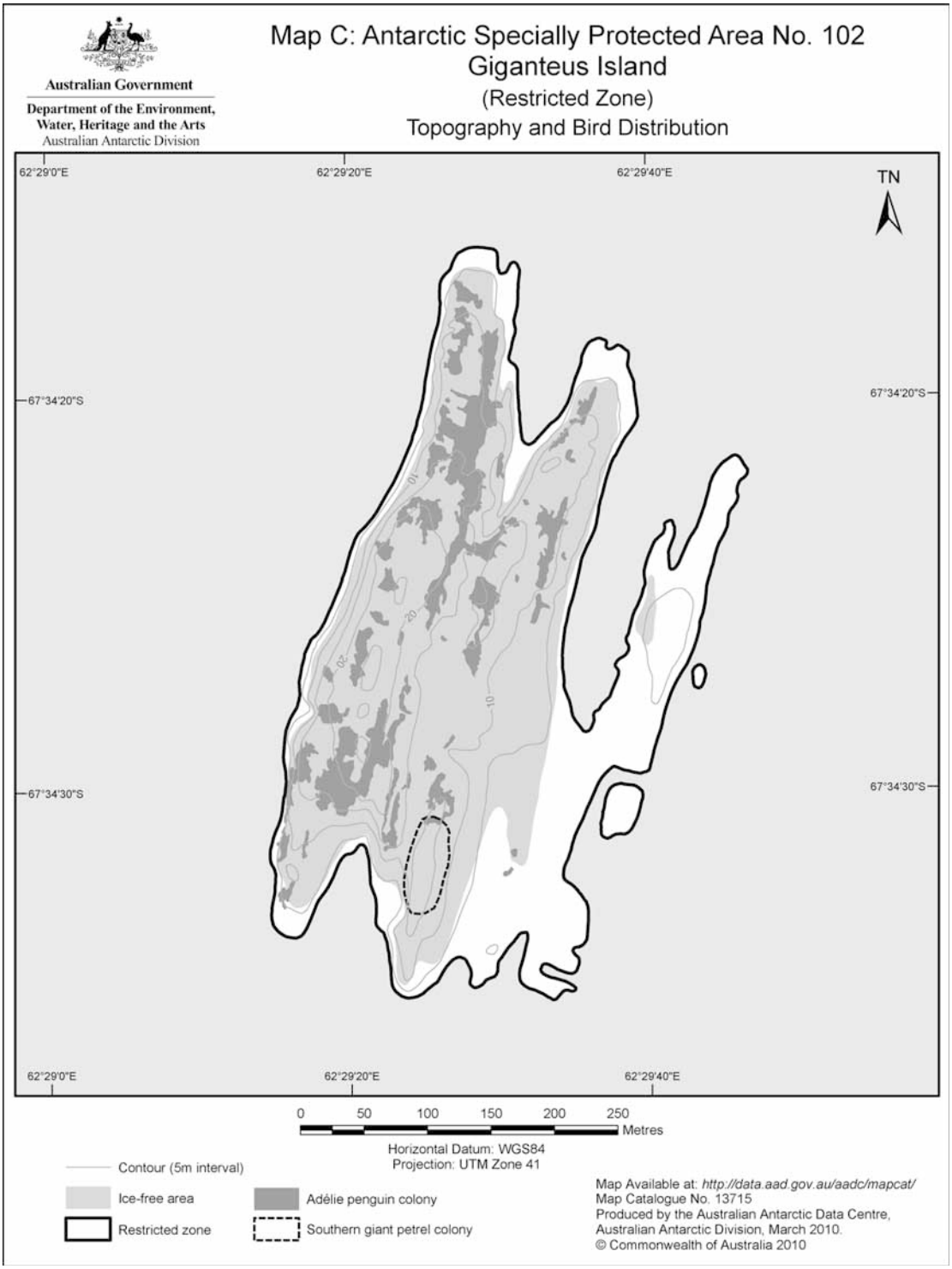
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map C: Antarctic Specially Protected Area No. 102
Giganteus Island
(Restricted Zone)
Topography and Bird Distribution
62°29'0"E
62°29'20"E
62°29'40"E
TN
67°34'20"S
67°34'30"S
0 50 100 150 200 250
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 41
Contour (5m interval)
Ice-free area
Restricted zone
Adélie penguin colony
Southern giant petrel colony
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13715
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, March 2010.
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Antarctic Specially Protected Area No. 103
(Ardery Island and Odbert Island, Budd Coast, Wilkes Land):
Revised Management Plan

The Representatives,

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

Recalling

- Recommendation IV-3 (1966) which designated Ardery Island and Odbert Island, Budd Coast as Specially Protected Area ("SPA") No. 3;

- Recommendation XVII-2 (1992), which adopted a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 3 as ASPA 103;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 103; Recalling that Recommendation XVII-2 (1992) has not become effective, that the Management Plan for ASPA 103 attached to it was withdrawn by Measure 2 (2005) and that the other Management Plans attached to it (in respect of ASPA 101, 102 and 116) have also already been withdrawn (by Measure 2 (2005) and Measure 1 (2006));

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 103;

Noting that Measure 1 (2010) withdraws Recommendation XVII-2 (1992);

Desiring to replace the existing Management Plan for ASPA 103 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 103 (Ardery Island and Odbert Island, Budd Coast, Wilkes Land), which is annexed to this Measure, be approved; and

2) the Management Plan for ASPA 103 annexed to Measure 2 (2005) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area No. 103

ARDERY ISLAND AND ODBERT ISLAND, BUDD COAST, WILKES LAND

Introduction

Ardery Island and Odbert Island (66°22'S; 110°28'E, Map A) were originally designated as Specially Protected Area 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. In accordance with Resolution XX-5 (1996), the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 103. A management plan for the Area was adopted under Recommendation XVII-2 (1992) and revised under Measure 2 (2005). The Area is designated on the grounds that the islands provide several breeding species of petrel, and an example of their habitat. The Antarctic petrel (*Thalassoica antarctica*) and the southern fulmar (*Fulmarus glacialoides*) are of particular scientific interest.

1. Description of values to be protected

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

Ardery Island is unique insofar as it might be 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 also supports a breeding population of Adélie penguins (*Pygoscelis adeliae*).

2. Aims and Objectives

Management of Ardery Island and Odbert Island aims to:

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

- allow scientific research on the ecosystem and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;

- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;

- minimise the possibility of introduction of alien plants, animals and microbes to the Area;

- allow for the gathering of data on the population status of the bird species on a regular basis; and

- allow visits for management purposes in support of the aims of the management plan.

3. Management activities

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

- a copy of this Management Plan shall be made available at Casey station and to ships visiting the vicinity;

- the Area shall be visited as necessary, preferably no less than once every five years, to assess whether it continues to serve the purposes for which it was designated, and to ensure that management activities are adequate: and

- the Management Plan shall be reviewed at least every five years.

4. Period of designation

Designation is for an indefinite period.

5. Maps

Map A: Antarctic Specially Protected Area No 103, Ardery Island and Odbert Island, Budd Coast, Wilkes Land. The inset map indicates the location in relation to the Antarctic continent.

Map B: Antarctic Specially Protected Area No 103, Ardery Island: Topography and Bird Distribution.

Map C: Antarctic Specially Protected Area No 103, Odbert Island: Topography and Bird Distribution.

Map D: Antarctic Specially Protected Area No 103: Helicopter approach and landing sites.

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

6. Description of the Area

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

Ardery Island (66°22'S, 110°28'E) and Odbert Island (66°22'S, 110°33'E) are among the southernmost of the Windmill Islands in the south of Vincennes Bay, off the Budd Coast of Wilkes Land, Eastern Antarctica. The Area comprises both islands down to low water mark.

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 biotitecordierite-almandine granulite, to hornblende-orthopyroxene granulite at Browning Peninsula in the south.

Ardery Island and Odbert Island together with Robinson Ridge, Holl Island, Peterson Island and the Browning Peninsula are similar geologically and are composed of Ardery charnockite. Charnockites are of granitic composition but were formed under anhydrous conditions. The Ardery Charnockite of Ardery Island and Odbert Island intrudes the Windmill metamorphics and consists of a modal assemblage of quartz + plagioclase + 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.

Climate

The climate of the Windmill Islands region is frigid-Antarctic. Conditions at Ardery Island and Odbert Island are probably similar to those of the Casey station area approximately 12 km to the north. Meteorological data for the period 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 10 to 15 years 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.

Environmental domains analysis

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

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

Birds and seals

Odbert Island has breeding populations of Adélie penguins (*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 species composition, except for Adélie penguins. The southern giant petrel (*Macronectes giganteus*) which breeds on the Frazier Islands approximately 23 km to the north-west is the only species breeding in the Windmill Islands which breeds neither at Ardery Island nor at Odbert Island.

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

Adélie penguin (Pygoscelis adeliae)

Two large colonies of Adélie penguins are present on Odbert Island. In 1985, an estimated 5,000 -10,000 breeding pairs were present in the two colonies on the island. Egg laying usually commences before the middle of November, the first chicks hatch around mid-December, and juveniles start leaving the colony in early February. 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 about 5000 breeding pairs. There are approximately 3000 occupied southern fulmar sites on Ardery Island; the largest colonies are 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 are situated on small cliff ledges but also on large nearly flat terraces, some birds nest in the open, others in deep crevices or between loose rocks. First eggs appear in early December and most are laid within 10 days. Hatching commences in the third week of January and chicks fledge by mid-March.

Antarctic petrel (Thalassoica antarctica)

On Ardery Island, about 280 apparently occupied Antarctic petrel nest sites have been located. The largest colony, on the Northern Plateau, contains at least 150 sites in the main area and some 25 sites in smaller groups nearby. On Odbert Island, some 30 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 very close together; isolated nesting on small ledges appears to be avoided. In late November, the first Antarctic petrels return from their pre-laying exodus and a week later most birds have returned to lay their eggs. First hatchlings appear in the second week of January, fledging commences in late February to early March, and all chicks have left before the middle of March.

Cape petrel (Daption capense)

Approximately 600 Cape petrel 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 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 are in less steep

parts of cliffs or along the top edges of cliffs both in colonies and small scattered groups. After returning from the pre-laying exodus, eggs are laid in late November, and hatching commences in the second week of January. Most chicks have fledged by the first week of March.

Snow petrel (Pagodroma nivea)

The number of snow petrels in the Area is estimated at over 1,100 breeding pairs. Approximately 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 100 – 1000 nesting sites. In 2003, 752 active nests were found on Ardery Island and 824 on 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. The onset of egg laying varies between concentrations of nests, with laying occurring within the first three weeks of December, and chicks hatching from the middle of January onwards. All are fledged in the first two weeks of March.

Wilson's storm petrel (Oceanites oceanicus)

Wilson's storm petrels are widely distributed, and nest in all suitable rocky areas within the Area. Approximately 1000 nesting sites have been documented for Ardery Island. Odbert Island has 1000 – 2000 nesting sites, 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 in 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 immediate Casey area but individual 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. An emaciated juvenile blue petrel (Halobaena caerulea) arrived at Casey in March 1987. In November 1984, an adult Dominican gull (Larus dominicanus) was sighted 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) Access to the Area

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

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

There are no permanent structures within or adjacent to the Area.

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

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

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

6(v) Special zones within the Area

There are no special zones within the Area.

7. Permit conditions

7(i) General permit conditions

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

- it is issued only for compelling scientific reasons that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or for essential management purposes consistent with plan objectives such as inspection, maintenance or review;

- the actions permitted will not jeopardise the values of the Area;

- the actions permitted are in accordance with the management plan;

- the permit, or an authorised copy, shall be carried within the Area;

- a visit report shall be supplied to the authority named in the permit;

- permits shall be issued for a stated period;

- the appropriate national authority shall be notified of any activities/measures undertaken that were not included in the authorised permit.

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

Travel to the Area may be by vehicle over sea ice, by boat or by aircraft. Vehicles and boats used to visit the islands must be left at the shoreline. Movement within the area is by foot only.

Landing sites for access by sea and helicopter to Ardery Island and Odbert Island 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. The boat landing site marked for Ardery Island on Map D is within 200 metres of seabird colonies. However, it represents the preferred safe landing site on the island.

All landings must be undertaken carefully to avoid disturbance to the birds. There are no defined pedestrian routes within the Area; however, pedestrians should avoid disturbance of the birds at all times.

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

- disturbance of the colonies by aircraft shall be avoided at all times;

- sea ice landings shall be encouraged (where practicable);

- overflight of the islands should be avoided at all times, except where it is considered essential for scientific or management purposes as authorised in a permit. In these instances, overflight must be at a vertical or horizontal distance of no less than 930 metres (3050 feet) for single-engined aircraft and 1500 metres (5000 feet) for twin-engined aircraft;

- during the breeding season of penguins and petrels, defined here as the period from 1 November to 1 April, helicopter movement to the islands should be kept to the minimum;

- the use of twin-engined helicopters to land on Ardery Island or Odbert Island is prohibited;

- the single-engined helicopter approach to Ardery Island should be at a high altitude and from a southern direction as the lowest densities of birds are on the southern cliffs (see Maps B and D);

- the single-engined helicopter approach to Odbert Island should preferably be from the south, avoiding cliff areas because of the nesting petrels (see Maps C and D); and

- when utilising the single-engined helicopter landing sites marked on Map D, pilots shall ensure that disturbance of breeding colonies is avoided.

- only personnel who are required to carry out work in the Area should leave the helicopter;

- refuelling of aircraft is prohibited within the Area.

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

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

- compelling scientific research consistent with the Management Plan for the Area which cannot be undertaken elsewhere and will not jeopardise the values for which the Area has been designated or the ecosystems of the Area;

- essential management activities, including monitoring; and

- sampling, which should be the minimum required for approved research programs.

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

- No permanent structures are to be erected in the Area.

- Any structures erected or installed within the Area are to be specified in a permit.

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

- A condition of the permit shall be the removal of equipment associated with scientific research before the permit for that research expires. Details of markers and equipment temporarily left in situ (GPS locations, description, tags, etc. and expected "use by date") shall 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 supported by vehicle over sea ice unless sea ice conditions prevent this.

7(v) Location of field camps

- Camping is prohibited on Odbert Island except in emergency.

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

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.

- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.

- 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 as to minimise the risk of environmental impact.

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

- Taking of or harmful interference with native flora and fauna is prohibited, except in accordance with a permit.

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

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

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

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

- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material in situ. If such material is found, the appropriate Authority must be notified and approval obtained prior to removal.

7(ix) Disposal of waste

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

7(x) Measures that may be necessary to continue to meet the aims of the management plan

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

- To help maintain the ecological and scientific values of the Area, visitors shall take special precautions against introductions. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora and fauna at other Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the

Area, visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area.

7(xi) Requirement for reports

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 contained in Appendix 4 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas appended to Resolution 2 (1998). 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 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(xii) Emergency provision

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

8. Supporting documentation

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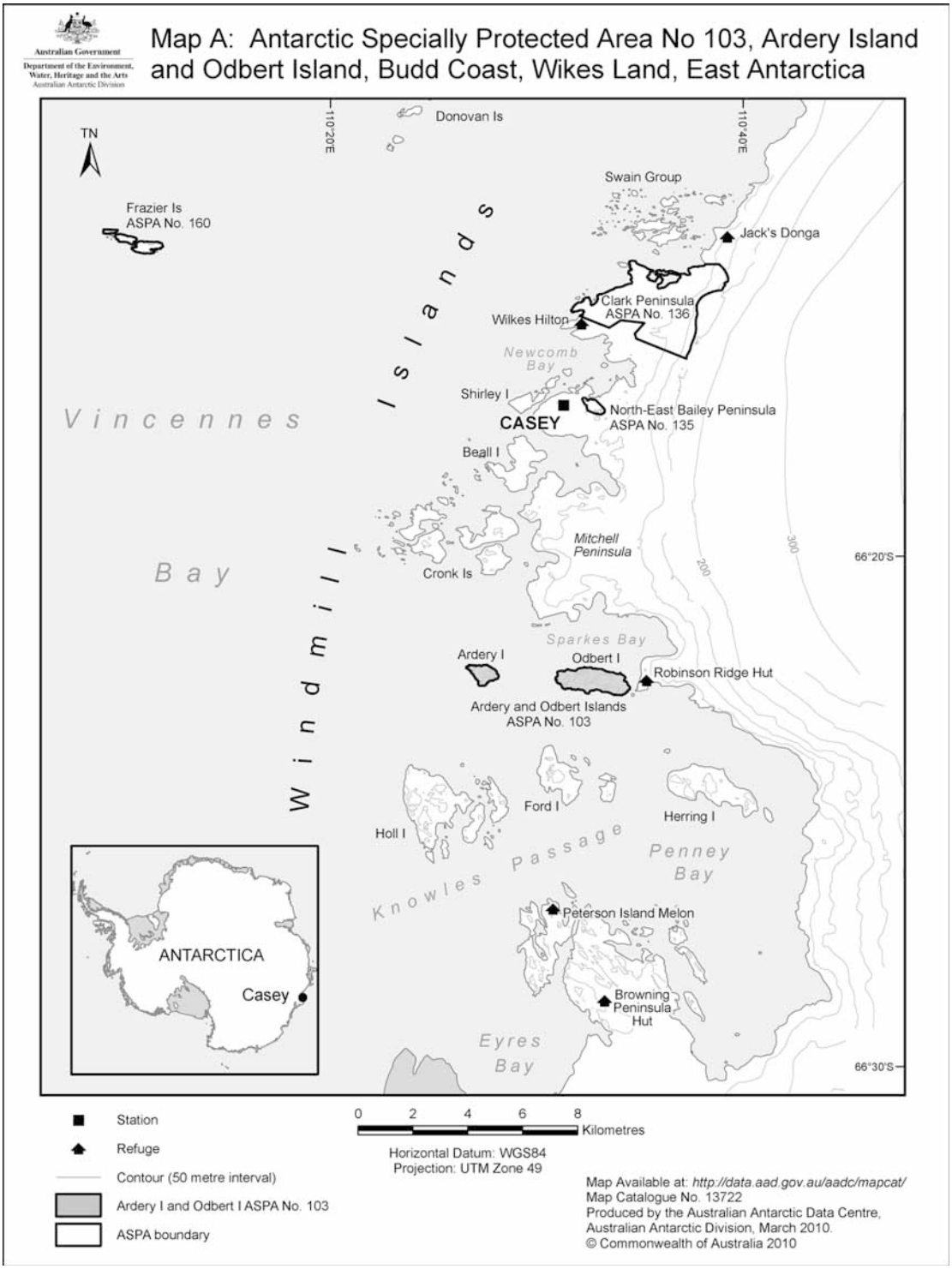
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map A: Antarctic Specially Protected Area No 103, Ardery Island and Odbert Island, Budd Coast, Wikes Land, East Antarctica
TN
110°20'E
110°40'E
Donovan Is
Swain Group
Frazier Is
ASPA No. 160
Jack's Donga
Clark Peninsula
ASPA No. 136
Wilkes Hilton
Newcomb Bay
Shirley I
CASEY
North-East Bailey Peninsula
ASPA No. 135
Beall I
Vincennes Bay
Windmill Islands
Mitchell Peninsula
Cronk Is
66°20'S
Sparkes Bay
Ardery I
Odbert I
Robinson Ridge Hut
Ardery and Odbert Islands
ASPA No. 103
Ford I
Herring I
Holl I
Knowles Passage
Penney Bay
Peterson Island Melon
ANTARCTICA
Casey
Browning Peninsula Hut
Eyres Bay
66°30'S
Station
Refuge
Contour (50 metre interval)
Ardery I and Odbert I ASPA No. 103
ASPA boundary
0 2 4 6 8
Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13722
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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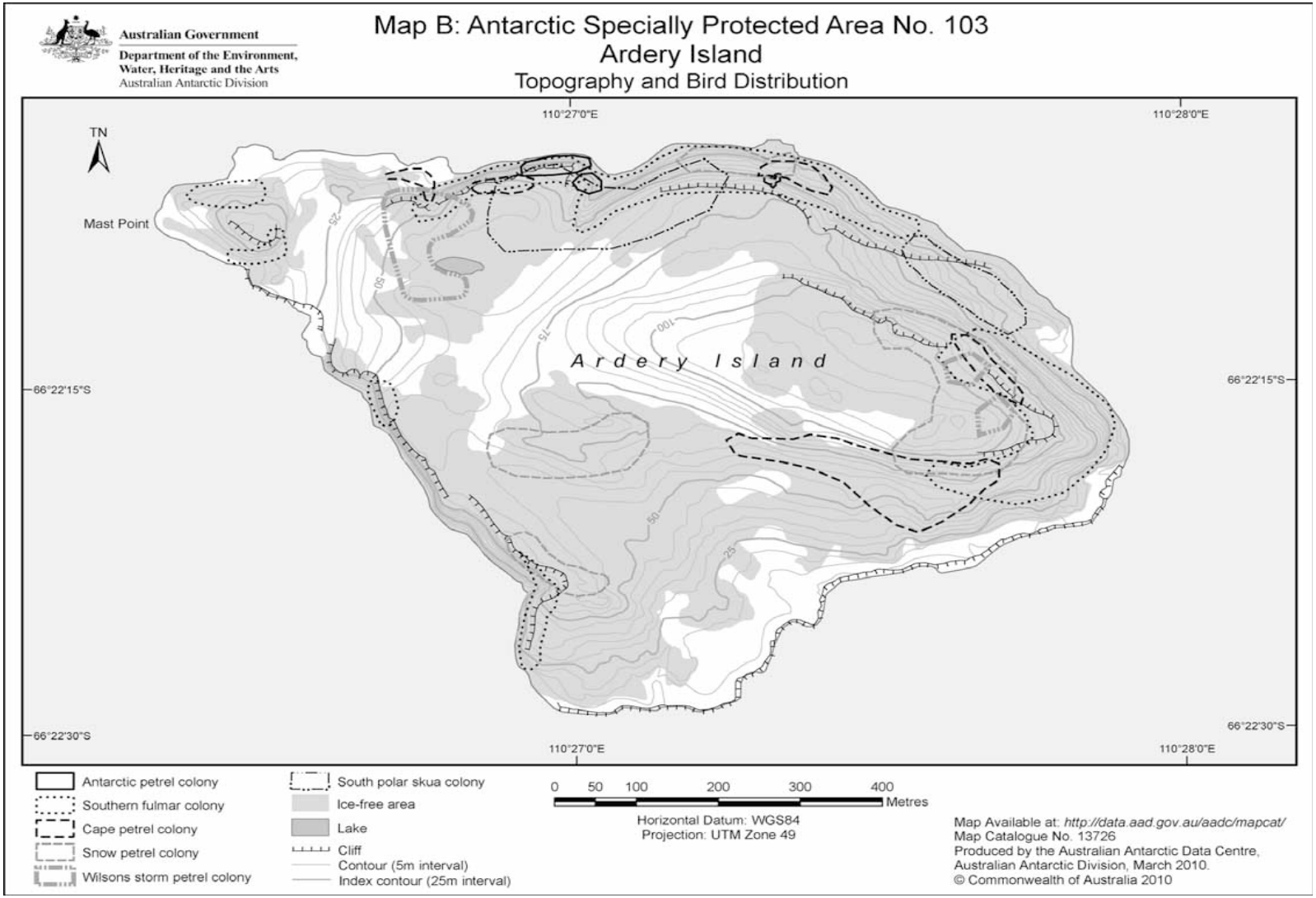
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No. 103
Ardery Island
Topography and Bird Distribution
110°27'0"E
110°28'0"E
TN
Mast Point
Ardery Island
66°22'15"S
66°22'30"S
Antarctic petrel colony
Southern fulmar colony
Cape petrel colony
Snow petrel colony
Wilsons storm petrel colony
South polar skua colony
Ice-free area
Lake
Cliff
Contour (5m interval)
Index contour (25m interval)
0 50 100 200 300 400
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13726
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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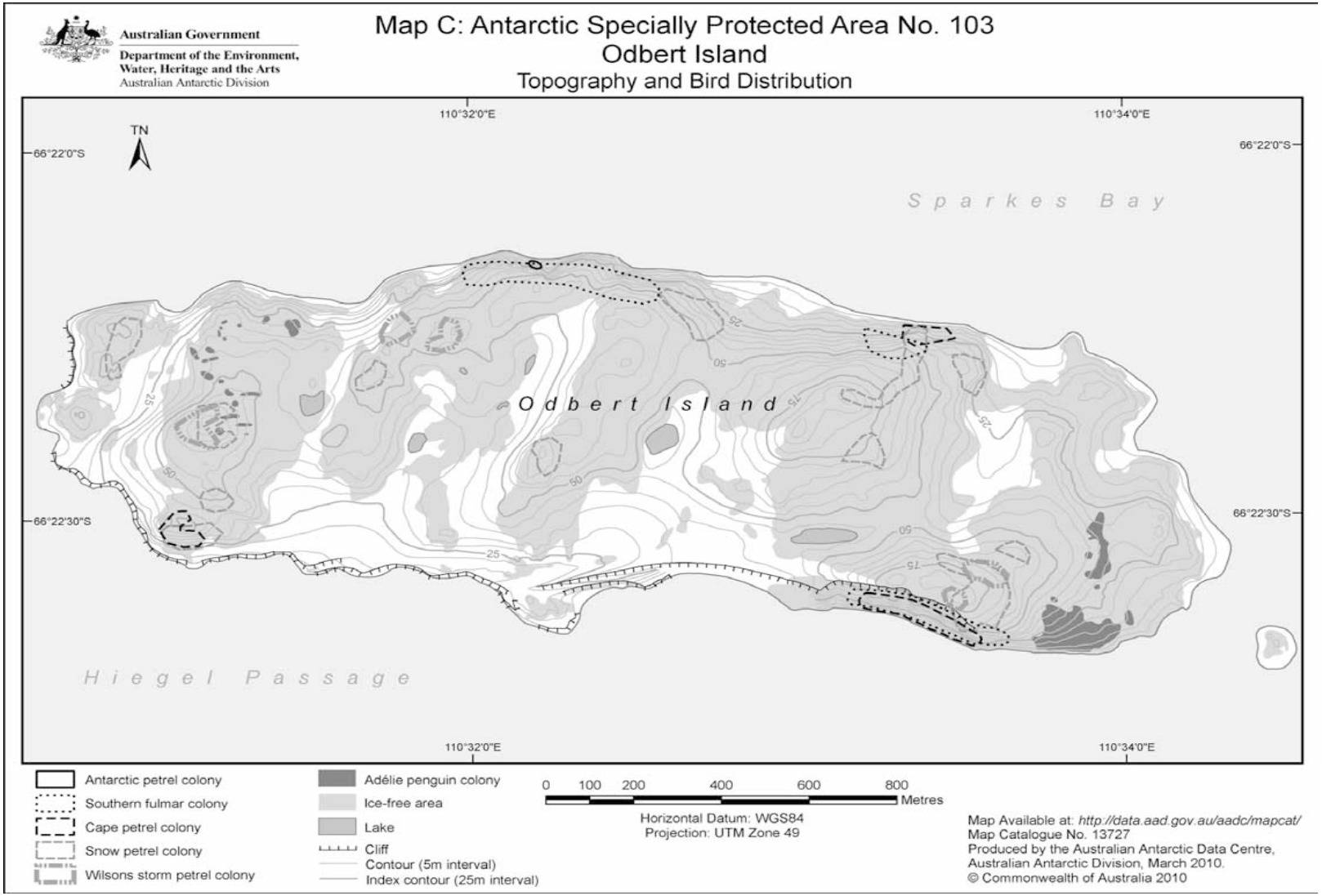
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map C: Antarctic Specially Protected Area No. 103
Odbert Island
Topography and Bird Distribution
110°32'0"E
110°34'0"E
66°22'0"S
66°22'30"S
TN
Sparkes Bay
Odbert Island
Hiegel Passage
Antarctic petrel colony
Southern fulmar colony
Cape petrel colony
Snow petrel colony
Wilsons storm petrel colony
Adélie penguin colony
Ice-free area
Lake
Cliff
Contour (5m interval)
Index contour (25m interval)
0 100 200 400 600 800
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13727
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, March 2010.
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Antarctic Specially Protected Area No. 105
(Beaufort Island, McMurdo Sound, Ross Sea):
Revised Management Plan

The Representatives,

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

Recalling

- Recommendation IV-5 (1966), which designated Beaufort Island, Ross Sea as Specially Protected Area ("SPA") No. 5;

- Measure 1 (1997), which annexed a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 5 as ASPA 105;

- Measure 2 (2003), which adopted a revised Management Plan for ASPA 105;

Recalling that Measure 1 (1997) has not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 105;

Desiring to replace the existing Management Plan for ASPA 105 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 105 (Beaufort Island, McMurdo Sound, Ross Sea), which is annexed to this Measure, be approved;

2) Recommendation IV-5 (1966) and the Management Plan for ASPA 105 annexed to Measure 2 (2003) shall cease to be effective; and

3) Measure 1 (1997), which is not yet effective, be withdrawn.

Management Plan For Antarctic Specially Protected Area No. 105

BEAUFORT ISLAND, McMURDO SOUND, ROSS SEA

1. Description of Values to be Protected

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

Beaufort Island is the northern most feature of the Ross Archipelago, lying 19 kilometres north of Cape Bird, Ross Island. It is a portion of the rim of a volcanic cone, the remainder of which was eroded away and is now submerged to the east of the island. The island and the remains of the submerged caldera block the predominantly westward drift of pack ice and ice bergs calving from the nearby Ross Ice Shelf. Icebergs ground on these peaks which in turn facilitate fast ice growth. Beaufort Island is predominantly rock but portions are ice and snow covered. On the south west side of the island there is a broad ice-free shelf with raised beaches behind which summer ponds form, fed by small meltwater streams draining to the coast. Sloping ice fields (about 12° to 15°) cover much of the west and north side of the island but the ice has been receding in recent years. An extensive flat area of less than 50 m elevation is at the north end of the island, where the ice cap of the island drains to a boulder beach, fringing that portion of the shore. Near vertical cliffs compose the eastern side of the island facing the centre of the caldera.

The avifauna is the most varied in the southern Ross Sea. There exists a large Adélie penguin (*Pygoscelis adeliae*) colony on the broad shelf of the southwest side of the island, and a smaller newly formed subcolony, established in 1995, on the beach along the northwest coast. The dating of Adélie penguin remains goes back 45,000 years. A breeding colony of Emperor penguins (*Aptenodytes forsteri*) exists in variable locations on the fast ice to the north and east of the island where grounded icebergs facilitate fast ice establishment. There is a dense colony of South polar skua (*Catharacta maccormicki*) on both the north and south coasts and Snow petrels (*Pagodroma nivea*) have been seen nesting in cavities on the cliffs at the south of the island (no more than a half-dozen pairs). The boundaries of the Area, which previously excluded the Emperor colony, have been extended to include the fast-ice that could potentially be occupied by breeding birds. Weddell seals (*Leptonychotes weddellii*) haul out and pup on the fast ice adjacent to the various grounded icebergs and Leopard seals (*Hydruga leptonyx*) and Ross sea killer whales (Type C) but also the form known as Type B, occur in the vicinity. The Ross sea killer whales are attracted by fish, and the Leopard seals and Type B killer whales are attracted by the penguins and seals. Crabeater seals (*Lobodon carcinophagus*), Minke whales

(*Balaenoptera acutorostrata*) and Arnoux's beaked whales (*Berardius arnuxii*) have also been seen in the surrounding waters.

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

2. Aims and Objectives

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

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- preserve the natural ecosystem as a reference area largely undisturbed by direct human activities;
- allow scientific research on the natural ecosystems, plant communities, avifauna, invertebrate communities and soils in the Area provided it is for compelling reasons which cannot be served elsewhere;
- minimise human disturbance to these communities by preventing unnecessary sampling;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management Activities

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

- Copies of this Management Plan including maps of the Area, shall be made available at adjacent operational research/field stations.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer necessary.

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

- National Antarctic Programmes operating in the region shall consult together with a view to ensuring these steps are carried out.

4. Period of Designation

Designated for an indefinite period.

5. Maps and Photographs

Map A: Beaufort Island topographic map. This map is derived from the orthophotograph used in Map B and C, using Map B and C specification. Inset: McMurdo Sound, showing Ross Island and the location of McMurdo Station (USA) and Scott Base (NZ).

Map B: Northern Beaufort Island orthophotograph. Orthophotograph specifications; Projection: Lambert Conformal Conic; Standard Parallel 1: 76.6°S; Standard Parallel 2: 79.3°S; Datum: WGS84; Includes material (c) METI and NASA 2006.

Map C: Southern Beaufort Island orthophotograph. Orthophotograph specifications as for Map B.

6. Description of the Area

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

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

- From the northern coast of Beaufort Island at 76 ° 55' 44" S, 166° 52' 42" E north to 76° 55' 30" S, 166° 52' 49" E;

- From 76° 55' 30" S, 166° 52' 49" E east to 76° 55' 30" S, 167° 00' E;

- From 76° 55' 30" S, 167° 00' E south along the 167° longitude parallel to where it intersects with the coastline of Beaufort Island at 76° 55' 30"S, 167° E (Map A).

The island is part of the late Tertiary volcanic vents that developed in a series along a line of weakness in the Ross Sea floor. The island is the remains of a basaltic cone of about the Last Interglacial age, and is one portion of the caldera. More than three quarters of the cone now comprises a circular series of submerged peaks to the east of Beaufort Island. These submerged peaks, along with the island, block the predominant westward drift of pack ice and cause icebergs to ground here which in

turn allows fast ice to establish in this area. It is upon this fast ice that the Emperor penguins breed. The location of the breeding colony varies with the fast ice distribution and therefore the protected area boundary has been extended to account for the location of the colony in any given season.

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

There is one main Adélie penguin colony and newly formed subcolony on Beaufort Island. The main colony of 48,276 breeding pairs (2006-07) occupies the flat area at Cadwalader Beach (Map A and C). The number of Adélie penguins breeding on Beaufort Island peaked at 53,733 pairs in 1986. Since then the population has ranged from 23,512 breeding pairs (in 1998) to 48,276 (in 2006). In 1995 a sub-colony established at the west end of the ice-free beach on the northern coast (76° 55' S, 166° 52'E) comprising 2 pairs with 3 chicks and approximately 10-15 non breeders. In the 2005-06 breeding season there were 525 breeding pairs and 677 breeding pairs in the 2008-09 season. Since 1996, scientists from the USA and NZ programmes have been banding a sample of 400 near-to-fledging Adélie penguin chicks at the Cadwalader Beach area. A few hundred banded adults, survivors of their juvenile years, now reside in the colony. Penguins banded at Cape Royds, Cape Bird and Cape Crozier have been sighted especially at the sub-colony on the north beach. Beaufort Island not long ago provided many emigrants to Ross Island colonies, but with recession of the ice fields and increased availability of nesting space, this is no longer the case. Above the beach, a raised ice-cored moraine terrace (5–20 m elevation, ranging from 2-3 metres wide over most of its length but broadening to 50 metres at its eastern end) extends for 550 m before rising more steeply toward the unstable basaltic cliffs which persist around the entire eastern side of the island. At least three sub-fossil penguin

colony deposits have been identified within the moraine terrace, each layer vertically separated by around 50–100 cm of gravels and sand, suggesting this part of the island had been occupied by a sizable breeding penguin colony.

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

On the fast-ice extending out from the northern and eastern coasts of Beaufort Island, a small colony of Emperor penguins (live chick counts from 1962 to 2005 range from 131 to 2,038 individuals; aerial photo of adult abundance was 1,312 in 2006) is present annually between the months of approximately April to January. Chick counts minimally represent the number of breeding pairs. The size of the colony is limited by the areal extent and condition of the fast-ice, which affects the availability of breeding sites in the lee of the northern slopes of Beaufort Island. The precise location of the colony varies from year to year and the colony moves within a breeding season, but the general area of occupation is on the fast ice at the foot of the cliffs off the north-eastern corner of the island, indicated on Map A and B. A higher coefficient of variation in chick abundance found at this small colony suggests that it occupies a marginal habitat and may be susceptible to environmental change.

The ice-cored moraine terrace above the beach on the north end of the island (Map A and B) supports the growth of vegetation. Little can grow in the thick guano covering the Cadwalader beach area and all other areas of the island are either cliffs or ice covered. An area of vegetation, 50 meters wide and 5-7 meters above the beach on the north of the island, was described from site visits in January 1995 and 1997, consisting of an extensive (approximately 2.5 ha), continuous area of a single moss species Bryum argenteum. A second species of moss, Hennediella heimii, is also found among the B.argenteum. The moss community is known to support significant populations of mites (*Acari*) and springtails (*Collembola*). Although a detailed survey of invertebrates has not been conducted, Gomphiocephalus hodgsoni (*Collembola*) and Stereotydeus mollis (*Acari*) were found to be very abundant in moss samples taken from Beaufort Island. Recent genetic analysis of these populations has found unique genetic mitochondrial DNA haplotypes at Beaufort Island not found in other invertebrate populations in the Ross Sea region.

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

snow algae, noticeable as a green band at the lower levels of snow banks above the beach and below the ice cliffs, contained a mixture of Chloromonas and Klebsormidium species.

6(ii) Restricted zones within the Area

None.

6(iii) Structures within and near the Area

The only structure known to exist on the island is a signpost on a prominent rock in the Adélie penguin colony at Cadwalader Beach (Map A and C). The sign, erected in 1959–60, bears the names and home towns of the seamen and the Captain of the HMNZS Endeavour.

The sign is set in concrete and was in good condition in November 2008. The sign is of potential historic value and should remain in situ unless there are compelling reasons for its removal, which should be kept under review.

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

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

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

7. Terms and Conditions for Entry Permits

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

- it is issued only for essential management purposes or compelling scientific reasons that cannot be served elsewhere;
- the actions permitted will not jeopardise the ecological or scientific values of the Area;
- any management activities are in support of the aims of the Management Plan;
- the actions permitted are in accordance with the Management Plan;

- the Permit, or an authorized copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- Permits shall be issued for a stated period.

7(i) Access to and movement within the Area

Land vehicles are prohibited within the Area and access shall be by small boat or by aircraft. Aircraft should land on the island only at the designated site (166° 52' 31" E, 76° 55' 49" S: Maps A and B) on the large flat toe of ice on the north end of the island. Should snow conditions at the designated landing site at the time of visit militate against a safe aircraft landing, a suitable mid- to late-season alternative to the designated landing site may be found at the nominated northern camp site at the western end of the northern beach on Beaufort Island. It is preferred that aircraft approach and depart from the designated landing site from the south or west (Map A). When it is found necessary to use the alternative site at the northern beach campsite, practical considerations may dictate a northern approach. When this is the case, aircraft shall avoid over flight of the area east of this site indicated on Maps A and B. Use of smoke grenades when landing within the Area is prohibited unless absolutely necessary for safety and all grenades should be retrieved. There are no special restrictions on where access can be gained to the island by small boat. Pilots, air or boat crew, or other people on aircraft or boats, are prohibited from moving on foot beyond the immediate vicinity of the landing site unless specifically authorised by a Permit.

Over flight of bird breeding areas lower than 750 m (or 2500 ft) is normally prohibited. The areas where these special restrictions apply are shown on Maps A and B. When required for essential scientific or management purposes (e.g. aerial photography to assess colony size), transient over flights down to a minimum altitude of 300 m (1000 ft) may be allowed over these areas. Conduct of such over flights must be specifically authorised by a Permit.

Visitors should avoid unnecessary disturbance to birds, or walking on visible vegetation.

Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise effects.

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

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

7(iii) Installation, modification or removal of structures

No scientific equipment or structures are to be erected within the Area except as specified in a Permit. All markers, structures or scientific equipment installed in the Area must be approved by Permit and clearly identified by country, name of the principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area. Removal of specific equipment for which the Permit has expired shall be a condition of the Permit.

7(iv) Location of field camps

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

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area and the precautions listed in 7(ix) below shall be taken against accidental introductions.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Fuel is not to be stored in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimised.

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

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

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

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

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

7(viii) Disposal of waste

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

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

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

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

3. To help maintain the ecological and scientific values of the isolation and historically low level of human impact at Beaufort Island visitors shall take special precautions against introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other Antarctic sites, including stations, or from regions outside Antarctica. Visitors shall take the following measures to minimise the risk of introductions:

a) Any sampling equipment or markers brought into the Area shall be sterilised and, to the maximum extent practicable, maintained in a sterile condition before being used within the Area. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including backpacks, carry-bags, tent pegs, tarps and any other camping equipment) shall be thoroughly cleaned or sterilised and maintained in this condition before entering the Area;

b) Sterilisation should be by an acceptable method, such as by UV light, autoclave or by washing exposed surfaces in 70% ethanol solution in water.

7(x) Requirements for reports

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

accessible archive to maintain a record of usage, to be used both in any review of the Management Plan and in organising the scientific use of the Area.

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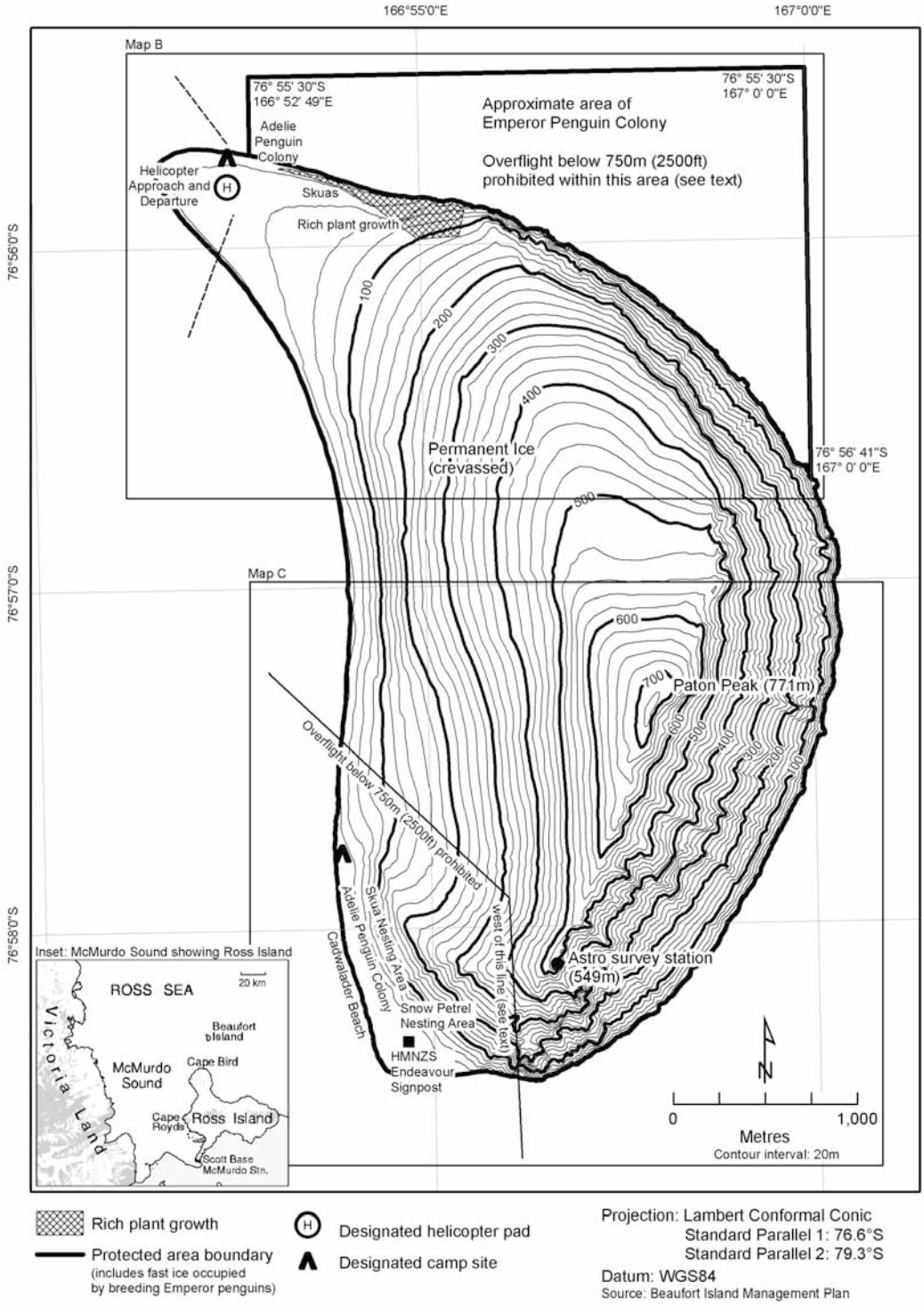
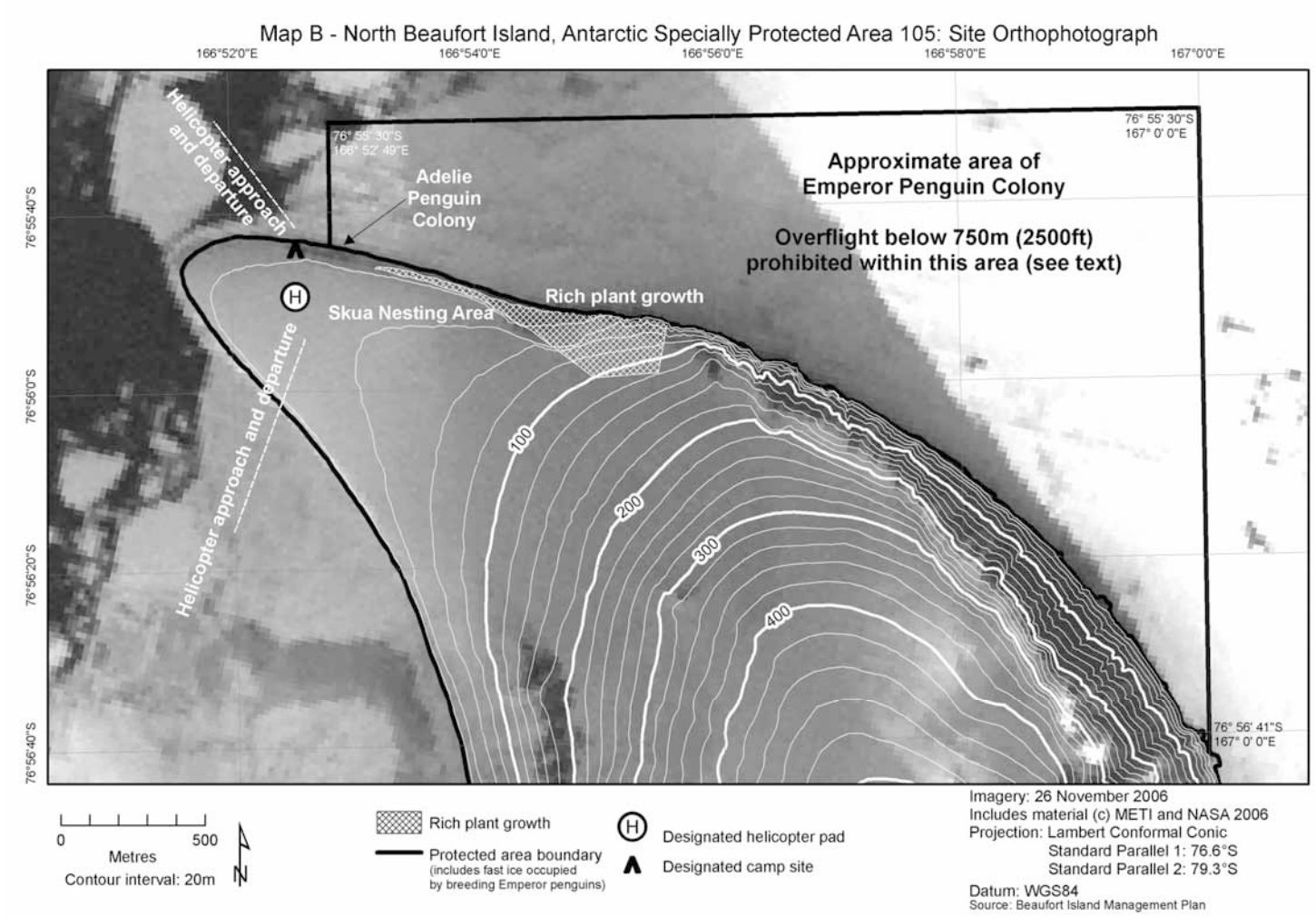
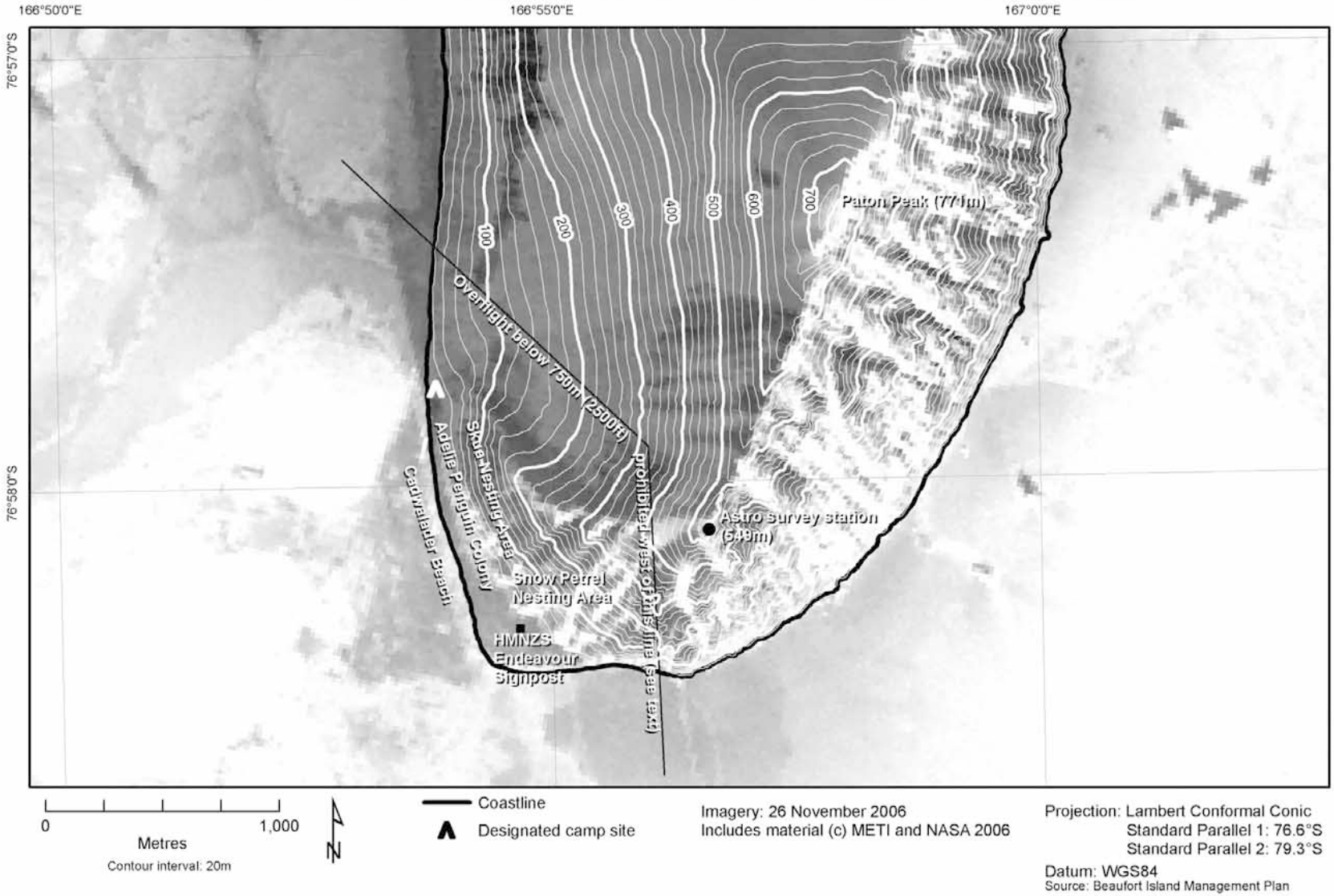
Map A - Beaufort Island, Antarctic Specially Protected Area 105: Topographic map




Map B - North Beaufort Island, Antarctic Specially Protected Area 105: Site Orthophotograph
166°52'0"E
166°54'0"E
166°56'0"E
166°58'0"E
167°0'0"E
76°55'40"S
76°56'0"S
76°56'20"S
76°56'40"S
Helicopter approach and departure
76° 55' 30"S
166° 52' 49"E
Adelie Penguin Colony
76° 55' 30"S
167° 0' 0"E
Approximate area of Emperor Penguin Colony
Overflight below 750m (2500ft) prohibited within this area (see text)
Rich plant growth
Skua Nesting Area
Helicopter approach and departure
100
200
300
400
76° 56' 41"S
167° 0' 0"E
0
500
Metres
Contour interval: 20m
N
Rich plant growth
Protected area boundary
(includes fast ice occupied by breeding Emperor penguins)
Designated helicopter pad
Designated camp site
Imagery: 26 November 2006
Includes material (c) METI and NASA 2006
Projection: Lambert Conformal Conic
Standard Parallel 1: 76.6°S
Standard Parallel 2: 79.3°S
Datum: WGS84
Source: Beaufort Island Management Plan

Map C - South Beaufort Island, Antarctic Specially Protected Area 105: Site Orthophotograph



Antarctic Specially Protected Area No. 106
(Cape Hallett, Northern Victoria Land, Ross Sea):
Revised Management Plan

The Representatives,

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

Recalling

- Recommendation IV-7 (1966), which designated Cape Hallett, Victoria Land as Specially Protected Area ("SPA") No. 7;

- Recommendation XIII-13 (1985), which revised the description and boundaries of SPA 7;

- Decision 1 (2002), which renamed and renumbered SPA 7 as ASPA 106;

- Measure 1 (2002), which adopted a Management Plan for the Area;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 106;

Desiring to replace the existing Management Plan for ASPA 106 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 106 (Cape Hallett, Northern Victoria Land, Ross Sea), which is annexed to this Measure, be approved; and

2) Recommendation IV-7 (1966), Recommendation XIII-13 (1985) and the Management Plan for ASPA 106 annexed to Measure 1 (2002) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area (ASPA) No. 106

CAPE HALLETT, NORTHERN VICTORIA LAND, ROSS SEA

(170° 14' E, 72° 19' S)

Introduction

The Cape Hallett Antarctic Specially Protected Area is situated at the northern extremity of the Hallett Peninsula, northern Victoria Land at 170°13'25" E, 72°19'11" S. Approximate area: 0.53 km2. The primary reason for designation of the Area is that it provides an outstanding example of biological diversity, in particular a rich and diverse terrestrial ecosystem. It includes a small area of particularly rich vegetation that represents a valuable scientific resource for monitoring of vegetation change in Antarctica. The Area contains the most diverse arthropod community known in the Ross Sea region, which is of scientific interest. Furthermore, the Area contains a substantial Adélie penguin (*Pygoscelis adeliae*) breeding colony comprising around 64,000 pairs in 2009-10, which is recolonizing the site of the former Hallett Station (NZ / US) and is therefore of particular scientific interest. Cape Hallett is the only protected area in northern Victoria Land designated on the grounds of its terrestrial ecosystem or which includes a substantial bird colony, providing an important representation of the ecosystem in this region of Antarctica. The Area was proposed by the United States of America and adopted through Recommendation IV-7 [1966, Specially Protected Area (SPA) No. 7]; boundaries were extended by Recommendation XIII-13 (1985); the Area was renamed and renumbered through Decision 1 (2002), and the boundaries were further extended through Measure 1 (2002) to include the Adélie penguin colony, increasing the size of the Area to 75 ha. A further adjustment of the boundary has been made in the present plan to delete the Managed Zone and replace this with two alternative sites outside of the protected area, to be managed by Antarctic Treaty Site Guidelines for Visitors. One of the sites identified for visitor access is on the northern / NW coast of Seabee Hook and the second is on the SE coast. In addition, a revision has been made to the eastern boundary to follow features apparent in recent mapping. The boundary revisions have reduced the size of the Area to 53 ha.

1. Description of values to be protected

An area of approximately 12 ha at Cape Hallett was originally designated in Recommendation IV-7 (1966, SPA No. 7) after a proposal by the United States of America on the grounds that the Area provided an outstanding example of biological diversity, containing “a small patch of particularly rich and diverse vegetation which supports a variety of terrestrial fauna”. The proposal gave special mention to the rich avifauna in the Area, which was noted as being of “outstanding scientific interest”. The boundaries of the Area were enlarged in Recommendation XIII-13 (1985) to include extensive stands of vegetation to the south and north of the Area, increasing the Area to approximately 32 ha.

The boundaries were further extended in Measure 1 (2002) to include scientific values related to the Adélie penguin (*Pygoscelis adeliae*) colony on Seabee Hook, increasing the size of the Area to 75 ha. Boundary revisions and zoning changes in the present plan, particularly in the east, have reduced the size of the Area to 53 ha.

The eastern part of the Area contains a variety of habitats with plant communities that are considered important as they include most extensive, representative, and outstanding examples known near the northern extremity of the latitudinal gradient of Victoria Land and the Ross Sea. Vegetation surveys have recorded five species of moss in the Area, dominated by Bryum subrotundifolium, and 18 species of lichen. Although few algal species have been identified numerous species are expected to be present. The terrestrial habitats have been extensively studied, most recently as part of the international Latitudinal Gradient Project (LGP) (Italy, New Zealand, and United States). A vegetation plot in the eastern part of the Area is particularly valuable as a scientific resource for monitoring vegetation change in Antarctica, and this is designated a Restricted Zone. This site was first surveyed in detail in 1961-62 and provides a valuable baseline against which vegetation changes can be measured at a fine scale.

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

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

Hallett Station was established by New Zealand and the United States on Seabee Hook in 1956 as part of the International Geophysical Year (IGY), and operated continuously until it closed in 1973. Although all structures have been removed, the site continues to possess enduring historic and heritage values relating to its former human use. In recognition of these values, many of the structures and artefacts from the former station are now held at the Canterbury Museum, Christchurch. In 2010, the only known remaining item of potential historical value and /or scientific value is the well-preserved body of a husky that died in 1964, which is contained in an enclosed wooden box located in the eastern part of the Area.

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

maintain this value it is desirable that any further human presence be carefully controlled and monitored.

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

2. Aims and objectives

Management at Cape Hallett aims to:

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

- allow scientific research, in particular on terrestrial and seabird ecology and on environmental recovery, while preventing unnecessary sampling and human disturbance in the Area;

- allow other scientific research provided it will not jeopardize the values of the Area;

- prevent the removal of, or disturbance to, markers used in previous scientific research that could be valuable for future comparative studies;

- allow environmental clean-up and remediation activities associated with the decommissioning and removal of the former Hallett Station as required and appropriate, provided the impacts of these activities are not greater than those arising from leaving material in situ;

- take into account the potential historic and heritage values of any artifacts before their removal and/or disposal, while allowing for appropriate clean-up and remediation;

- minimize the possibility of introduction of alien plants, animals and microbes into the Area; and

- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

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

- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer necessary;

- National Antarctic programs operating in the Area should maintain a record of all new markers, signs and structures erected within the Area;

- To the extent practicable, efforts shall be made to remove any small waste debris still present within the Area following the removal of Hallett Station, although this shall be undertaken in consultation with an appropriate authority to ensure that potentially important historic or heritage values of any artifacts are not lost;

- Visits shall be made as necessary (preferably at least once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure that management and maintenance measures are adequate;

- National Antarctic programs operating in the region shall consult together for the purpose of ensuring that the above provisions are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: Cape Hallett Antarctic Specially Protected Area No. 106: Regional map.

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

Map 2: Cape Hallett Antarctic Specially Protected Area No. 106: Air access guidance.

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

Map 3: Cape Hallett Antarctic Specially Protected Area No. 106: Topographic map.

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

Map 4: Cape Hallett Antarctic Specially Protected Area No. 106: Former Hallett Station area.

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

6. Description of the Area

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

Boundaries and coordinates

Cape Hallett is located at the southern end of Moubray Bay, Northern Victoria Land, in the western Ross Sea (Map 1).

The protected area occupies most of the ice-free ground of a cuspate spit of low elevation known as Seabee Hook and includes the adjacent western slopes of the northern extremity of Hallett Peninsula, extending east of Willett Cove to the margin of the permanent glaciers (Maps 1 – 3).

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

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

From 170° 13' 24.9" E, 72° 19' 28.0" S the boundary extends eastward to the Bornmann Glacier, following a seasonal stream which descends from the glacier. The eastern boundary of the Area then follows the glacier and permanent ice margin northward at elevations approximately between 120 – 150 m, crossing the steep western slopes of Hallett Peninsula and following the upper outcrops of a series of

rocky ridges dissecting the slope. The boundary then descends to join the northern coastline of Seabee Hook at the base of a rock buttress at 170° 14' 25.5" E, 72° 19' 05.0" S (Map 3).

Climate

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

Geology, geomorphology and soils

The topography of the Area comprises the large flat area of the spit and adjoining steep scree forming part of the western slopes of northern Hallett Peninsula. Seabee Hook is composed of coarse volcanic material deposited in a series of beach ridges, with gently undulating terrain of hummocks and depressions and a number of level areas. Many of the depressions contain melt water in the summer, and are colonized by dense mats of algae. In the northeastern part of the Area a small meltwater stream flows from the western slopes of the Hallett Peninsula down to Willett Cove. There is higher moisture availability in soils at Cape Hallett compared to sites in Southern Victoria Land. Sub-surface soils are typically saturated after snowfall, with groundwater at between 8 and 80 cm below the soil surface during summer.

Vegetation

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

The vegetation within the Area, with the exception of algae such as Prasiola, is largely confined to the ice-free ground not occupied by breeding Adélie penguins, which is to the east of Willett Cove and south of 72° 19' 10" S. This area includes a 100-200 m strip of relatively level ground adjacent to Willett Cove and steeper slopes up to the crest of the Hallett Peninsula ridge. The strip of flat ground comprises a number of dry, gravel hummocks up to 1.5 m high, many of which are occupied by nesting skuas, and in the northern part old guano deposits indicate former occupation by Adélie penguins. Small patches of moss and algae may be found at the base of these hummocks but the upper parts are devoid of vegetation. Substantial beds of moss colonize stable gravel flats in the north part of the flat ground where there is a high water table, while scattered patches of moss, algae and lichen occur on coarser, more angular, loose rocks in the south. The moss becomes more sparse as the ground slopes upwards, with the notable exception of a particularly dense and extensive patch covering approximately 3900 m2 with almost complete coverage of the

substratum occupying a shallow valley on a scree slope in the south of the Area (Map 3). Only the most prolific areas are illustrated on Map 3.

Bryum subrotundifolium is the dominant moss within the Area. The presence of Bryum subrotundifolium in such a bird enriched area, makes the Area an excellent example of a bird affected vegetation site. Also, the presence of almost mono-specific stands of Bryum pseudotriquetrum at the site is unusual for the region.

The steep scree slope adjoining the largely flat area is dissected by shallow gullies and small ridges, with a number of prominent rock outcrops. These rock outcrops, particularly in the north of the Area, support large stands of lichens and scattered moss, with cover of 70 – 100% in many places. Table 1 lists moss and lichen species recorded within the Area.

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

Mosses [a]	**Lichens** [a]	**Invertebrates** [b]
Bryum subrotundifolium (formerly Bryum argenteum)	*Acarospora gwynnii*	Mites
Bryum pseudotriquetrum	*Amandinea petermannii*	*Coccorhagidia gressittii*
Ceratodon purpureus	*Buellia frigida*	*Eupodes wisei*
Grimmia sp Sarconeurum glaciale	*Caloplaca athallina*	*Maudheimia petronia*
	Caloplaca citrina	*Nanorchestes sp.,*
	Candelaria murrayi	*Stereotydeus belli*
	Candelariella flava	*S. puncatus*
	Lecanora chrysoleuca	*Tydeus setsukoae*
	Lecanora expectans	*T. wadei*
	Lecidea cancriformis	
	Physcia caesia	Springtails
	Pleopsidium chlorophanum	*Cryptopygus cisantarcticus*
	Rhizocarpon geographicum	*Friesea grisea*
	Rhizoplaca chrysoleuca	*Desoria klovstadi (formerly Isotoma klovstadi)*
	Rhizoplaca melanophthalma	
	Usnea sphacelata	
	Xanthoria elegans	
	Xanthoria mawsonii	

Sources: a) T.G.A. Green, University of Waikato, New Zealand and R. Seppelt, Australian Antarctic Division, 2002; b) Sinclair et al. (2006).

Eight species of mites and three species of springtails have been recorded from within the Area (Table 1) (Sinclair et al. 2006). F. grisea occurs mainly on the scree slopes and adjacent level areas, C. cisantarcticus was reported to be associated with moss, occurring plentifully on level ground, while D. klovstadi was abundant under stones on the slopes.

Birds

Seabee Hook is the site of one of the largest Adélie penguin colonies in the Ross Sea region, numbering approximately 64,041 breeding pairs in 2009-10. Seabee Hook is also the site of the former Hallett Station, a joint United States and New Zealand station that was open from 1956-73. During operation the station and associated infrastructure occupied an area of 4.6 ha on land that had formerly been occupied by breeding Adélie penguins. Establishment of Hallett Station in 1956 required eviction of 7580 penguins, including 3318 chicks, in order to clear the 0.83 ha required for bulldozing and erection of buildings. The colony was subjected to substantial impacts from the establishment and operation of Hallett Station, and declined from 62,900 pairs in 1959 to a low of 37,000 pairs in 1968, although increased again to 50,156 by 1972. Fluctuations in populations may have been exacerbated by changes in sea ice cover documented for the entire region. By 1987, after the closure of the station in 1973, the colony had increased to near its 1959 population; however, few areas modified by humans had by that time been fully recolonized. The area formerly occupied by the station has now been partly recolonized, although numbers were estimated at 39,014 breeding pairs in 1998-99, and an aerial census in 2006-07 (conducted as part of a long-term program) recorded only 19,744 breeding pairs (Lyver and Barton 2008, unpublished data). Using a combination of ground counts and aerial and ground photography data gathered 26 November – 3 December 2009, the Adélie colony had recovered to around 64,041 breeding pairs, which is close to the numbers recorded on Seabee Hook around the time Hallett Station was built.

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

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

Human activities and impact

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

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

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

6(ii) Access to the Area

Access to the Area may be made by air, from the sea or by pedestrians over sea ice. Break out of sea ice at Cape Hallett usually begins between late December and early January and sea ice generally reforms in early March. Areas of sea ice that are potentially more stable and better suited to aircraft landing may be found at sites southwest of Seabee Hook in the enclosure of Edisto Inlet. However, sea ice within Edisto Inlet can break out rapidly, even early in the season, so care is needed.

The breeding season for Adélie penguins and skuas within the Area is between October and March. During this period and when suitable sea ice is present, fixed wing aircraft may land at any site outside of the 1/2 nautical mile (~930 m) guideline distance described in Section 7(i) and shown on Map 2. When landings beyond 1/2 nautical mile are unsafe or impractical, fixed wing landings may be made at any site beyond 1/4 nautical mile (~460m) of the Adélie colony on Seabee Hook. Access to the Area from fixed wing landing locations may be by helicopter or on foot over sea ice.

Helicopters may land at any site outside of the 1/2 nautical mile (~930m) guideline distance, except when such landings are unsafe or impractical, in which case the

designated helicopter landing site within the Area in Willett Cove at 170° 13.579' E, 72° 19.228' S may be used. Helicopter access to the designated landing site should be from the south and follow the eastern coastline of Willett Cove (Map 2). Occasionally the designated helicopter landing site at Willett Cove may be susceptible to inundation by high tides.

When access to the Area is made from the sea, small boats may land anywhere within the Area, although small boat landings with the purpose of camping should be made to Willett Cove. Strong currents and eddies have been reported on the seaward margins of Seabee Hook, which may prove difficult for small boat landings. Ocean conditions are generally calmer in Willett Cove and in the lee of Seabee Hook.

Access to the Area on foot may be made over sea ice.

6(iii) Restricted and managed zones within the Area

Restricted Zone

A small zone directly below the scree slopes in the northeast of the Area is designated a Restricted Zone in order to preserve part of the Area as a reference site for future comparative vegetation studies. The remainder of the Area is more generally available for research programs and sample collection.

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

The Restricted Zone provides a buffer around the monitoring plot of 20 m on the NW side and 10 m on the other three sides, making a rectangle of 58 m in width and 140 m in length. The corner coordinates of the Restricted Zone are defined in Table 2. A series of cairns has been constructed (on existing rocks where possible) to indicate the extent of the Restricted Zone (Map 3).

Table 2: Restricted Zone corner coordinates

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

Access to the Restricted Zone is allowed only for compelling reasons that cannot be served elsewhere in the Area.

6(iv) Structures within and near the Area

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

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

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

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

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

The nearest protected areas to Cape Hallett are Cape Adare (ASPA No.159) 115 km to the north, and Mt. Melbourne (ASPA No.118) and Edmonson Point (ASPA No.165), both approximately 240 km to the south.

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 purposes, or for educational purposes that cannot be served elsewhere, or for essential management purposes consistent with plan objectives such as assessment or remediation of impacts, inspection, maintenance or review;

- the actions permitted will not jeopardize the ecological, scientific, educational, historic or aesthetic values of the Area;

- access to the Restricted Zone is allowed only for compelling reasons that cannot be served elsewhere in the Area;

- any management activities are in support of the objectives of the Management Plan;

- the actions permitted are in accordance with the Management Plan;

- the permit, or a copy, shall be carried 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 into the Area shall be by small boat, helicopter, or on foot.

- Vehicles are prohibited in the Area;

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

    - Overflight of the Area below 2000 feet (~610 m) is prohibited, unless authorized by permit for purposes allowed for by the Management Plan;

    - Overflight and landings within ½ nautical mile (~930 m) of the Adélie colony on Seabee Hook for tourism is strongly discouraged;

    - Landings within ½ nautical mile (~930 m) of the Adélie colony on Seabee Hook should be avoided wherever possible;

- Landings beyond ½ nautical mile (~930 m) of the Adélie colony may select landing sites according to visit needs and local conditions;

- the Primary Landing Site (170° 11.460' E, 72° 19.686' S) shown on Map 2 represents the location where access to the designated camping site is shortest by traverse over sea ice. Landings at this site may be made as local conditions allow; and

- When landings beyond ½ nautical mile (~930 m) of the Adélie colony are considered unsafe or impractical (e.g. because sea ice is absent or poor, if weather conditions are unfavorable, or because there is an important logistic need such as to move heavy equipment), the following conditions apply:

FIXED WING

- Fixed wing aircraft may land beyond ¼ nautical mile (~460 m) of the Adélie colony;

- Fixed wing aircraft landings should not be made in Willett Cove.

HELICOPTERS

- Helicopters shall land at the designated site at Willett Cove (170° 13.579' E, 72° 19.228' S) (Map 2), either on land or on sea ice adjacent to the campsite;

- On occasions the landing site is susceptible to inundation by high tides: if this occurs landings may made on nearby dry ground, avoiding vegetated sites and preferably remaining on beach gravels south of the designated landing site, keeping as close to the shore as possible. Landings closer to the Adélie penguin colony shall be avoided;

- Helicopters should follow the designated approach route to the maximum extent practicable. The preferred helicopter approach route is from the south and extends from the primary landing site to the designated landing site following a route along the southern and eastern coastline of Willett Cove (Map 2).

• There are no special restrictions on where access can be gained to the Area by small boat, although small boat landings with the purpose of camping should be made to Willett Cove in order to avoid the need to haul camp equipment through the Adélie colony.

• It is important that all visitors are careful to restrict their movements around the campsite, keeping to the area along the shoreline to avoid trampling inland areas that

are seasonally moist and richly colonized by a variety of plants and invertebrates, which are the subject of on-going research.

- Within the Adélie colony, visitors should not enter sub-groups of nesting penguins unless required for research or management purposes: visitors should walk around the coastal strip of Seabee Hook when possible, and/or around or between sub-groups. Traces of the old station road extend from the NW corner of Willett Cove through to the former station site, and remains a comparatively wide corridor where pedestrians can maintain a reasonable distance from nesting birds.

- Visitors should avoid walking on the scree slopes in the eastern part of the Area unless necessary for essential scientific or management purposes; screes are a sensitive and easily damaged habitat for a diverse community of flora and fauna.

- All pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects. Visitors should avoid walking on visible vegetation. Care should be exercised when walking in areas of moist ground and on screes, where foot traffic can easily damage sensitive soils and plant communities.

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

- Scientific research that will not jeopardize the values of the Area;

- Essential management activities, including assessment or remediation of impacts, and monitoring;

- Activities with educational aims (such as documentary reporting (photographic, audio or written), the production of educational resources or services, or educating program personnel about clean-up methods) that cannot be served elsewhere. Educational aims do not include tourism; and

- Activities with the aim of preserving or protecting historic resources within the Area.

7(iii) Installation, modification or removal of structures

- No structures are to be erected within the Area except as specified in a permit;

- All structures and scientific equipment installed in the Area must be authorized by permit and clearly identified by country, name of the principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area;

- Installation (including site selection), maintenance, modification or removal of structures shall be undertaken in a manner that minimizes disturbance to flora and fauna;

- Respect the emergency cache and only use it in genuine emergency, reporting any such use to an appropriate authority so the cache can be restocked; and

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

7(iv) Location of field camps

Permanent field camps are prohibited within the Area. When conditions allow, temporary camping should preferably be located on sea ice in Willett Cove, which is outside of the Area. When this is not practical, temporary camping is permitted at a designated site on the eastern shore and 100 m south of the head of Willett Cove (72º 19' 13" S, 170º 13' 34" E). This site comprises unconsolidated beach gravels, is not colonized by birds or significant plant communities (although these are present nearby) and lies on the site of a former station road (Map 3). Stakes have been driven into the hard, stony ground at the campsite for tent guys; these should be used wherever possible.

The campsite is located immediately adjacent to areas rich in terrestrial fauna and flora and visitors should restrict their movements around the campsite to the area along the shoreline unless required for research purposes. On occasions the site is susceptible to inundation by high tides: if this occurs the camp may be moved to dry ground, avoiding vegetated sites to the maximum extent practicable and preferably remaining on beach gravels south of the designated campsite, keeping as close to the shore as possible.

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

- No living animals, plant material, microorganisms or soils shall be deliberately introduced into the Area, and the precautions listed below shall be taken against accidental introductions;

- To help maintain the ecological and scientific values of the Area visitors shall take special precautions against nonnative species introductions. Of particular concern are microbial, invertebrate and vegetation introductions from soils at other Antarctic sites, including stations, or from regions outside Antarctica. Visitors shall ensure that sampling equipment and markers brought into the Area are clean. To the maximum extent practicable, footwear and other equipment used or brought into the area (including backpacks, carry-bags and tents) shall be thoroughly cleaned before entering the Area;

- In view of the presence of breeding bird colonies at Cape Hallett, no poultry products, including products containing uncooked dried eggs, and wastes from such products, shall be released into the Area;

- No herbicides or pesticides shall be brought into the Area;

- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted;

- Fuel, food, and other materials are not to be stored in the Area, unless required for essential purposes connected with activities for which a permit has been granted or are contained within an emergency cache authorized by an appropriate authority;

- All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized; and

- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ.

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

Taking or harmful interference of native flora and fauna is prohibited, except in accordance with a separate permit issued under Article 3 of Annex II by the appropriate national authority specifically for that purpose.

7(vii) Collection or removal of anything not introduced by a visitor

- 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;

- Removal of, or disturbance to, markers left by previous scientific work within the Area is prohibited unless specifically authorized by permit;

- Other than scientific markers as noted above, material of human origin likely to compromise the values of the Area, which was not brought into the Area by a permit holder, and is clearly of no historic value or otherwise authorized, may be removed from any part of the Area unless the impact of removal is likely to be greater than leaving the material in situ. If this is the case the appropriate authority should be notified;

- Material found that is likely to possess important historic or heritage values should not be disturbed, damaged, removed or destroyed. Any such artifacts

should be recorded and referred to the appropriate authority for a decision on conservation or removal. Relocation or removal of artifacts for the purposes of preservation, protection, or to reestablish historical accuracy is allowable by permit;

- The well-preserved body of a husky is contained in an enclosed wooden box located in the eastern part of the Area and should not be disturbed while options for its future management remain under consideration; and

- The appropriate national authority should be notified of any items removed from the Area that were not introduced by the permit holder.

7(viii) Disposal of waste

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

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

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

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 contained in Appendix 4 of Resolution 2 (1998)(CEP I).

- 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.

- The appropriate authority should be notified of any activities/measures undertaken, and/or of any materials released and not removed, that were not included in the authorized permit.

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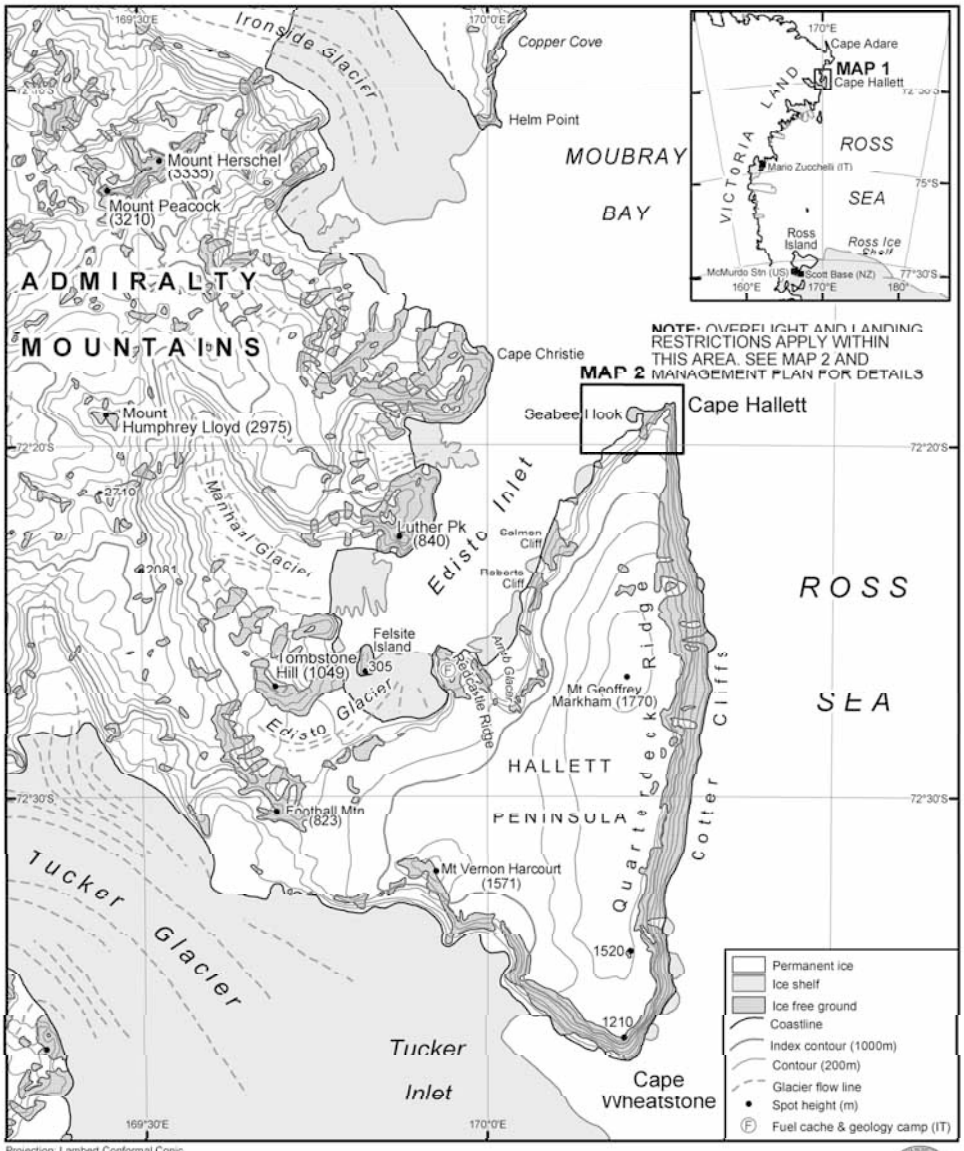
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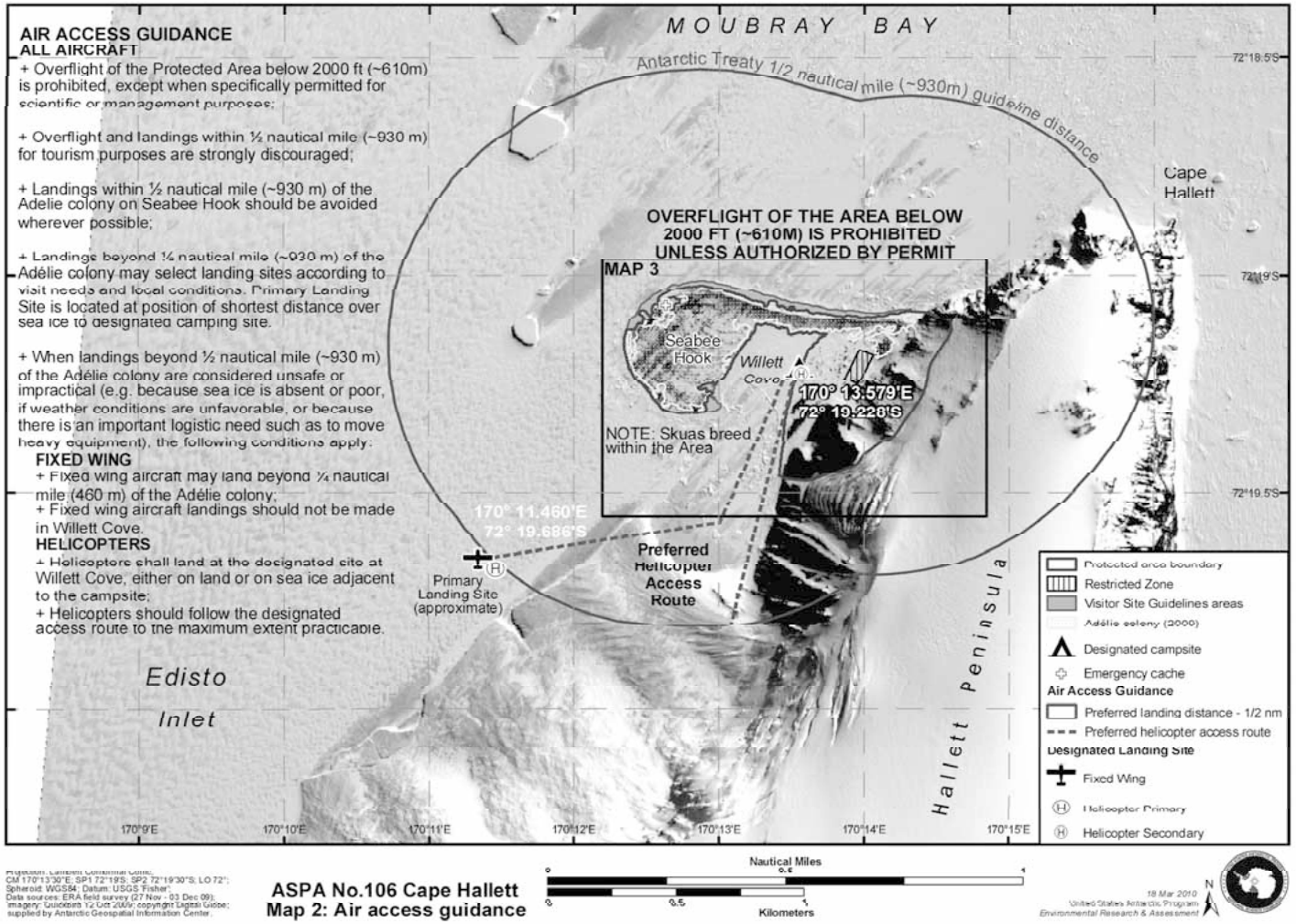
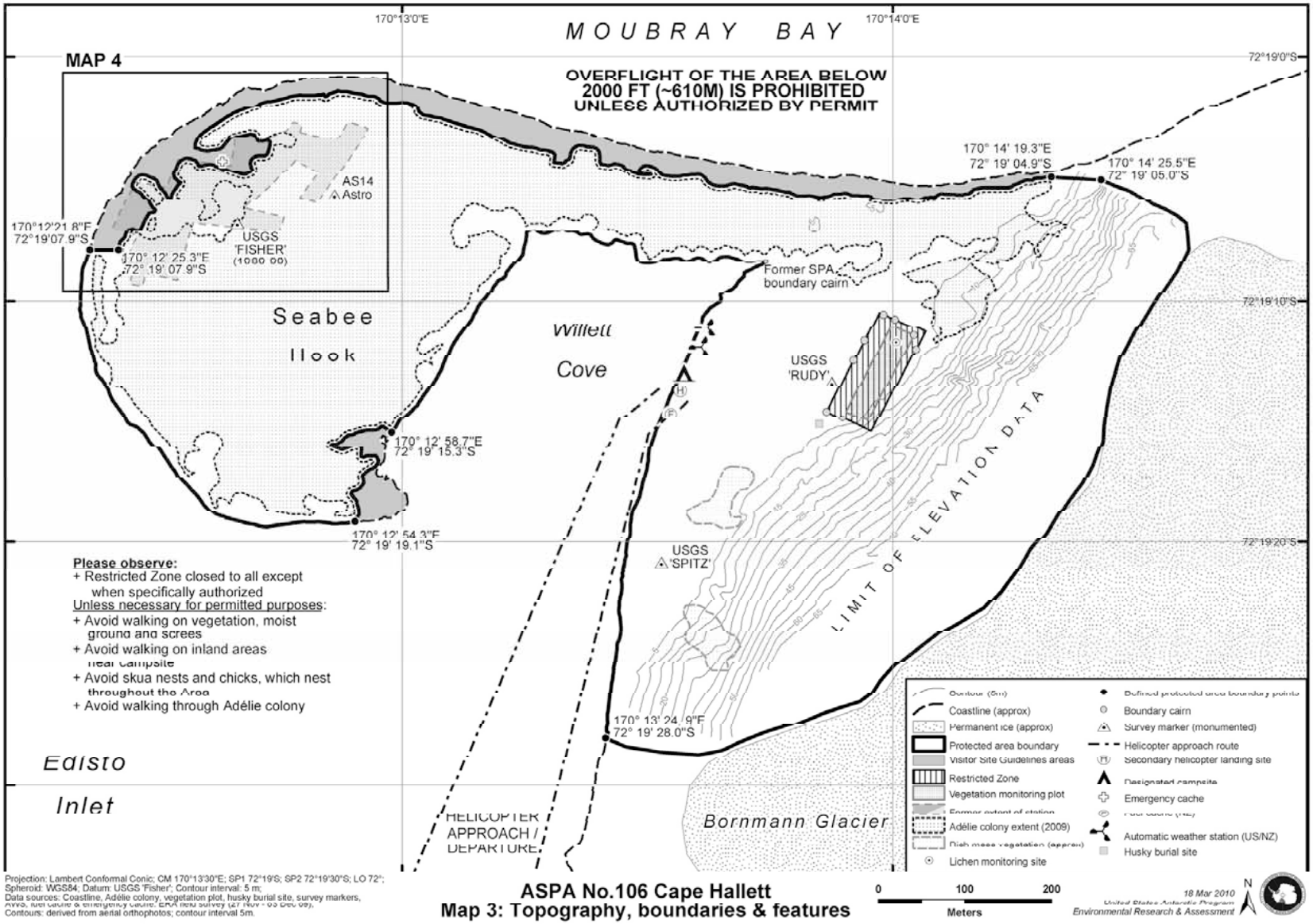
Helm Point
MOUBRAY
BAY
Mount Herschel
(3335)
Mount Peacock
(3210)
ADMIRALTY
MOUNTAINS
Cape Christie
Seabee Hook
Cape Hallett
Mount
Humphrey Lloyd (2975)
Marshall Glacier
Luther Pk
(840)
Edisto Inlet
Salmon
Cliff
Roberts
Cliff
ROSS
SEA
Felsite
Island
Tombstone
Hill (1049)
Edisto Glacier
Redcastle Ridge
Arrub Glacier
Mt Geoffrey
Markham (1770)
Quarterdeck Ridge
Cotter Cliffs
HALLETT
PENINSULA
Football Mtn
(823)
Mt Vernon Harcourt
(1571)
Tucker
Glacier
1520
1210
Tucker
Inlet
Cape
Wheatstone
NOTE: OVERFLIGHT AND LANDING
RESTRICTIONS APPLY WITHIN
THIS AREA. SEE MAP 2 AND
MANAGEMENT PLAN FOR DETAILS
MAP 2
MAP 1
Cape Adare
Cape Hallett
VICTORIA LAND
ROSS
SEA
Mario Zucchelli (IT)
Ross
Island
Ross Ice
McMurdo Stn (US)
Scott Base (NZ)
Permanent ice
Ice shelf
Ice free ground
Coastline
Index contour (1000m)
Contour (200m)
Glacier flow line
Spot height (m)
Fuel cache & geology camp (IT)
Projection: Lambert Conformal Conic
CM 170°, SP1 72°19'; SP2 72°19'30"; LO 72°;
Horizontal datum & spheroid: WGS84
Contour interval: 200 m;
Heights in meters
Data: SCAR Antarctic Digital Database v5 (2007)
ASPA No. 106 - Cape Hallett
Map 1: Regional Map
0 1 2 3 4 5
Kilometers
26 Feb 2010
United States Antarctic Program
Environmental Research & Assessment



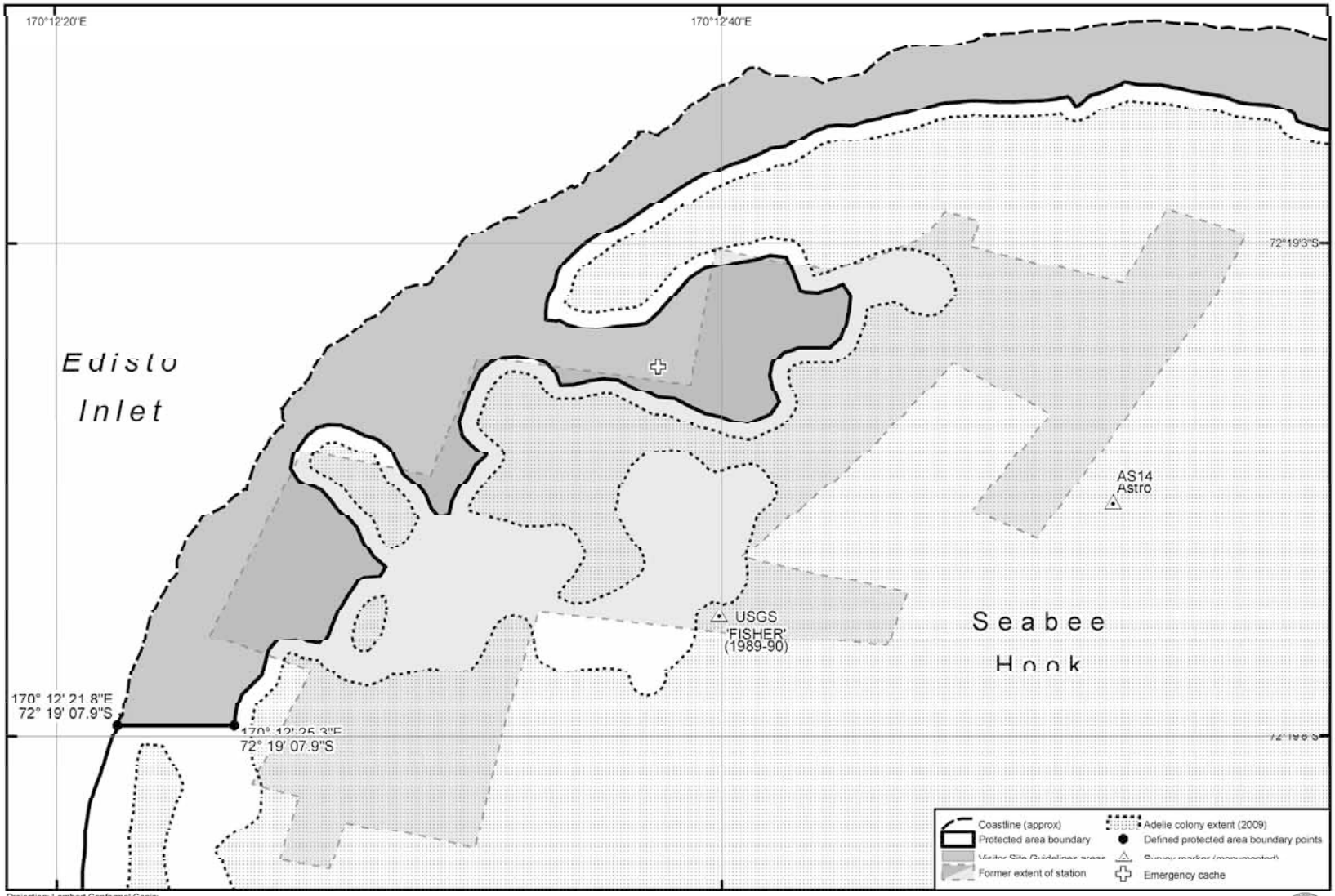
Projection: Lambert Conformal Conic; CM 170°13'30"E; SP1 72°19'S; SP2 72°19'30"S; LO 72°; Spheroid: WGS84; Datum: USGS Fisher; Data sources: ERA field survey (27 Nov - 03 Dec 09); Imagery: Quickbird 12 Oct 2009; copyright Digital Globe; supplied by Antarctic Geospatial Information Center.

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



Projection: Lambert Conformal Conic; CM 170°13'30"E; SP1 72°19'S; SP2 72°19'30"S; LO 72°; Spheroid: WGS84; Datum: USGS 'Fisher'; Contour interval: 5 m;
Data sources: Coastline, Adélie colony, vegetation plot, husky burial site, survey markers, AWS, fuel cache & emergency cache: ERA field survey (27 Nov - 03 Dec 09).
Contours: derived from aerial orthophotos; contour interval 5m.

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


170°12'20"E
170°12'40"E
72°19'3"S
Edisto
Inlet
AS14
Astro
USGS
'FISHER'
(1989-90)
Seabee
Hook
170° 12' 21.8"E
72° 19' 07.9"S
170° 12' 25.3"E
72° 19' 07.9"S
Coastline (approx)
Protected area boundary
Former extent of station
Adelie colony extent (2009)
Defined protected area boundary points
Emergency cache
Projection: Lambert Conformal Conic;
CM 170°13'30"E; SP1 72°19'S; SP2 72°19'30"S; LO 72°;
Spheroid: WGS84; Datum: USGS 'Fisher'; Contour interval: 5 m;
Data sources: Coastline, penguin colony, AS14 Astro
& emergency cache: ERA field survey (27 Nov - 03 Dec 09).
ASPA No.106 Cape Hallett
Map 4: Former Hallett Station area
0 10 20 30 40 50
Meters
18 Mar 2010
United States Antarctic Program
Environmental Research & Assessment
N

Antarctic Specially Protected Area No. 119
(Davis Valley and Forlidas Pond, Dufek Massif, Pensacola Mountains):
Revised Management Plan

The Representatives,

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

Recalling

- Recommendation XVI-9 (1991), which designated Forlidas Pond and Davis Valley Ponds as Specially Protected Area ("SPA") No. 23 and annexed a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 23 as ASPA 119;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 119;

Recalling that Recommendation XVI-9 (1991) has not become effective, and that the Management Plan for ASPA 119 attached to it was withdrawn by Measure 2 (2005);

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 119;

Desiring to replace the existing Management Plan for ASPA 119 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 119 (Davis Valley and Forlidas Pond, Dufek Massif, Pensacola Mountains), which is annexed to this Measure, be approved;

2) the Management Plan for ASPA 119 annexed to Measure 2 (2005) shall cease to be effective; and

3) Recommendation XVI-9 (1991), which is not yet effective, be withdrawn.

Management Plan for Antarctic Specially Protected Area (ASPA) No. 119

DAVIS VALLEY AND FORLIDAS POND, DUFEK MASSIF, PENSACOLA MOUNTAINS

(51° 05' W, 82° 29' S)

Introduction

Davis Valley and Forlidas Pond Antarctic Specially Protected Area (ASPA) is situated within the Dufek Massif, Pensacola Mountains at 51°4'53"W, 82°29'21"S. Approximate area: 57.3 km2. The primary reason for the designation of the Area is that it contains some of the most southerly freshwater ponds with plant life known to exist in Antarctica, which represent unique examples of near-pristine freshwater ecosystems and their catchments. The geomorphology of the Area represents a unique scientific resource for the reconstruction of previous glacial and climatic events. As a consequence of its extreme remoteness and inaccessibility, the Area has experienced very little human activity and with the total number of visitors estimated to be less than 50 people. As a result, the Area has outstanding potential as a scientific reference site. Furthermore, the Area possesses outstanding wilderness and aesthetic values. The Area is one of the most southerly 'dry valley' systems in Antarctica and, as of March 2010, is the most southerly Antarctic Specially Protected Area (ASPA) in Antarctica. The Area was originally proposed by the United States of America and adopted through Recommendation through Recommendation XVI-9 (1991, SPA No. 23) and included Forlidas Pond (82°27'28"S, 51°16'48"W) and several ponds along the northern ice margin of the Davis Valley. The boundaries of the Area were extended to include the entire ice-free region centered on the Davis Valley through Measure 2 (2005). The boundaries of the Area have not been changed in the current management plan.

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 metres apart with a combined total area of around 6 km2. 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 March 2010, is the most southerly Antarctic Specially Protected Area in Antarctica. While occupying an area of only 53 km2, 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 being published (Hodgson et al., in press) 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; 2nd 83°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 northeastern 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 km2 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 is landlocked and occupies a small unnamed dry valley separated from the Davis Valley by a tributary ridge extending north from Forlidas Ridge. Other pro-glacial lakes and ponds occur within the Area at various locations along the blue ice margin of the Ford Ice Piedmont, at the terminus of the Edge Glacier, and along the ice margin west of Forlidas Ridge.

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 metres 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 km2.

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 metres 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 26 km to the south (Map 1), measured in a crevasse at 8 metres 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, though sensors were not shielded with a Stevenson screen. 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%.

Directly measured data on windspeeds and directions within the Area are not available, but models suggest near surface winds are predominantly from the west-north-west with mean winter velocities of c. 10m s-1 (van Lipzig et al., 2004). While the older exposed ice-free areas above the glacial drift limit possess many features related to long-term wind erosion, there is some evidence to suggest that windspeeds within 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 bottom of 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. This is consistent with a Type 2 dominated ablation area where sublimation-driven ablation occurs at the foot of the steep topographic barriers, with individual glacier valleys serving as gates for air drainage from the plateau to the Ronne-Filchner Ice Shelf. Strongest sublimation rates occur on these localized glaciers in the Transantarctic Mountains, where widespread blue ice areas are present (van den Broeke et al., 2006).

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. Features include overlapping valley-glacier moraines, ice sheet moraines, lake shoreline, lateral glacial channels, ice eroded surfaces, well-developed patterned ground and erratics. Boyer (1979) identified at least three major glacial and two major interglacial events and recent work by Hodgson et al. (in prep) maps geomorphological features derived from up to seven glacial stages. From oldest to youngest, these stages were: alpine glaciation of the escarpment edge; over-riding warm-based glaciation; glacier advance to an upper limit (760 m); two ice-sheet advances to closely parallel limits in the valleys; advance of the plateau outlet glacier (Edge Glacier) to merge with the ice

sheet; and finally an advance and retreat of the main ice sheet margin. Attempts to provide age constraints for some of these glacial events have been carried out using paired cosmogenic 10Be-26Al exposure ages on erratic boulders, composed of Dover Sandstone. These suggest that some parts of the valley have been exposed for > 1.0-1.8 Ma and experienced only a minor ice sheet advance at the Last Glacial Maximum, consistent with an emerging dataset from around the Weddell Sea rim that implies only rather modest ice thickening at this time.

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 landlocked pond that was estimated to be approximately 100 metres in diameter in 1957 (Behrendt, 1998). In December 2003 the lake was measured by Hodgson and Convey (2004) as 90.3 metres 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 1015 cm of ice (Hodgson and Convey, 2004). Depth was measured at 1.83 m and the thickness of the ice between 1.63 and 1.83 metres. The conductivity and temperature in the brine layer was 142.02 mS cm-1 and -7.67ºC respectively, compared with 2.22 mS cm-1 and 0.7 C in the freshwater moat (Hodgson et al. in press). The salinity of the bottom-water in Forlidas Pond is thus around four times greater than seawater. This concentration of salts is the result of the pond being the evaporated remnant of a much larger lake, which evaporated from about 2200 years ago and can be identified by a series of lake terraces and a high shoreline 17.7 m above the present water level (Hodgson in prep.).

Hodgson and Convey (2004) also report a small remnant pro-glacial pond near the margin of the Ford Ice Piedmont, 900 metres north of Forlidas Pond. Two pro-glacial meltwater ponds also occur to the west of Forlidas Ridge and a series of similar pro-glacial meltwater ponds also occur along the blue-ice margin of the northern Davis Valley, located at 82º 27.5' S, 51º 05.5'W and, 82º 27.55' S, 51º 07' W. The pro-glacial lake at the terminus of the Edge Glacier is the largest within the Area. This is permanently frozen to the bottom apart from at the eastern margins where seasonal meltwater has been observed.

Dry stream channels and water erosion features are evident within the ice-free area, although only the small glacial melt streams on the eastern margin of 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 lake moats, the positive 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 dominated by 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. 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. These have been identified as Lecidea cancrioformis Dodge & Baker (Hodgson et al., in press, and see Appendix 1: Table A1 for a list of taxa identified in the Area). The British Antarctic Survey Plant Database also reports Blastenia succinea Dodge & Baker and Xanthoria elegans (Link.) Th. Fr. in samples from elsewhere in the Dufek Massif, although these have not been independently verified. 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.The cyanobacterial community is the most abundant biota and is present in at least three distinct environments:

(1) In the permanent water bodies; particularly in the moat of Forlidas Pond, at the bottom and littoral zones of the Davis Valley Ponds, and in the seasonally wetted perimeter of Edge Lake. These habitats are extensively covered by red-brown cyanobacterial mats. These are actively photosynthesizing, as evidenced by gas bubbles trapped against the lower ice surfaces, and bubbles incorporated into the ice. Because perennially ice covered lakes have elevated concentrations of dissolved O2 gas, the microbial mats growing on the bottom can become buoyant and start to float off the bottom as ‘lift-off’ mats, or become incorporated into the base of the lake ice when it makes contact with the bed. In Forlidas Pond and the Davis Valley Ponds lift off mats frozen into the base of the lake ice eventually migrate up through the ice profile. In the Davis Valley, this appears to take place over several years with each summer marked by the development of a 2-3 cm melt-cavity formed by the upward progression of the clump thorough the lake ice due to preferential heating of its upper surface. These clumps eventually break out at the surface and are dispersed by wind onto the shoreline, or further afield. Cyanobacteria were also present in the hypersaline brine of Forlidas Pond as single cells and as small flakes. A strain corresponding to the morphology of Leptolyngbya antarctica was isolated from the saline slush of TM1 (Fernandez-Carazo et al. in prep.).

(2) In exposed terrestrial locations, particularly at the edge of larger rocks and within the boundary crevices of frost sorted polygons. These are generally very foliose in form, mid brown in colour, and best developed at the edge of larger rocks with depths of at least 10-15 cm. Nearly all clumps were completely dry on discovery, although those near to melting snow were damp and some had lower thalli that were often deep green in colour. Particularly good examples of this growth form were found in the mid valley floor of Forlidas Valley and in Davis Valley (near a large snow gully where it meets the second major terrace above Edge Lake).

(3) In a series of dry pond beds in the Davis Valley, two of up to 50 m diameter, which have extensive areas of almost continuous cyanobacterial mat on the former pond floors. These pond beds and gullies occupy depressions and therefore may accumulate snow in winter, permitting the cyanobacteria to take advantage of the wet and protected environment within the snow patches.

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.

Analyses of the cyanobacterial molecular diversity from four samples collected in and around Forlidas Pond show a depleted diversity, with only 2 - 5 Operational Taxonomic Units (OTUs) per sample (Hodgson et al, in press). This is likely a product of geographical isolation combined with multiple environmental stressors such as salinity and seasonal desiccation, and UV radiation. Some of the cyanobacteria, for example from the brine of Forlidas Pond, are related to sequences from other hypersaline Antarctic lakes, whilst others are found almost exclusively in glacial regions. The six cyanobacterial OTUs described from the Dufek Massif are all distributed in more than one location within the continent and are found outside Antarctica.

The invertebrate fauna within the area is equally impoverished, with both the diversity and abundance of organisms being extremely limited compared with lower latitude and coastal Antarctic sites. No nematodes arthropods have been found but there are three species of the tardigrade present from two Classes: Echiniscus (cf) pseudowendti Dastych, 1984 (Heterotardigrada), Acutuncus antarcticus (Richters, 1904) and Diphascon sanae Dastych, Ryan and Watkins, 1990 (Eutardigrada) and a few unidentified bdelloid rotifers (Hodgson et al in press). Acutuncus antarcticus is an Antarctic species that occurs in semi-permanent damp/wet habitats throughout the Antarctic continent and sub-Antarctic islands, but has not been reported from any of the close neighbour continents. Echiniscus (cf) pseudowendti and Diphascon sanae found in samples from Forlidas Pond are also endemic to the Antarctic, with restricted distributions.

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, 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.

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.

Avifauna is sparse: in December 2003 a single snow petrel (Pagadroma nivea) was noted flying around one of the peaks above Davis Valley.

Human activities and impact

There have been few visits to the Area and human impacts are believed to be minimal (Table A2 Appendix 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 A2 (Appendix 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.

6(ii) Access to the Area

Access to the Area may be made only on foot. Access to the icefields surrounding the Area may be made by aircraft or via land routes. Access to the Area should be made as close as practicable to the intended study site, in order to minimize the amount of the Area that needs to be crossed. Due to the surrounding terrain and crevasse patterns, the most practical access routes into the Area are from the Ford Ice Piedmont to the north of the Area.

6(iii) Restricted and managed zones within the Area

None.

6(iv) 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 or educational 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 of the Area at less than 100 metres 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 in order 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 to the north of the Area.

- 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

- Scientific 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;

- Activities with educational aims that are undertaken for compelling reasons which cannot be served elsewhere. Activities may include documentary reporting (photographic, audio or written) or the production of educational resources or services. Educational activities shall not compromise the values for which the Area is protected, in particular its value as a near-pristine reference site. Educational aims do not include tourism.

- 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

- No structures are to 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.

- Installation (including site selection), maintenance, modification or removal of structures shall be undertaken in a manner that minimizes disturbance to the physical, ecological, scientific or aesthetic and wilderness values 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. To help maintain the ecological, scientific and wilderness values of the Area visitors shall take special precautions against non-native species introductions. Of particular concern are pathogenic, microbial, invertebrate and vegetation introductions from soils at other Antarctic sites, including stations, or from regions outside Antarctica. Visitors shall ensure that sampling equipment and markers brought into the Area are clean. To the maximum extent practicable, footwear and other equipment used or brought into the area (including backpacks, carry-bags and tents) shall be thoroughly cleaned before entering the Area; 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'.

- 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, food, and other materials are not to be stored in the Area, unless required for essential purposes connected with the activity for which the permit has been granted or are contained within an emergency cache authorized by an appropriate authority;

- All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is 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; and

- 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.

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.

- The appropriate national authority should be notified of any items removed from the Area that were not introduced by the permit holder.

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 carry out biological monitoring and site inspection activities within the Area, 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;

- 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 contained in Appendix 4 of Resolution 2 (1998)(CEP I).

- 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.

- The appropriate authority should be notified of any activities/measures undertaken, and/or of any materials released and not removed, that were not included in the authorized permit.

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Appendix 1: Table A1. Biological sampling program in the Davis and Forlidas Valleys: groups of taxa identified and the methods used (Hodgson et al., in press)

Description	**Method**	**No. Samples**	**No. taxa**	**Taxa**
Bryophyta	Observational survey	0	0	n/a
Lichens	Observational survey	1	1	*Lecidea cancriformis* Dodge & Baker
Bacillariophyceae/Diatoms	Survey under light microscope	2	1	*Pinnularia microstauron* Her.) CI. [1]
Cyanobacteria	Clone library, DGGE + band sequencing, isolation of strains + sequencing (microsophy)	3	6	Sample TM1: 16ST63, 16ST14 Sample TM2: 16ST63, 16ST14, 16ST44, 16ST49, 16ST80 Sample TM3: 16ST44, 16ST49, 16ST80, 16ST07
Chlorophyta/Green algae	DGGE + band sequencing	2	1	*Urospora* sp.
Rhizaria/Cercozoa	DGGE + band sequencing	2	2	Hetermitidae, *Paulinella* sp.
Bacteria	DGGE + band sequencing	2	32	Cyanobacteria: Nostocales, Oscillatoriales, Chroococcales, Gloeobacteriales [2]
Bacteria	Isolation of strains + sequencing	1	330 isolates	*Firmicutes 33%, Bacteroidetes 23%, Alphaproteobacteria 25%, Actinobacteria 9%, Betaproteobacteria 8%, Gammaproteobacteria 1.5%,* Deinococci 0.3%
Arthropods	Tullenberg	50	0	n/a
Invertebrates	Baermann extractions	130	3	See Tardigrades (below)
Tardigrades	Light microscope (Molecular [3])	14 20	3 1	*Echiniscus*(cf) *pseudowendi* Dastuch, 1984 (Hetereotradigrada), *Acutuncus antarcticus* (Richters, 1904) *Diphascon sanae* Dastych, Ryan and Watkins, 1990 (Eutardigrada)

[1] Not considered as evidence of an extant community

[2] Tentative identifications based on about 100 bases

[3] Analyses carried out on morphologically congruent samples from the Shackleton Range

Rotifers	Tullenberg and light microscope	130	present	Bdelliod rotifers
Soil bacteria and algae	Cultured (Parker *at al* 1982)[4]	1	3	Cyanobacteria: *Oscillatoria* sp.Algae: *Trebouxia* sp., *Heterocous* sp. (viable yeasts present)
Avifauna	Observation	n/a	1	Snow petrel (*Pagadroma Nivea*)

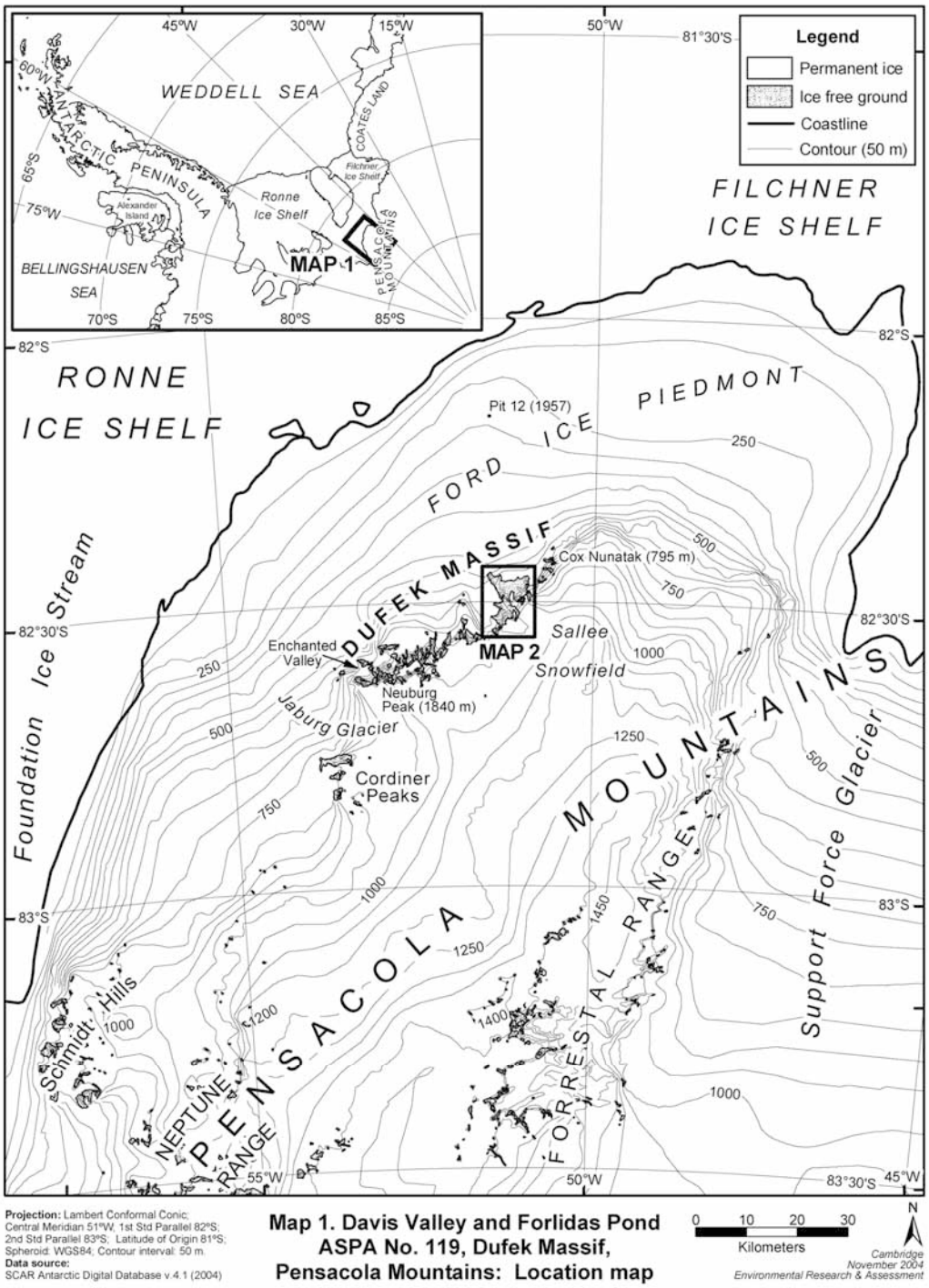
Appendix 1: Table A2. Known visits to the Davis Valley and adjacent ice-free valleys within and near the Area.

Party	**No. Papers**	**Org**	**Purpose**	**Dates**	**Duration (days)**	**Locations Visited**	**Camp**	**Transport**
Aughenbaugh, Behrendt, Neuberg, Theil, Walker	5	IGY (US)	Geology Geophysics	Dec 1957	?	FIP, DV, FP, FR	FIP west of FR	Sno-cat traverse to FIP then on foot
Ford, Schmidt, Nelson, Boyd, Rambo (?)	5	USGS	Geology	Dec 1965-1966	?	?	Base camp in Neptune Range	Numerous helicopter landings in Dufek Massif
Ford & Team	?	USGS	Geology	Summer 1973-74	?	?	?	?
Ford, Carlson, Czamanske, Nutt, England, Nelson	6	USGS	Geology	30 Nov-30 Dec 1976 (expedition dates)	?	?	Base camp close to Walker Peak (southwest Dufek Massif)	Numerous helicopter landings in Dufek Massif. Motor toboggans and ski traverse used on ground.
Russian team led by Shijatin, O.G. Accompanied by Ford (and Grue?) from the USA and Paech from	11	Soviet Antartic Expedition (22)	Geology Geophysics	Summer 1976-77	49 (total expedition)	Dufek Massif and other locations in Pensacola Mountains	Field camps on Provender Mountain, Read Mountain and Skidmor Mountain. Druznaja Station	Helicopter landings, snowmobile 'Buran', thence on foot

[4] Previously published

Germany							used as base camp	
Russian team led by Kamenev, E.N.	6	Soviet Antarctic Expedition (23)	Geology Geophysics	06 Feb-17 Feb 1978	11	Dufek Massif	Field camp in Schmidt Hills, Druznaja Station used as base camp.	Airplane, snowmobile 'Buran', thence on foot
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 Limnology, 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	30				40 (numbers approximate owning to incomplete data)			

Key: FIP – Ford Ice Pidemont; DV – Davis Valley; FP – Forlidas Ridge; AP – Angels Peak; CS – Clemons Spur; PS – Preslik Spur; MB – Mt Beijakova; MP – Mt Pavlovskogo; EV- Enchanted Valley.


Legend
Permanent ice
Ice free ground
Coastline
Contour (50 m)
WEDDELL SEA
ANTARCTIC PENINSULA
COATES LAND
Filchner Ice Shelf
Ronne Ice Shelf
Alexander Island
BELLINGSHAUSEN SEA
MAP 1
PENSACOLA MOUNTAINS
FILCHNER ICE SHELF
RONNE ICE SHELF
Pit 12 (1957)
PIEDMONT ICE
FORD
DUFEK MASSIF
Cox Nunatak (795 m)
MAP 2
Sallee Snowfield
Enchanted Valley
Neuburg Peak (1840 m)
Jaburg Glacier
Cordiner Peaks
Foundation Ice Stream
Support Force Glacier
PENSACOLA MOUNTAINS
FORRESTAL RANGE
NEPTUNE RANGE
Schmidt Hills
Projection: Lambert Conformal Conic; Central Meridian 51°W, 1st Std Parallel 82°S; 2nd Std Parallel 83°S; Latitude of Origin 81°S; Spheroid: WGS84; Contour interval: 50 m.
Data source: SCAR Antarctic Digital Database v.4.1 (2004)
Map 1. Davis Valley and Forlidas Pond ASPA No. 119, Dufek Massif, Pensacola Mountains: Location map
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Kilometers
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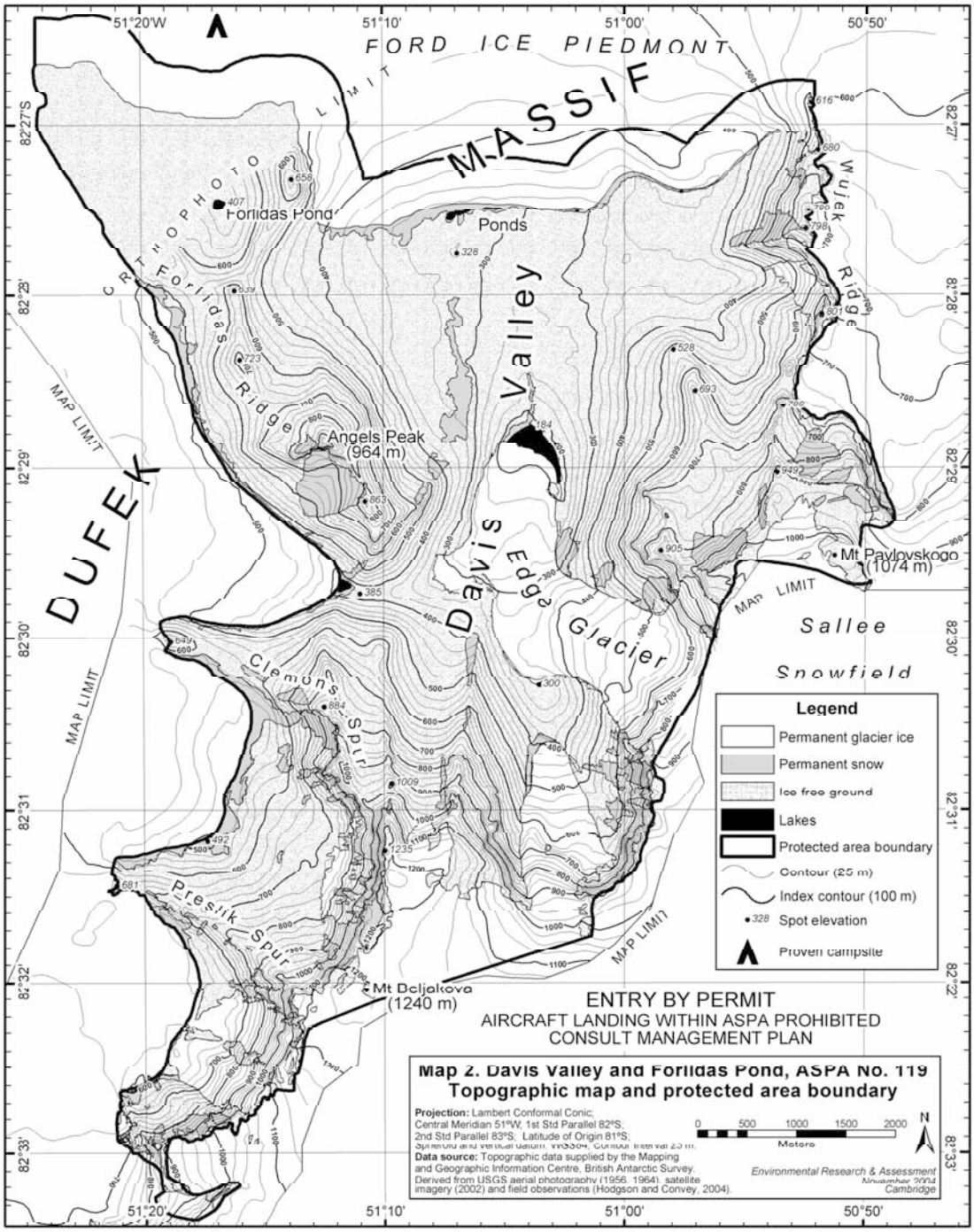
Cambridge November 2004
Environmental Research & Assessment


51°20'W
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82°27'S
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82°29'
82°30'
82°31'
82°32'
82°33'
FORD ICE PIEDMONT
MASSIF
LIMIT
DUFEK
Forlidas Pond
Ponds
Forlidas Ridge
Angels Peak (964 m)
Davis Valley
Edge Glacier
Wujek Ridge
Mt Pavlovskogo (1074 m)
Sallee Snowfield
MAP LIMIT
Clemons Spur
Presilk Spur
Mt Beljakova (1240 m)
Legend
Permanent glacier ice
Permanent snow
Ice free ground
Lakes
Protected area boundary
Contour (25 m)
Index contour (100 m)
Spot elevation
Proven campsite
ENTRY BY PERMIT
AIRCRAFT LANDING WITHIN ASPA PROHIBITED
CONSULT MANAGEMENT PLAN
Map 2. Davis Valley and Forlidas Pond, ASPA No. 119
Topographic map and protected area boundary
Projection: Lambert Conformal Conic;
Central Meridian 51°W, 1st Std Parallel 82°S;
2nd Std Parallel 83°S; Latitude of Origin 81°S;
Spheroid and Vertical Datum: WGS84; Contour interval 25 m.
Data source: Topographic data supplied by the Mapping and Geographic Information Centre, British Antarctic Survey. Derived from USGS aerial photography (1956, 1964), satellite imagery (2002) and field observations (Hodgson and Convey, 2004).
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Metres
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Environmental Research & Assessment
November 2004
Cambridge

Document	Figure	Source	Term	Translation	Proper Name	Translation
Davis Map 1	First	Legend	Permanent ice			
			Ice free ground			
			Coastline			
			Contour			
		Map	Ice Shelf		Filchner	
			Ice Shelf		Ronne	
			Ice Piedmont		Ford	
			Pit			
			Foundation Ice Stream			
			Massif		Dufek	
			Snowfield		Salle	
			Mountains		Pensacola	
			Enchanted Valley			
			Peak		Neuburg	
			Map			
			Glacier		Jaburg	
			Peaks		Cordiner	
			Hills		Schmidt	
			Range		Neptune	
			Range		Forrestal	
			Support Force Glacier			
					Cox Nunatak	
		Inset Map	Sea		Wendell	
			Penninsula		Antarctic	
			Sea		Bellinghausen	
			Map			
			Ice Shelf		Ronne	
			Mountains		Pensacola	
			Ice Shelf		Filchner	
			Coates land			
		Title	Map 1. Davis Valley and Forlidas Pond ASPA No. 119, Dufek Massif,Pensacola Mountains: Location map			
			Projection: Lambert Conformal Conic; Central Meridian 51ºW; 1st Std Parallel 82ºS; 2nd Std Parallel 83ºS; Latitude of Origin 81ºS; Spheroid: WGS84; Contour interval: 50 m.Data source: SCAR Antarctic Digital Database v.4.1 (2004)			
			Cambridge November 2004Environmental Research & Assessment			
			Kilometers			

Davis Map 2		Legend	Permanent glacier ice			
			Permanent snow			
			Ice free ground			
			Lakes			
			Protected area boundary			
			Contour			
			Index contour			
			Spot elevation			
			Proven campsite			
		Map	Ice Piedmont		Ford	
			Massif		Dufek	
			Orthophoto Limit			
			Pond		Forlidas	
			Ridge		Forlidas	
			Map Limit			
			Valley		Davis	
			Ridge		Wujek	
			Mount (Mt)		Pavlovskogo	
			Snowfield		Salle	
			Glacier		Edge	
			Angels Peak			
			Spur		Clemons	
			Spur		Preslik	
			Mount (Mt)		Beljakova	
			Entry by permit Aircraft landing within ASPA Prohibited Consult Management Plan			
		Title	Map 2. Davis Valley and Forlidas Pond, ASPA No. 119 Topographic map and protected area boundary			
			Projection: Lambert Conformal Conic; Central Meridian 51ºW; 1st Std Parallel 82ºS; 2nd Std Parallel 83ºS; Latitude of Origin 81ºS; Spheroid and vertical datum: WGS84; Contour Interval 25 m. Data source: Topographic data supplied by the Mapping and Geographic Information Centre, British Antarctic Survey. Derived from USGS aerial photography (1956, 1964), satellite imagery (2002) and field observations (Hodgson and Convey, 2004).			

			Environmental Research & Assessment November 2004 Cambridge			
			Meters			

Antarctic Specially Protected Area No. 139
(Biscoe Point, Anvers Island, Palmer Archipelago):
Revised Management Plan

The Representatives,

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

Recalling

- Recommendation XIII-8 (1985), which designated Biscoe Point, Anvers Island, Palmer Archipelago as Site of Special Scientific Interest ("SSSI") No. 20 and annexed a Management Plan for the site;

- Resolution 3 (1996), which extended the expiry date of SSSI 20 to 31 December 2000;

- Decision 1 (2002), which renamed and renumbered SSSI 20 as ASPA 139;

- Measure 2 (2004), which adopted a revised Management Plan for ASPA 139;

Recalling that ASPA 139 is located within Antarctic Specially Managed Area No. 7;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 139;

Desiring to replace the existing Management Plan for ASPA 139 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No.139 (Biscoe Point, Anvers Island, Palmer Archipelago), which is annexed to this Measure, be approved; and

2) all prior Management Plans for ASPA 139, namely those annexed to:

- Recommendation XIII-8 (1985); and

- Measure 2 (2004);

shall cease to be effective.

Management Plan for Antarctic Specially Protected Area (ASPA) No. 139

BISCOE POINT, ANVERS ISLAND, PALMER ARCHIPELAGO

(64° 48' S, 63° 47' W)

Introduction

The Biscoe Point Antarctic Specially Protected Area is located near the south-west coast of Anvers Island, in the Palmer Archipelago, Antarctic Peninsula, at 64°48'40"S, 63°46'27"W. Approximate area: 0.63 km2. The primary reason for the designation of the Area is its extensive vegetation communities, soils and terrestrial ecology. The Area contains the most extensive stands of Antarctic hair grass (*Deschampsia antarctica*) and Antarctic pearlwort (*Colobanthus quitensis*) in the Anvers Island region, as well as numerous species of mosses and lichens. The Area is a breeding site for several bird species, including Adélie (*Pygoscelis adeliae*) and Gentoo (*Pygoscelis papua*) penguins, Brown (*Catharacta loennbergi*), South Polar (*C. maccormicki*) and hybrid skuas, which have been the subject of long-term monitoring and ecological research. Furthermore, the long history of protection of the Area makes it a valuable reference site for comparative studies and long-term monitoring.

The Area was proposed by the United States of America and adopted through Recommendation XII-8 [1985, Site of Special Scientific Interest (SSSI) No. 20]; date of expiry was extended by Resolution 3 (1996) and through Measure 2 (2000); and the Area was renamed and renumbered through Decision 1 (2002). The boundary of the Area was revised through Measure 2 (2004) to remove its marine component, and following the collapse of the ice ramp joining the island to Anvers Island. The boundaries of the Area have not been changed in the current management plan.

1. Description of values to be protected

Biscoe Point (64°48'47"S, 63°47'41"W), 0.63 km2), Anvers Island, Palmer Archipelago, Antarctic Peninsula, was originally designated as a Site of Special Scientific Interest through Recommendation XIII-8 (1985, SSSI No. 20) after a proposal by the United States of America. It was designated on the grounds that the "Site contains a large (approximately 5000 m2) but discontinuous stand of the two native vascular plants, Antarctic hair grass (*Deschampsia antarctica*) and, less commonly, Antarctic pearlwort (*Colobanthus quitensis*). A relatively well developed loam occurs beneath closed swards of the grass and contains a rich biota, including the apterous midge Belgica antarctica. Longterm research programs could be jeopardised by interference from nearby Palmer Station and from tourist ships."

The present management plan reaffirms the exceptional ecological and scientific values associated with the rich flora and invertebrate fauna within the Area. In addition, it is noted that the first observation of C. quitensis growing south of 60°S was made at Biscoe Point, reported by Jean-Baptiste Charcot from the Expédition Antarctiques Française in 1903-05. The island on which Biscoe Point lies contains the

most extensive communities of D. antarctica and C. quitensis in the Anvers Island vicinity, and they are of unusual abundance for this latitude. The abundance is much greater than previously described, with almost half of the island of Biscoe Point, and much of the ice-free area of the peninsula to the north, possessing significant stands of vegetation. The communities extend over a large proportion of the available ice-free ground, with a discontinuous cover of D. antarctica, C. quitensis and bryophytes and lichens of several species varying in density over an area of approximately 250,000 m2. One stand of mosses in the prominent valley on the northern side of the main island extends almost continuously for 150 m along the valley floor, covering an area of approximately 6500 m2. Individual, near-continuous stands of D. antarctica and C. quitensis reach a similar size, both on the main island and, to a lesser extent, on the promontory to the north.

Several plant community studies were in progress when the Area was designated in 1985. Although these studies were discontinued soon after site designation, botanical research at the site has continued. For example, D. antarctica and C. quitensis seeds have been collected from Biscoe Point for plant studies examining the influence of climate change and enhanced UV-B radiation (Day, pers. comm. 1999). Biscoe Point was valuable for these studies because of the amount and quality of seeds available within the Area. Cores containing plant material and soils have been collected within the Area to investigate carbon and nitrogen fluxes within the ecosystem and to evaluate the influence of increased temperature and precipitation on the ecosystem (Park et al., 2007, Day et al., 2009). In addition, Biscoe Point is one of the few low-lying vegetated sites that has not yet been substantially damaged by Antarctic fur seals, and as such the Area has been identified as a potential control site for assessing Antarctic fur seal impacts on vegetation and soils in this region.

Biscoe Point is also valuable for ornithological research. Research into seabird ecology and long-term monitoring studies are being conducted on Adélie (*Pygoscelis adeliae*) and Gentoo (*Pygoscelis papua*) penguin colonies, as well as Brown (*Catharacta loennbergi*) and hybrid skuas (Patterson-Fraser, pers. comm., 2010).The Gentoo colony became established at Biscoe Point sometime around 1992 and, as a recently founded colony, is of particular value for monitoring long-term ecological changes to the local bird population structure and dynamics (Fraser, pers. comm., 1999). The Adélie colony is valuable for long-term monitoring and comparison with other colonies in Arthur Harbor that are subjected to higher levels of human influence. In this respect, the fact that the Area has been protected from significant human use, and that use allowed has been regulated by permit, for such a long period of time is of particular value. The Adélie colony is one of the oldest in the southern Anvers Island region (more than 700 years), and as such is valuable for paleoecological studies. The site is also the only site in the region where Brown (*Catharacta loennbergi*), south polar (*C. maccormicki*) and hybrid skuas are known to occur annually.

Until recently, Biscoe Point was on a peninsula joined to Anvers Island by an ice ramp extending from the adjacent glacier. The ice ramp disappeared as the glacier retreated, and a narrow channel now separates Anvers Island from the island on which Biscoe Point lies. The original boundary of the Area was of geometric shape

and extended to include a separate ice-free promontory 300 m to the north of this island, and also included the intervening marine environment.

The Area is now defined to include all land above the low tide water level of the main island on which Biscoe Point is situated (0.53 km2), all offshore islets and rocks within 100 m of the shore of the main island, and most of the predominantly ice-free promontory 300 m to the north (0.1 km2). The marine component has now been excluded from the Area because of the lack of information on its values. The Area in total is now approximately 0.63 km2.

In summary, the Area at Biscoe Point therefore has high value for its outstanding:

- examples of vegetation communities, soils and associated terrestrial ecology;
- ornithological interest, with several of the resident breeding bird species and associated paleoecological features possessing unusual properties, and which are the subject of long-term studies; and
- utility as a reference site for comparative studies and monitoring.

In order to protect the values of the Area, it is important that visitation continue to remain low and be carefully managed.

2. Aims and Objectives

Management at Biscoe Point aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance and sampling in the Area;
- allow scientific research on the ecosystem and physical environment associated with the values for which the Area is protected, while ensuring protection from over-sampling;
- 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;
- minimize the possibility of introduction of alien plants, animals and microbes to the Area;
- allow visits for management purposes in support of the aims of the management plan.

3. Management activities

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

- Signs showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and copies of this management plan, including maps of the Area, shall be made available at Palmer Station (US) on Anvers Island and at Yelcho Station (Chile) on Doumer Island.

- 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 (at least once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA No. 139 Biscoe Point, in The context of ASMA No. 7 SW Anvers Island and Palmer Basin, showing the location of nearby stations (Palmer Station, US; Yelcho Station, Chile; and Port Lockroy, UK), and the location of nearby protected areas. Projection Lambert Conformal Conic: Standard parallels: 1st 64° 45' S; 2nd 65° 00' S; Central Meridian: 64° 06' W; Latitude of Origin: 63° 45' S, Spheroid WGS84, Data source SCAR Antarctic Digital Database V4.1. Inset: the location of Anvers Island and the Palmer Archipelago in relation to the Antarctic Peninsula.

Map 2: ASPA No. 139 Biscoe Point: Physical features, boundaries and access guidelines. Map specifications: Projection: Lambert Conformal Conic: Standard parallels: 1st 64° 48' S; 2nd 64° 50' S; Central Meridian: 63° 46' W; Latitude of Origin: 63° 48' S; Spheroid: WGS84; Vertical datum: mean sea level; Horizontal Datum: USGS BIS1 (1999); Contour interval: 5 m. The coastline of the island on which Biscoe Point lies is derived from USGS digital orthophotography with a horizontal and vertical accuracy of ± 2 m (Sanchez and Fraser, 2001). The peninsula to the north of Biscoe Point, several offshore islands and Anvers Island are beyond the limits of this orthophotograph. These features are digitized from an orthophotograph covering the wider area (ERA, 2010) and are estimated as accurate to ±1 m.

Map 3: Biscoe Point, ASPA No. 139: Penguin colonies, approximate vegetation extent, and known contaminated sites. Map specifications as for Map 2.

6. Description of the Area

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

General description

Biscoe Point (64°48'47" S, 63°47'41" W) is at the western extremity of a small island (0.53 km2), located close to the southern coast of Anvers Island (2700 km2) about 6 km south of Mount William (1515 m), in the region west of the Antarctic Peninsula known as the Palmer Archipelago (Map 1). Until recently, this island was joined to Anvers Island by an ice ramp extending from the adjacent southward-flowing glacier, and many maps (now incorrectly) show Biscoe Point as lying on a peninsula. A narrow, permanent, marine channel of approximately 50 m in width now separates the island on which Biscoe Point lies from Anvers Island. This mostly ice-free island lies south-east of Biscoe Bay and to the north of Bismarck Strait. A smaller extent of mostly ice-free land about 300 m to the north remains joined as a peninsula to Anvers Island by an ice ramp.

The island on which Biscoe Point lies is approximately 1.8 km long in an east-west direction and of up to about 450 m in width (Map 2). Topography consists of a series of low-lying hills, with the main east-west oriented ridge rising to a maximum altitude of about 24 m. A small ice cap (0.03 km2) previously rising to 12 m at the eastern end of the island no longer exists and has wasted to a series of small snow patches. The coastline is irregular and generally rocky, studded by offshore islets and rocks, and pitted by numerous bays. A number of the more sheltered bays harbor gentle and accessible gravel beaches. The unnamed promontory to the north is approximately 750 m in length (east-west) by 150 m wide and is of similar character, although of lower topography.

Palmer Station (US) is located 13.8 km north-west of the Area at Arthur Harbor, Yelcho Station (Chile) is located approximately 12 km to the southeast at Doumer Island, while ‘Base A’ (UK, Historic Site No. 61) is located at Port Lockroy, Goudier Island (off Wiencke Island) approximately 13 km to the east (Map 1).

Boundaries

The original boundary of the Area was of geometric shape to include the land associated with Biscoe Point, the separate ice-free promontory 300 m to the north, and also the intervening islands and marine environment. A recent detailed review revealed little information to substantiate special values associated with the local marine environment. The marine area is not the subject of current or planned scientific studies, nor is it being subjected to specific pressures or threats requiring management. For these reasons, the boundary has been revised to exclude the marine environment.

The Area is now defined to include all land above the low tide water level of the main island on which Biscoe Point is situated (0.53 km2), all offshore islets and rocks within 100 m of the shore of this main island, and most of the predominantly ice-free

promontory 300 m to the north (0.1 km2) (Map 2). The landward (eastern) boundary on the northern promontory bisects the peninsula at the point where it protrudes from Anvers Island, distinguished by a small bay cutting into the glacier in the south and a similar, although less pronounced, coastline feature in the north. The total area including the main island and the northern promontory is approximately 0.63 km2.

Climate

No meteorological data are available for Biscoe Point, although data are available for Palmer Station (US), where conditions are expected to be broadly similar. Monthly air temperature averages recorded for Palmer Station over a 22-year period range from -7.8°C in August (the coldest month) to 2.5°C in January (the warmest) (Baker, 1996). The minimum recorded temperature is -31°C and the maximum is 9°C, while the annual mean is -2.3°C. During the same period, the average annual precipitation was 75cm and snowfall averaged 387 cm. Storms and precipitation at Palmer Station are frequent, with winds being persistent but generally light to moderate in strength, prevailing from the northeast.

Cloud cover is frequently extensive, often with a ceiling of less than 300 m. While these broad patterns are expected to be reflected at Biscoe Point, the Area is in a more exposed position that is open to weather particularly from the west and south, which may result in some minor climatic differences.

Geology and Soils

Specific descriptions are not available of the geology of island on which Biscoe Point lies, or of the peninsula to the north. However, the bedrock appears to be composed mainly of gabbros and adamellites of Late Cretaceous to Early Tertiary age belonging to the Andean Intrusive Suite, which dominate the composition of southeastern Anvers Island (Hooper, 1958). Gabbro is a dark, coarse-grained plutonic rock that is mineralogically similar to basalt, and which is composed mainly of calcium-rich plagioclase feldspar and pyroxene. Adamellite is a granitic rock composed of 10-50% quartz and which contains plagioclase feldspar. A fine mineral soil is present on the gentle terrain, although precise soil characteristics have yet to be described. A relatively well-developed, loamy soil is associated with the closed swards of Deschampsia. Cores extracted in the south of the island, close to the Adélie penguin colony, consisted of an organic horizon, overlying a sandy loam glacial drift or bedrock (Day et al. 2009).

Freshwater Habitat

A number of small seasonal streams and ponds are present on the island on which Biscoe Point lies, although they have not been scientifically described. A small pond (perhaps the largest, at approximately 30 m x 8 m) and stream occur in a valley on the southern side of the principal ridge of the island, 50 m NE of the southern small boat landing site (Map 2).

The presence of a long rubber hose suggests that at one time visitors may have collected fresh water from this site. The hose was removed in 2009-10 and disposed of at Palmer Station. Another freshwater pond of similar size (approximately 25 m x 6 m) is found in the prominent east-west trending valley on the northern side of the island. A small associated stream drains this pond to the west. The freshwater environment has thus far escaped significant disturbance from seals. Information on the hydrology of the separate promontory to the north is not available.

Vegetation

The most significant aspect of the vegetation at Biscoe Point is the abundance and reproductive success of the two native Antarctic flowering plants, the Antarctic hair grass Deschampsia antarctica and Antarctic pearlwort Colobanthus quitensis. The communities of D. antarctica and C. quitensis at Biscoe Point are the most extensive in the Anvers Island vicinity and are considered particularly abundant for such a southerly location (Greene and Holtom 1971; Komárková 1983, 1984; Komárková, Poncet and Poncet 1985). The first observation of C. quitensis growing south of 60°S was made near Biscoe Point, recorded (as C. crassifolius) by the biologist Turquet on Jean-Baptiste Charcot's Expédition Antarctiques Française (1903-05). More recently, seeds from both flowering plants within the Area have been collected for propagation in studies on the effects of climate change and UV-B exposure on these species being conducted out of Palmer Station (Day, pers. comm., 1999; Xiong, 2000). In January 2004, cores of plant material and soils were collected from Biscoe Point and were used in multi-year experiments into the tundra ecosystem. The cores were used in combination with precipitation and surface runoff samples to measure pools and fluxes of carbon and nitrogen within the Biscoe Point ecosystem and to evaluate the role of nitrogen inputs from the nearby penguin colony (Park et al., 2007). Cores were also used in climate manipulation experiments at Palmer Station, which investigated the influence of increased temperature and precipitation on plant productivity and the abundance of the springtail Cryptopygus (Day et al., 2009).

The abundance of D. antarctica and C. quitensis is much greater than previously described, and almost half of the island on which Biscoe Point lies, and much of the ice-free area of the peninsula to the north, possess significant stands of these species and a wide range of bryophytes and lichens. The approximate distribution of the most substantial stands of vegetation on the main island has been estimated from air and ground photography (Map 3). The distribution illustrated in Map 3 is intended as a general guide to the main areas of vegetation cover, rather than as a definitive description, and is not based on a precise ground survey. However, it does serve to indicate the scale of the vegetated communities, which comprise a discontinuous cover of varied composition and density over an area of approximately 250,000 m2. Komárková (1983) noted a discontinuous stand of D. antarctica and C. quitensis reaching approximately 5000 m2 on the main island. One particularly extensive stand of mosses in the principal valley on the northern side of the main island extends almost continuously for 240 m along the valley floor, occupying an area of approximately 8000 m2 (Harris, 2001). Stands of lesser extent are present elsewhere on the island and on the separate promontory 300 m to the north. Colonization has been observed occurring on recently deglaciated material.

Mosses tend to dominate on valley floors, close to streams and ponds, and in moist depressions. Mosses specifically recorded at Biscoe Point include Bryum pseudotriquetrum and Sanionia uncinata (Park et al., 2007). On valley sides, mixed communities of moss and C. quitensis are frequent on lower north-facing slopes, with an increasing prevalence of D. antarctica with elevation. Mixed D. antarctica and C. quitensis communities are particularly prolific on northern slopes between 10-20 m, while D. antarctica tends to be more frequent on the higher exposed sites above 20 m. Mosses and lichens are frequently co-dominants or subordinate taxa. In some habitats C. quitensis may occur in small patches alone. Plant communities are commonly found on snow-free benches below the ridgelines on which Adélie (*Pygoscelis adeliae*) and Gentoo (*Pygoscelis papua*) penguins nest (Park and Day, 2007).Patches of dead vascular plants of up to 20m2 have been observed within the Area, believed to result from the effects of desiccation, flooding and frost during some summers (Komárková, Poncet and Poncet 1985).

Unlike many other low-lying coastal sites in the region, the vegetation at Biscoe Point does not appear to have been severely affected by the recent substantial increase in numbers of Antarctic fur seals (*Arctocephalus gazella*). As such, the Area has been identified as a potential control site for assessing Antarctic fur seal impacts on vegetation and soil (Day, pers. comm., 1999).

Invertebrates, Bacteria and Fungi

The apterous midge Belgica antarctica has been observed associated with the well-developed loam and closed swards of grass. Cores collected at Biscoe Point contained several species of microarthropod, including several species or genera of Acrai, one species of Diptera and three species of Collembola. The springtail Cryptopygus antarcticus was the most abundant microarthropod (Day et al., 2009) No further information is available on the invertebrate assemblages in the Area, although in view of the well-developed plant communities a rich invertebrate fauna might be expected. There is no information available on local bacterial or fungal communities.

Breeding Birds and Mammals

At least six species of birds breed on the island on which Biscoe Point lies. The most numerous colony is of Adélie penguins (*Pygoscelis adeliae*), located on the ridge of a promontory on the south side of the island, above a narrow cove on the southern coast (Map 3). A Gentoo penguin (*Pygoscelis papua*) colony was discovered on slopes on the northern side of this cove, on the southern side of the main island ridge, in 1992-93 (Fraser, pers. comm., 1999) (Map 3) and Gentoo numbers have increased significantly in recent years with 2401 breeding pairs in the 2009-10 season (Patterson-Fraser, pers. comm., 2010). Data on numbers of breeding pairs are presented in Table 1.

Table 1. Numbers of breeding Adélie (*Pygoscelis adeliae*) and Gentoo (*Pygoscelis papua*) penguins on the island on which Biscoe Point lies 1971-2002.

Year	*Pygoscelis adeliae*			*Pygoscelis papua*		
	Breeding Pairs	**Count Type[1]**	**Source**	**Breeding Pairs**	**Count Type[1]**	**Source**
1971-72	3020	N3	2	0	N3	2
1983-84	3440	C3	3	0	C3	3
1984-85	2754	N1	3	0	N1	3
1986-87	3000	N4	4			
…						
1994-95				14	N1	5
1995-96				33	N1	5
1996-97	1801	N1	5	45	N1	5
1997-98				56	N1	5
1998-99				26	N1	5
1999-2000	1665	N1	5	149	N1	5
2000-01	1335	N1	5	296	N1	5
2001-02	692	N1	5	288	N1	5
2002-03	1025	N1	5	639	N1	5
2009-10	594	N1	6	2401	N1	6

1. N = Nest, C = Chick, A = Adults; 1 = < ± 5%, 2 = ± 5-10%, 3 = ± 10-15%, 4 = ± 25-50% (classification after Woehler, 1993)
2. Müller-Schwarze and Müller-Schwarze, 1975
3. Parmelee and Parmelee, 1987
4. Poncet and Poncet 1987 (note: the number of 3500 given in Woehler (1993) appears to be in error).
5. Fraser data supplied February 2003, based on multiple published and unpublished sources.
6. Patterson-Fraser data supplied March 2010 based on census at time of peak egg presence.

The Adélie colonies are some of the oldest in the region (more than 700 years), and have been the subject of paleoecological studies (Emslie, 2001), while the Gentoo colony is considered particularly interesting because it has been recently established (Fraser, pers. comm., 1999). Long-term studies are being conducted on the population structure and dynamics of the penguin colonies within the Area, which make a useful comparison with other colonies in Arthur Harbor that are subjected to higher levels of human influence (Fraser, pers. comm., 1999). The number of Adélie breeding pairs at Biscoe Point has declined from a high of around 3000-3500 in the 1980s to less than 600 in the most recent count made in 2009-10 (Patterson-Fraser pers. comm. 2010).

South Polar skuas (*Catharacta maccormicki*) and Brown skuas (*C. loennbergi*) breed within the Area annually, and hybrids also occur. On the island on which Biscoe Point lies, 132 pairs of South Polar skuas and one pair of Brown skuas were counted on 26-27 February 2001 (Harris, 2001). Concurrently, 15 pairs of South Polar skuas, usually with one or two chicks, were counted on the promontory 300 m to the north. Kelp gulls (*Larus dominicanus*) and Antarctic terns (*Sterna vittata*) breed within the Area (Fraser, pers. comm., 2000), although data on numbers are not available.

Information on other bird species that breed within the Area, or that transiently visit, is not available. Small numbers of non-breeding Antarctic Fur seals (*Arctocephalus gazella*) (several counted on the island in late-February 2001 – Harris, 2001), Weddell seals (*Leptonychotes weddellii*) and Southern Elephant seals (*Mirounga leonina*) have been observed on beaches in summer. Despite the presence of beaches and terrain suitable for haul-out, relatively few seals are typically observed within the Area. This may be a result of the observed frequent persistence of dense brash ice originating from glaciers calving from nearby Anvers Island (Fraser, pers. comm., 1999). Further information on numbers and breeding status, or on other seal species, is not available. No information is available on the local marine environment.

Human Activities and Impact

Human activity within the Area appears to have been minimal, but few details have been recorded. The first documented human activity in the vicinity of Biscoe Point occurred over 150 years ago, when John Biscoe, Royal Navy, entered the bay now named after him on 21 February 1832. Biscoe recorded a landing on Anvers Island, probably near Biscoe Point, to take formal possession for the United Kingdom of what he believed to be part of the mainland of Antarctica (Hattersley-Smith, 1991). The next recorded visit to Biscoe Point was in 1903-05, when Turquet made observations of C. quitensis at the site on the Première Expédition Antarctiques Française led by Charcot.

More recently, formal plots for plant studies were established on the island near Biscoe Point in 1982 (Komárková, 1983), although the long-term research originally planned was discontinued soon thereafter. Komárková used welding rods inserted into the soil to mark study sites. A partial survey accurately mapped the positions (± 2 m) of 44 welding rods found in soils and vegetation during a systematic search made on the northeastern side of the island in February 2001 (Map 3) (Harris, 2001). The rods were located in an area of some of the richest vegetation on the island, and distributed over an area of at least 8000 m2. In general, they had been inserted into soil or vegetation with chemically coated ends downwards. Contaminants from the rods appeared to kill all vegetation up to 20 cm from where the rods lay. Numerous rods have been found in previous seasons, possibly numbering in the hundreds (Fraser, Patterson, Day: pers. comms., 1999-2002). Additional welding rods were found on and near the beach during the 2009-10 season, which were collected and disposed of at Palmer Station (Patterson-Fraser, pers. comm., 2010). The Area is not considered suitable as a reference site for measuring chemical contamination, because there remains uncertainty over contaminant types and concentrations, which sites have been affected, and the extent to which contaminants may have moved through soil, water and biological systems.

Fraser (pers. comm., 2001) also reported markers made of lead present in the Gentoo colony. In addition, seaborne litter (mostly wood) may be found on beaches, and there remains a rubber hose (15 m long, ~15 cm diameter) in a small valley near the southern small boat landing site, which may once have been used for water supply purposes.

Recent scientific studies within the Area have focused on monitoring the breeding status of penguins and skuas. The Area has also been used for the collection of seeds of Deschampsia and Colobanthus and cores of soil and plant material for ecological research in the Palmer Station region. Permits have been required to visit the Area since the site was specially protected in 1985.

6(ii) Access to the Area

Access to the Area may be made by small boat, by aircraft or across sea ice by vehicle or on foot. The seasonal cycle of sea ice formation in the Palmer area is highly variable, with sea ice formation beginning between March and May. For the period 1979 to 2004, the seasonal duration of sea ice in the Palmer area varied between five and 12 months (Stammerjohn et al., 2008).

Aircraft access restrictions to the Area apply for the period 01 October to 15 April inclusive. During this time, helicopters may land at either of the two designated landing sites (Map 2). Landing site (A) is located on the northern coast of the main island on which Biscoe Point lies (64°48'35" S, 63°46'49" W). Landing site (B) is situated on the promontory 300 m north of the main island and is on the permanent snow slope approximately 50-100 m east of the icefree ground (64°48'22" S, 63°46'24" W). Helicopter access to the Area should be within the Helicopter Access Zone.

The zone allows helicopter access from two main directions: from the north and west, from the region of Biscoe Bay towards landing site (A) and from the north and east, across the Anvers Island coastline towards landing site (B).

When access to the Area is made by sea, two landing sites are recommended although small boats may land anywhere within the Area. The first recommended landing site is located on the southern coast of the island, on the beach on the northern shore of the elongated cove (Map 2) and is the site most likely to be free of sea ice. The second recommended landing site is on the beach in the small cove mid-way along the northern coast of the island and is adjacent to the designated camp and helicopter landing sites. Dense brash ice is frequently found in the vicinity of the island and originates from calving glaciers on Anvers Island.

When sea ice conditions allow, the Area may be accessed over sea ice on foot or by vehicle. However, movement within the Area is by foot only and vehicles may not be taken onto land within the Area. Persons entering the Area may not move beyond the immediate vicinity of their landing site unless specifically authorised by Permit.

6(iii) Restricted and managed zones within the Area

A Helicopter Access Zone (Maps 2 and 3) has been defined within the Management Plan for Antarctic Specially Managed Area No. 7, which applies to aircraft accessing the designated landing sites within the Area. The Helicopter Access Zone extends in northwesterly and northeasterly directions from the designated landing sites out to a

distance of 2000 feet (610 m) from the edges of known bird colony breeding locations within the Area.

6(iv) Structures within and near the Area

No structures or instruments are known to be present within the Area. A permanent survey marker, consisting of a 5/8" stainless steel threaded rod, was installed on the island on which Biscoe Point lies by the USGS on 31 January 1999. The marker is located at 64°48'40.12"S, 63°46'26.42"W at an elevation of 23 m (Maps 2 & 3). It is sited approximately midway along the principal ridgeline of the island, about 100 m north of the southern small boat landing site. The marker is set in bedrock and marked by a red plastic survey cap.

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

The nearest protected areas to Biscoe Point are: Litchfield Island (ASPA No. 113) which is 16 km west of the Area in Arthur Harbor; South Bay (ASPA No. 146), which is approximately 12 km to the southeast at Doumer Island; and Eastern Dallmann Bay (ASPA No. 153) which is approximately 85 km to the northeast, adjacent to Brabant Island (Map 1).

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 for scientific purposes, or for educational purposes that cannot be served elsewhere, or for essential management purposes consistent with plan objectives such as inspection, maintenance overview;
- the actions permitted will not jeopardize the ecological, scientific, or educational 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 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 aircraft, or over sea ice by vehicle or on foot.

Boat access

The recommended landing sites for small boats are at either of the following locations (Maps 2&3):

1) on the beach on the northern shore of the elongated cove on the southern coast of the island, which is the site most likely to be free of sea ice;

2) on the beach in the small cove mid-way along the northern coast of the island, adjacent to the designated camp and helicopter landing sites.

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.

Aircraft access and overflight

Restrictions on aircraft operations apply during the period between 01 October and 15 April inclusive, when aircraft shall operate and land within the Area according to strict observance of the following conditions:

1) Overflight of the Area below 2000 ft (~610 m) is prohibited outside of the Helicopter Access Zone (Map 2), except when specifically permitted for purposes allowed for by the Management Plan. It is recommended that aircraft maintain a 2000 ft (~610 m) horizontal separation distance from the edges of bird colonies breeding within the Area as shown in Map 2, unless accessing the designated landing sites through the Helicopter Access Zone;

2) Helicopter landing is permitted at two designated sites (Map 2), the first (A) on the main island on which Biscoe Point lies, and the second (B) on the separate promontory 300 m further to the north. The landing sites with their coordinates are described as follows:

   (A) on beach gravels a few meters above sea level 35 m east of the beach on the eastern shore of a small cove on the northern coast of the island (64°48'35" S, 63°46'49" W). A small tidal pool of about 25 m in diameter is located 30 m east of the landing site; and

   (B) on the lower (western) slopes of a permanent snow / ice ramp extending from Anvers Island towards the northern promontory at a site approximately 50-100 m east of the ice-free ground (64°48'22" S, 63°46'24" W). Care should be exercised on this snow slope, which is likely to becrevassed further towards the east and up-slope on Anvers Island.

3) Aircraft landing within the Area should approach within the Helicopter Access Zone to the maximum extent practicable. The Helicopter Access Zone allows access from the north and west, from the region of Biscoe Bay, to landing site (A), and from the north and east to landing site (B) (Map 2). The Helicopter Access Zone extends over the open water between landing sites (A) and (B).

4) 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

When access over sea ice is viable, there are no special restrictions on the locations where such access may be made, although vehicles are prohibited from being taken on land within the Area.

Foot access and movement within the Area

Movement on land within the Area shall be on foot. All people in aircraft, boats, or vehicles are prohibited from moving on foot beyond the immediate vicinity of their landing site 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. Pedestrians should walk around the penguin colonies and should not enter sub-groups of nesting penguins unless required for research or management purposes. Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects.

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 ecosystem or values of the Area;
- Essential management activities, including monitoring;
- Activities with educational aims (such as documentary reporting (photographic, audio or written) or the production of educational resources or services) that cannot be served elsewhere.
- The appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

7(iii) Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a permit and, with the exception of permanent survey markers and signs, permanent structures or installations are prohibited;

All structures, scientific equipment or markers installed in the Area must be authorized by permit and clearly identified by country, name of the principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area;

Installation (including site selection), maintenance, modification or removal of structures shall be undertaken in a manner that minimizes disturbance to flora and fauna.

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

7(iv) Location of field camps

Temporary camping is allowed within the Area at the designated site located approximately 50 m north-east of helicopter landing site (A), on the northern coast of the main island on which Biscoe Point lies. The camp site is located on beach gravels and rocky ground a few meters above sea level, immediately north of a transient tidal pool, and is separated from the sea further to the north by a low rocky ridge of about 8 m. When necessary for essential purposes specified in the Permit, temporary camping is allowed on the separate peninsula 300 m to the north, although a specific camping site has not been determined. Camping on surfaces with significant vegetation cover is prohibited.

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

No living animals, plant material, microorganisms or soils shall be deliberately introduced into the Area, and the precautions listed below shall be taken against accidental introductions;

To help maintain the ecological and scientific values at Biscoe Point visitors shall take special precautions against introductions. Of concern are pathogenic, microbial, invertebrate or plant introductions sourced from other Antarctic sites, including stations, or from regions outside Antarctica. Visitors shall ensure that sampling equipment and markers brought into the Area are clean. To the maximum extent practicable, footwear and other equipment used or brought into the area (including backpacks, carry-bags and tents) shall be thoroughly cleaned before entering the Area;

In view of the presence of breeding birds at Biscoe Point, no poultry products, including products containing uncooked dried eggs, including wastes from such products, shall be released into the Area;

No herbicides or pesticides shall be brought into the Area;

Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be

removed from the Area at or before the conclusion of the activity for which the permit was granted;

Fuel, food, and other materials are not to be stored in the Area, unless required for essential purposes connected with the activity for which the permit has been granted; All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is 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 of native flora and fauna is prohibited, except in accordance with a separate permit issued under Article 3 of Annex II by the appropriate national authority specifically for that purpose.

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

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

Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorized, may be removed from any part of the Area, unless the impact of removal is likely to be greater than leaving the material in situ. If this is the case the appropriate authority should be notified.

The appropriate national authority should be notified of any items removed from the Area that were not introduced by the permit holder.

7(viii) Disposal of waste

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

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

1) 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.

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

7(x) Requirements for reports

Parties should ensure that the principal holder of each permit issued submit to the appropriate authority a report describing the activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form contained in Appendix 4 of Resolution 2 (1998)(CEP I).

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 originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the Management Plan and in organizing the scientific use of the Area.

The appropriate authority should be notified of any activities/measures undertaken, and / or of any materials released and not removed, that were not included in the authorized permit.

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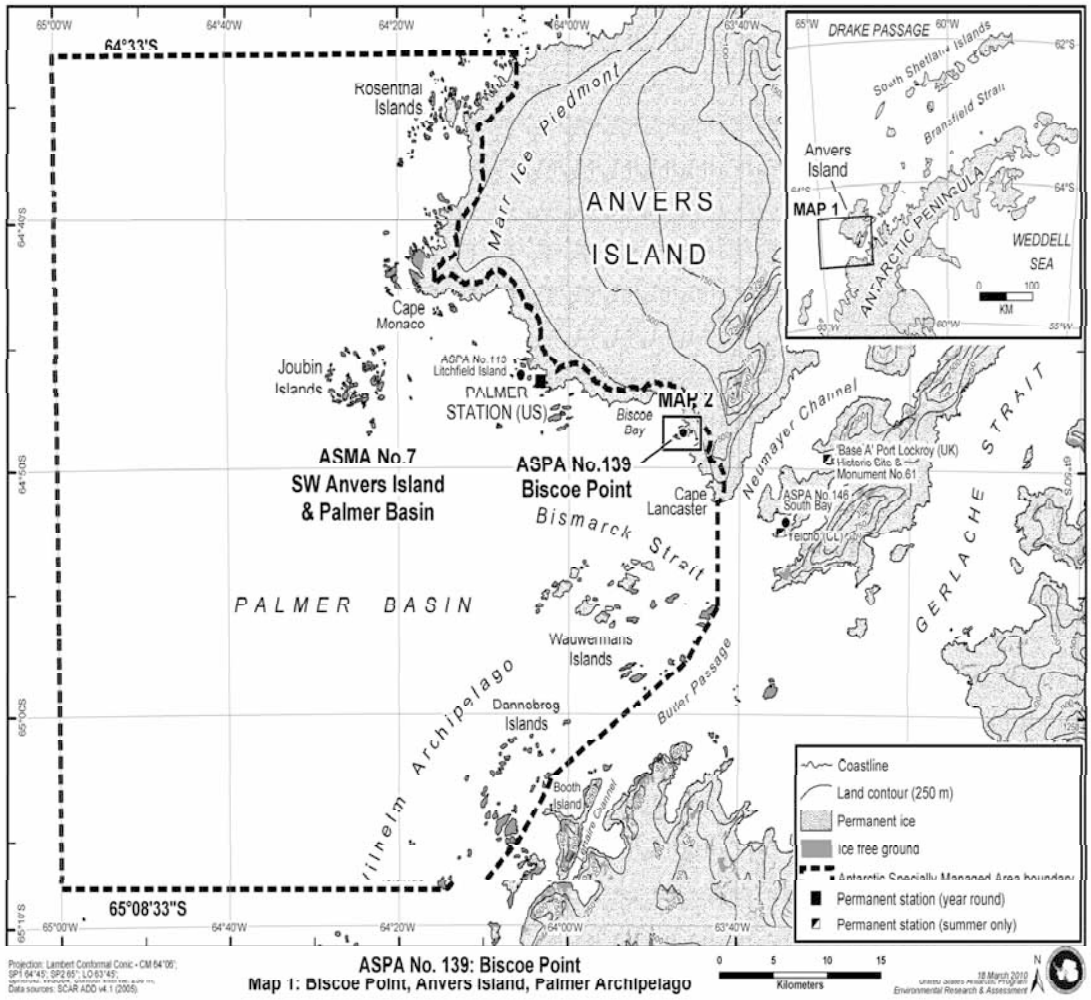
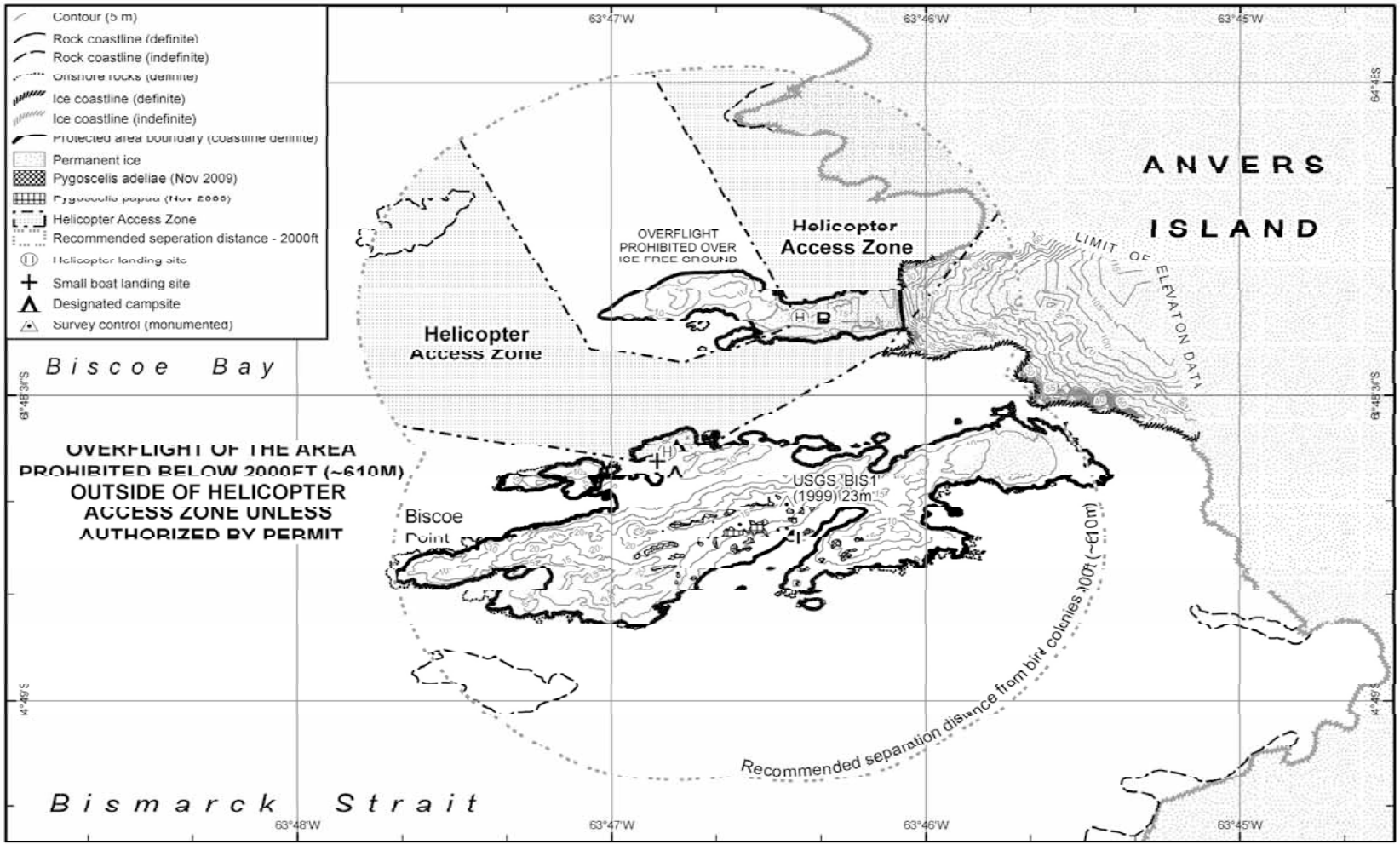

DRAKE PASSAGE
South Shetland Islands
Bransfield Strait
Anvers Island
MAP 1
ANTARCTIC PENINSULA
WEDDELL SEA
ANVERS ISLAND
Mar Ice Piedmont
Rosenthal Islands
Cape Monaco
Joubin Islands
ASPA No.110 Litchfield Island
PALMER STATION (US)
MAP 2
Biscoe Bay
ASMA No.7
SW Anvers Island & Palmer Basin
ASPA No.139
Biscoe Point
Cape Lancaster
Neumayer Channel
'Base A' Port Lockroy (UK) Historic Site & Monument No.61
ASPA No.146 South Bay
Yelcho (CL)
GERLACHE STRAIT
Bismarck Strait
PALMER BASIN
Wauwermans Islands
Dannebrog Islands
Wilhelm Archipelago
Butler Passage
Booth Island
Penola Channel
65°08'33"S
Coastline
Land contour (250 m)
Permanent ice
Ice free ground
Antarctic Specially Managed Area boundary
Permanent station (year round)
Permanent station (summer only)
Projection: Lambert Conformal Conic - CM 64°05'; SP1 64°45'; SP2 65°; LO 63°45'
Data sources: SCAR ADD v4.1 (2005)
ASPA No. 139: Biscoe Point
Map 1: Biscoe Point, Anvers Island, Palmer Archipelago
0 5 10 15
Kilometers
18 March 2010
United States Antarctic Program
Environmental Research & Assessment

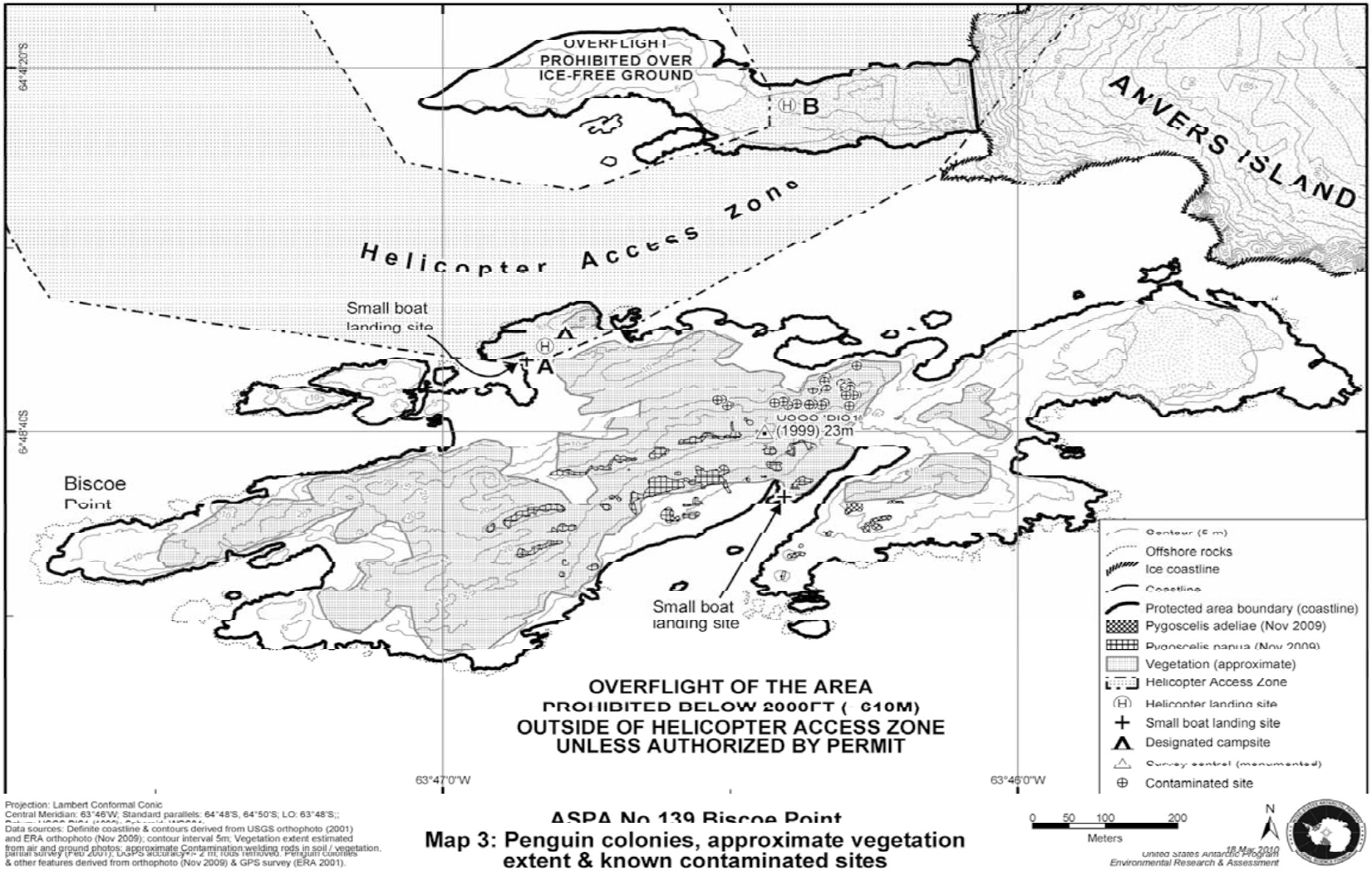


Projection: Lambert Conformal Conic
Central Meridian: 63°46'W, Standard parallels: 64°48'S, 64°50'S; LO: 63°48'S;
Datum: WGS 84, Spheroid: WGS84
Data sources: Definite coastline derived from USGS orthophoto (2001);
Indefinite coastline derived from TMA3208 006V rectified image (1998);
Contours derived from USGS orthophoto (2001), Contour interval 5m;
Penguin colonies & other features derived from orthophoto
(Nov 2009) & GPS survey (ERA 2001).

ASPA No.139 Biscoe Point
Map 2: Topography, features, boundaries & access

Meters

16 May 2010
United States Antarctic Program
Environmental Research & Assessment


OVERFLIGHT
PROHIBITED OVER
ICE-FREE GROUND
B
ANVERS ISLAND
Helicopter Access Zone
Small boat
landing site
A
(1999) 23m
Biscoe
Point
Small boat
landing site
OVERFLIGHT OF THE AREA
OUTSIDE OF HELICOPTER ACCESS ZONE
UNLESS AUTHORIZED BY PERMIT
63°47'0"W
63°46'0"W
Offshore rocks
Ice coastline
Protected area boundary (coastline)
Pygoscelis adeliae (Nov 2009)
Vegetation (approximate)
Helicopter Access Zone
Helicopter landing site
Small boat landing site
Designated campsite
Contaminated site
Projection: Lambert Conformal Conic
Central Meridian: 63°46'W; Standard parallels: 64°48'S, 64°50'S; LO: 63°48'S;;
Data sources: Definite coastline & contours derived from USGS orthophoto (2001)
and ERA orthophoto (Nov 2009); contour interval 5m; Vegetation extent estimated
from air and ground photos; approximate Contamination;welding rods in soil / vegetation.
& other features derived from orthophoto (Nov 2009) & GPS survey (ERA 2001).
ASPA No 139 Biscoe Point
Map 3: Penguin colonies, approximate vegetation
extent & known contaminated sites
0 50 100 200
Meters
N
18 Mar 2010
United States Antarctic Program
Environmental Research & Assessment

Antarctic Specially Protected Area No. 155
(Cape Evans, Ross Island):
Revised Management Plan

The Representatives,

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

Recalling

- Measure 2 (1997), which designated the Cape Evans Historic Site and its environs as Specially Protected Area ("SPA") No. 25 and annexed a Management Plans for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 25 as ASPA 155;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 155;

- Measure 12 (2008), which adopted a revised Management Plan for ASPA 155;

Recalling that Measure 2 (1997) has not become effective and that all Management Plans for the Area ceased to be effective in accordance with Measure 12 (2008);

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 155;

Desiring to replace the existing Management Plan for ASPA 155 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 155 (Cape Evans, Ross Island), which is annexed to this Measure, be approved;

2) the Management Plan for ASPA 155 annexed to Measure 12 (2008) shall cease to be effective; and

3) Measure 2 (1997), which is not yet effective, be withdrawn.

Management Plan For Antarctic Specially Protected Area No. 155

CAPE EVANS, ROSS ISLAND

(including Historic Site and Monument Nos. 16 and 17, the historic Terra Nova hut of Captain Robert Falcon Scott and its precincts and the Cross on Wind Vane Hill)

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 Nos. 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 consists of 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, two anchors from the ship Aurora of the Imperial Trans-Antarctic Expedition, two instrument shelters (one on Wind Vane Hill and the other near the Terra Nova hut), several supply dumps and numerous artefacts are distributed around the site.

Cape Evans is one of the principal sites of early human activity in Antarctica. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, flora and fauna in Antarctica are associated with the Terra Nova Expedition based at this site. The data collected can provide a bench mark against which to compare current measurements. The history of these activities and the contribution they have made to the understanding and awareness of Antarctica therefore contribute to both the historic and scientific value of the site.

A revised version of the Management Plan was adopted by means of Measure 2 (2005) and changes to the access and movement provisions were adopted by means of Measure 12 (2008).

2. Aims and Objectives

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

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the area through planned conservation work which may include:
    a. an annual 'on-site' maintenance programme,
    b. a programme of monitoring the condition of artefacts and structures, and the factors which affect them, and
    c. a programme of 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.
- 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.
- Copies of this Management Plan, including maps of the Area, shall be made available at adjacent operational research/field stations.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Map A: Cape Evans regional map. This map shows the boundaries of the Area with significant topographical features, 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 at 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 centered 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.

Skua (*Catharacta maccormicki*) nest at Cape Evans and Adelie penguins (*Pygoscelis adeliae*) from the colony at Cape Royds may occasionally transit the Area. Weddell seals (*Leptonychotes weddellii*) have also been seen hauled out 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 are prohibited from entering the Area, unless approved to do so for management activities in accordance with 7(i) below. 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 A and B. 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 two anchors from the Aurora, dog skeletons, an instrument shelter, two dog lines, meteorological screen, fuel dump, magnetic hut, coal stores, a flag pole and the experimental rock hut/rubbish dump which is an historic rock structure linked with the 'Worst Journey in the World' to Cape Crozier (1911) containing a small collection of artefacts. A memorial cross to three members of Shackleton's Ross Sea party of 1914-1917 stands on Wind 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 250m to the south west of the Area.

The former Greenpeace year-round World Park Base was sited to the north east of Scott's Terra Nova 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), Cape Royds, and
- ASPA 157 (SPA No. 27), Backdoor Bay, 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 22 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 this Plan;
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Plan; and
- any other activity specifically provided for in 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 1127 per year between 1998 and 2009) 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. Refer to section 6(ii) for recommended approaches and landing sites.

- Vehicles are prohibited from entering the Area except where it is necessary to use vehicles for management activities. This may include, but is not limited to activities such as clearing snow and ice that is judged to be a threat to the historic hut or other artefacts. In all such cases consideration shall be given to:

  i. using the minimum sized vehicle required for the job;

  ii. ensuring the vehicle operator is fully trained and aware of the provisions of this Plan, and of the sensitivities at the site of operation of the vehicle;

  iii. careful planning and monitoring of all vehicle movements within the site so as to avoid damage to either the hut or artefacts buried beneath accumulated snow and ice.

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 and only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the floor;

- 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 and when the maximum number of visitors (12) are in the hut at one time the use of tripods or monopods is prohibited;

- When moving around the sites, take great care not to tread on any items which may be obscured by snow and remain on established walking tracks;

- Use of combustion style lanterns, naked flames or smoking in or around the hut 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 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 in the Area under any circumstances.

- An existing field camp site is associated with the two New Zealand field shelters located 250m south west of the Area and should be used by all parties intending to camp in this area. A second alternative field camp site is located to the north of the Area near the helicopter pad on Home Beach (Map A and B).

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 introduced 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 Management 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.

- Except with respect to any part of, or the contents of, an historic site or monument, samples of soil and other natural materials may be removed for scientific purposes.

Such removal must be 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 the requirements of this Management Plan and ensuring they are 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.

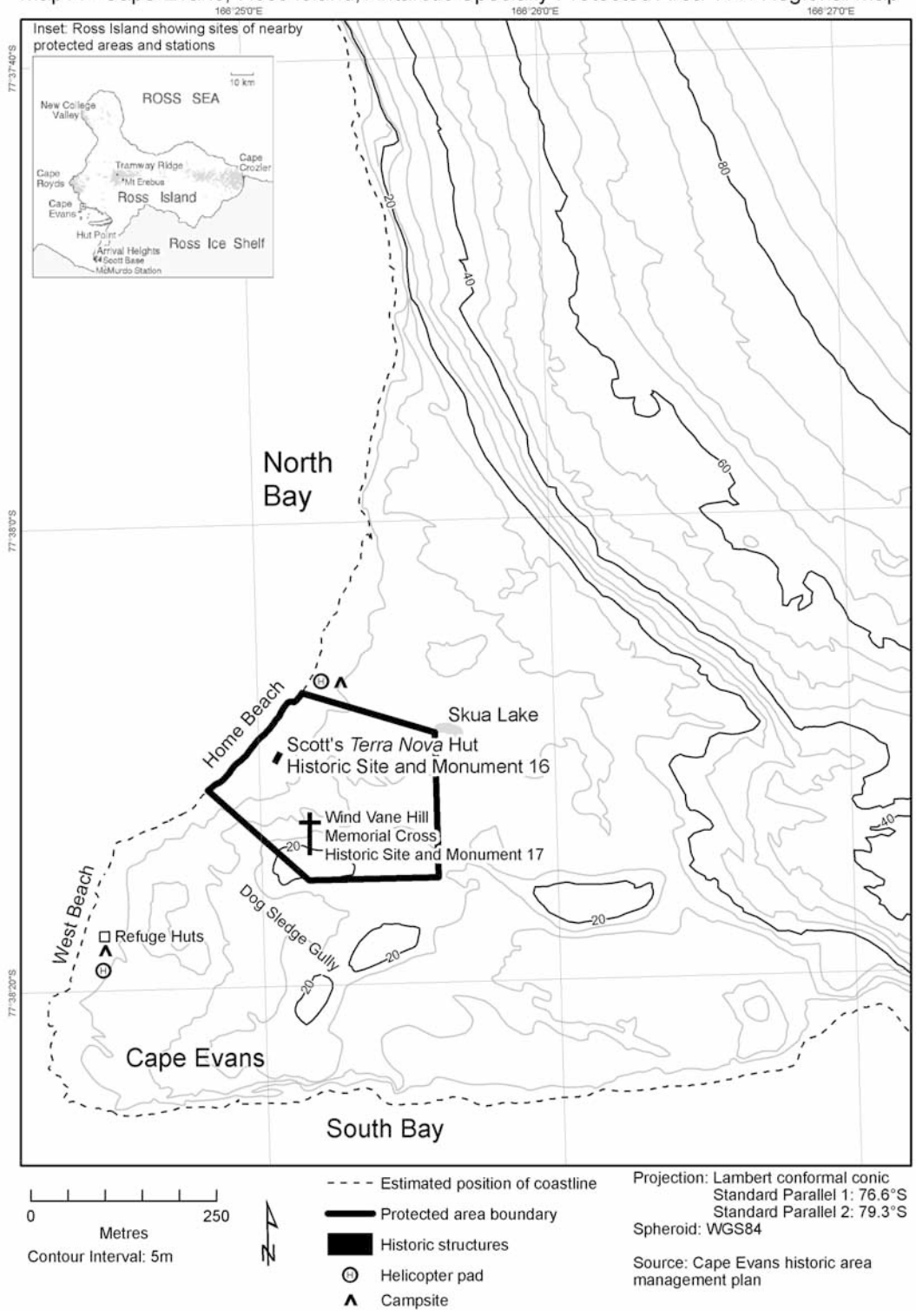
7(x) Requirements for reports

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.

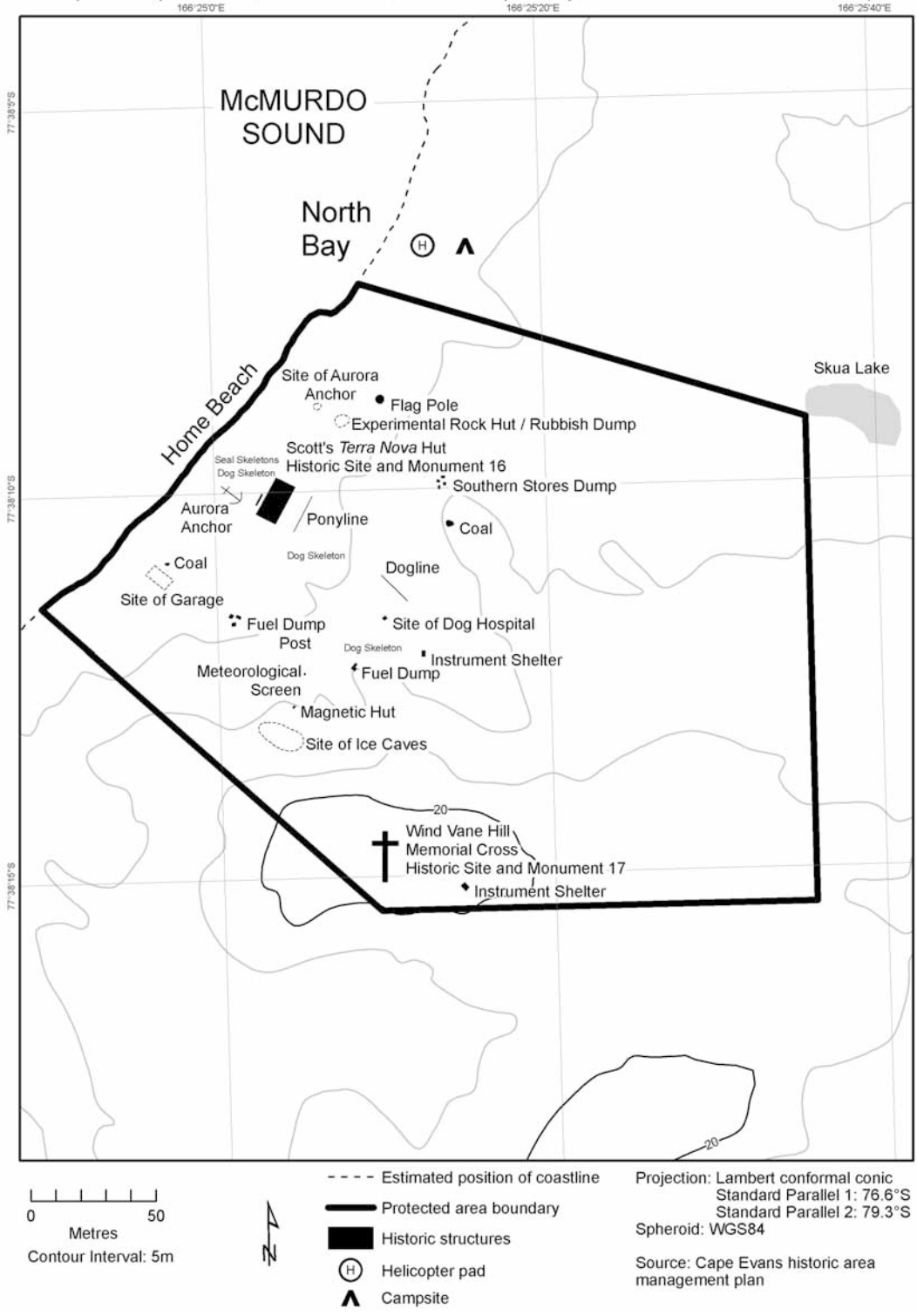
Parties shall maintain a record of activities within the Area and, in the Annual Exchange of Information, shall provide summary descriptions of activities conducted

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, Ross Island, Antarctic Specially Protected Area 155: Regional Map



Map B - Cape Evans, Ross Island, Antarctic Specially Protected Area 155: Site Map



Antarctic Specially Protected Area No. 157
(Backdoor Bay, Cape Royds, Ross Island):
Revised Management Plan

The Representatives,

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

Recalling

- Measure 1 (1998), which designated the Cape Royds site as Specially Protected Area ("SPA") No. 27 and annexed a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 27 as ASPA 157;

- Measure 1 (2002), which adopted a revised Management Plan for ASPA 157;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 157;

Recalling that Measure 1 (1998) has not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 157;

Desiring to replace the existing Management Plan for ASPA 157 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 157 (Backdoor Bay, Cape Royds, Ross Island), which is annexed to this Measure, be approved;

2) the prior Management Plans for ASPA 157, namely those annexed to:

- Measure 1 (2002); and

- Measure 2 (2005);

shall cease to be effective; and

3) Measure 1 (1998), which is not yet effective, be withdrawn.

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 157 in Decision 1 (2002).

The hut (Historic Site and Monument No. 15) on which this Area is centered 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 value.

The Management Plan was reviewed and a revised version with additional visitor management provisions was adopted by means of Measure 2 (2005).

2. Aims and Objectives

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

- avoid degradation of, or substantial risk to, the values of the Area;
- maintain the historic values of the Area through planned conservation work which may include:
    a. an annual 'on-site' maintenance programme,

b. a programme of monitoring the condition of artefacts and structures, and the factors 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; and

- 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.

- Copies of this Management Plan, including maps of the Area, shall be made available at adjacent operational research/field stations.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Map A: Backdoor Bay, Cape Royds regional topographic map. This map shows the location of the Area in relation to ASPA 121 and significant topographic features in the vicinity. Inset 1: shows the location of Ross Island in the Ross Sea region. Inset 2: shows the position of the site in relation to other protected areas on Ross Island.

Map B: Backdoor Bay, Cape Royds area topographic 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 colony. The Area is centered 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.

Skua (*Catharacta maccormicki*) nest in the vicinity of the Area and Adelie penguins (*Pygoscelis adeliae*) from the adjacent colony at Cape Royds often transit the Area.

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 and B). Helicopter landings may be made at the designated landing sites marked on Map B. The primary (and preferred) site is approximately 100 meters north of the Area. A secondary landing site is located 30 meters 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 northwest 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 35 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.

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 Management Plan;
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Management Plan; and
- any other activity specifically provided for in 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: 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 833 per year between 1998 and 2009) suggest that a significant increase could cause significant adverse impacts. The annual maximum 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 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(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 near 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;
- 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 and only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the floor;
- 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 and when the maximum number of visitors (8) are in the hut at one time the use of tripods or monopods is prohibited;
- When moving around the sites, take great care not to tread on any items which may be obscured by snow and remain on established walking tracks;
- Use of combustion style lanterns, naked flames or smoking in or around the hut 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 section 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 are 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 introduced 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 Management 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 Management Plan continue to be met

- The Permit, or an authorised copy, shall be carried within the Area.

- Information on the requirements of this Management 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 (including tourism) shall be supervised by a nominated guide, who is responsible for briefing visitors on the Code of Conduct and the requirements of this Management Plan and ensuring they are complied with.

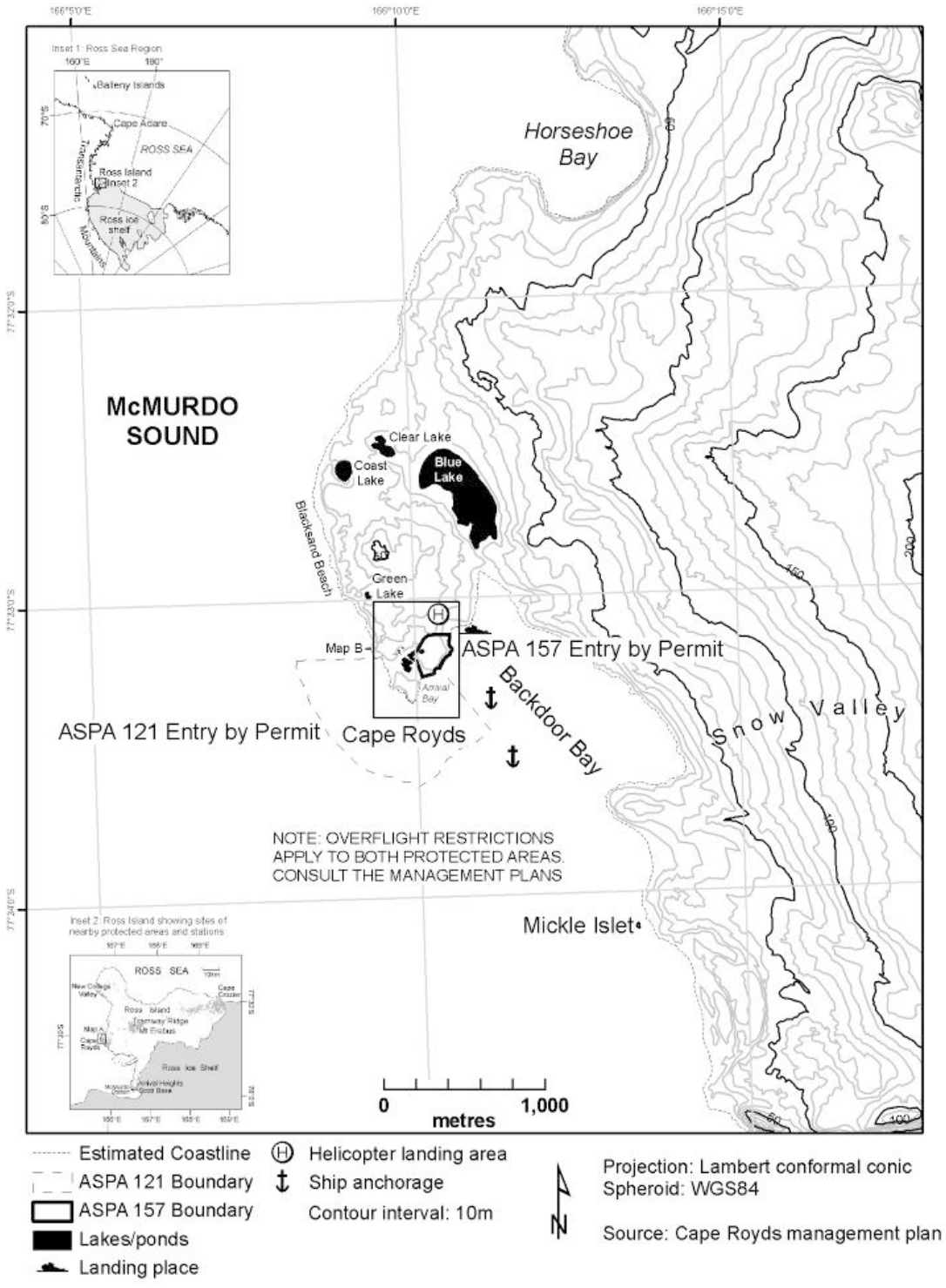
• Parties should consult and coordinate to develop skills and resources, particularly those related to conservation techniques, to assist with the protection of the Area's values.

7(x) Requirements for reports

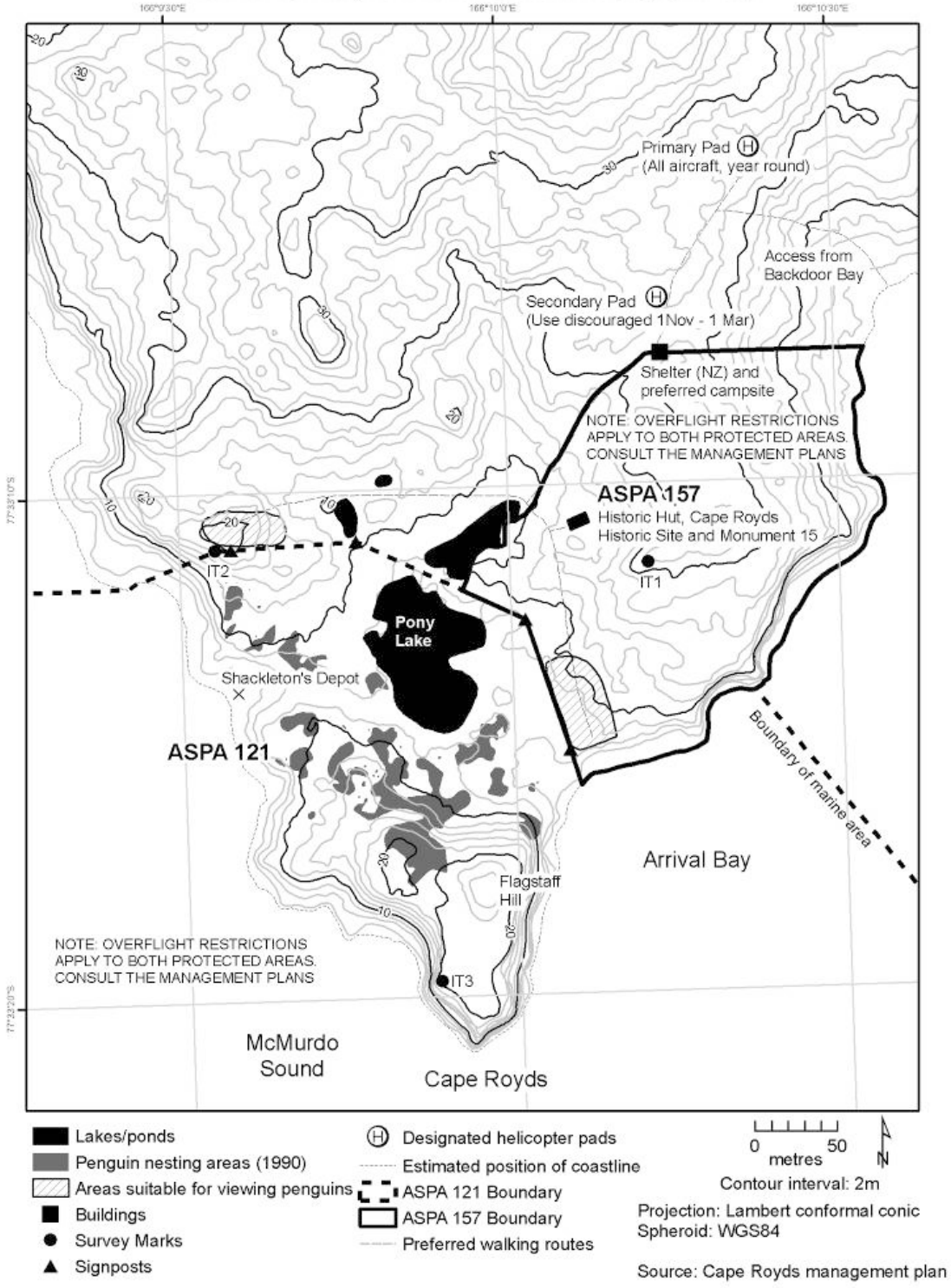
Parties shall ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports shall include, as appropriate, the information identified in the Visit Report Form provided in Appendix 4 of Resolution 2 (1998). In addition, any removal of materials in accordance with section 7(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 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, Antarctic 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



Antarctic Specially Protected Area No. 158
(Hut Point, Ross Island):
Revised Management Plan

The Representatives,

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

Recalling

- Measure 1 (1998), which designated the Hut Point Historic Site as Specially Protected Area ("SPA") No. 28 and annexed a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 28 as ASPA 158;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 158;

Recalling that Measure 1 (1998) has not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 158;

Noting that Measure 9 (2010) withdraws Measure 1 (1998);

Desiring to replace the existing Management Plan for ASPA 158 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 158 (Hut Point, Ross Island), which is annexed to this Measure, be approved; and

2) the Management Plan for ASPA 158 annexed to Measure 2 (2005) shall cease to be effective.

Management Plan For Antarctic Specially Protected Area No. 158

HUT POINT, ROSS ISLAND

(including Historic Site and Monument No. 18, the historic Discovery hut of Captain Robert Falcon Scott)

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 Nimrod 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 verandas 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 value.

The Management Plan was reviewed and a revised version with additional visitor management provisions was adopted by means of Measure 2 (2005).

2. Aims and Objectives

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

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

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

- 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.

- Copies of this Management Plan, including maps of the Area, shall be made available at adjacent operational research/field stations.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Map A: Hut Point regional topographic 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 topographic 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 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 (77° 50'S, 166° 37'E) 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. 18). Historic Site and Monument No. 19, a cross to the memory of George 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) Cape Royds and
- ASPA 157 (SPA No. 28), Backdoor Bay, 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 Management Plan;
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Management Plan; and
- any other activity specifically provided for in 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 requires an annual limit on visitor numbers. The effects of current visitor levels (average 992 per year between 1998 and 2009) suggest that a significant increase could cause significant adverse impacts. The annual maximum number of visitors shall be: 2,000 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 and only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the floor;
- 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 and when the maximum number of visitors (8) are in the hut at one time the use of tripods or monopods is prohibited;
- 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 hut 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 section 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.

7(v) Restrictions on materials and organisms which may be brought into 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 structure or the associated relics.

- All introduced 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 Management 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 Management 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 the requirements of this Management Plan and ensuring it is complied with.

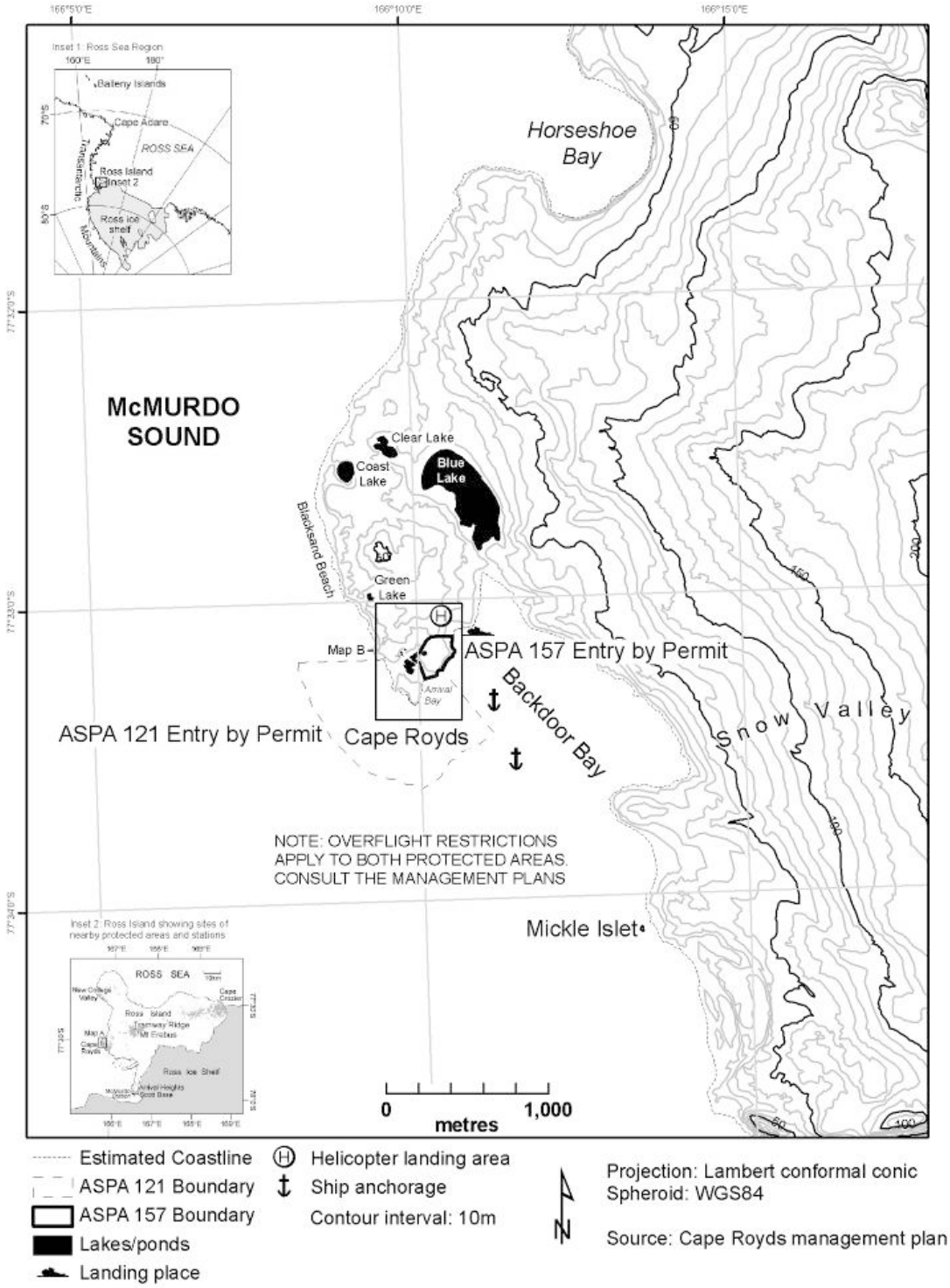
- Parties shall consult and coordinate to develop skills and resources, particularly those related to conservation techniques, to assist with the protection of the Area's values.

7(x) Requirements for reports

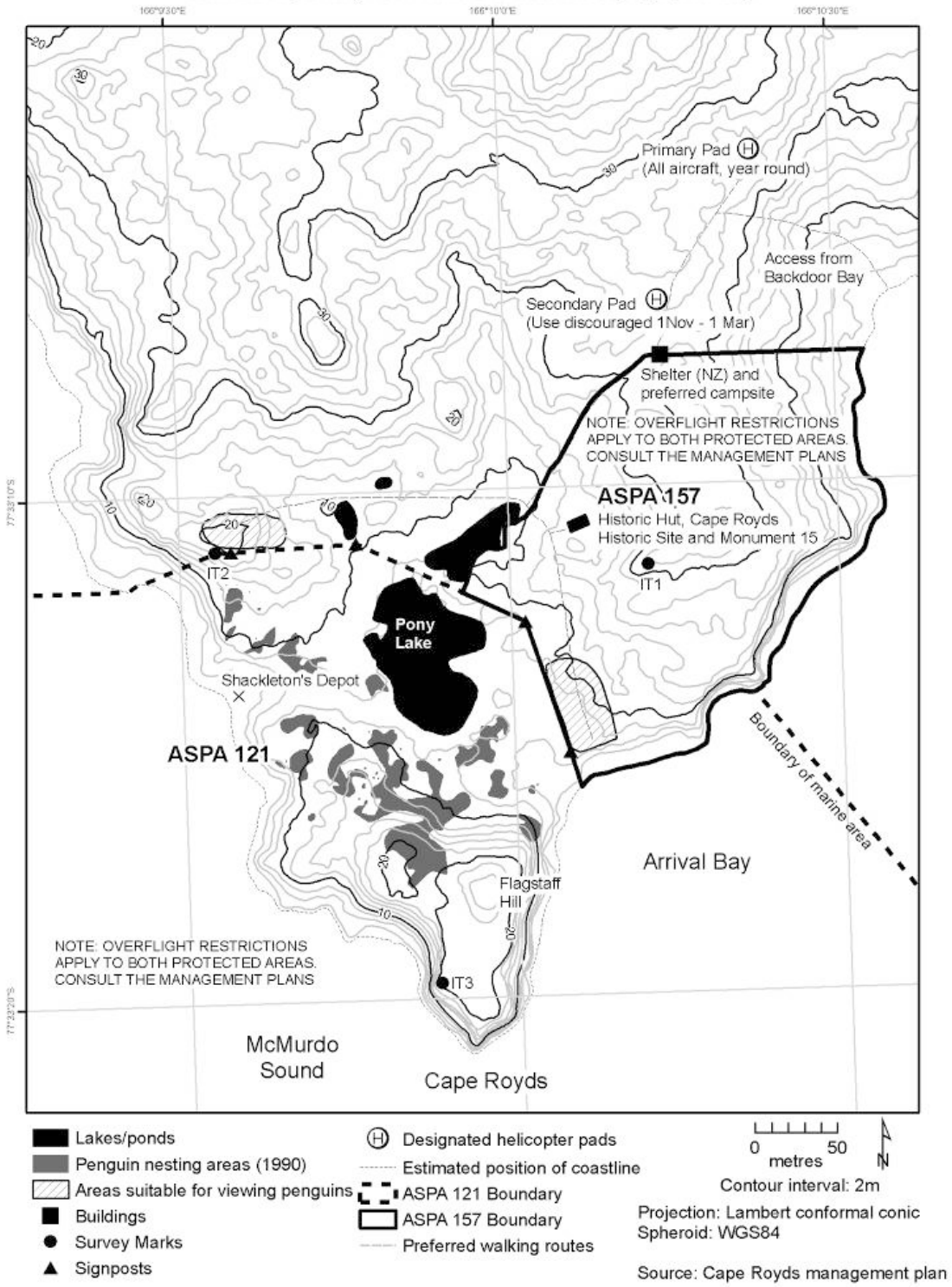
Parties shall ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports shall include, as appropriate, the information identified in the Visit Report Form provided in Appendix 4 of Resolution 2 (1998). In addition,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



Antarctic Specially Protected Area No. 159
(Cape Adare, Borchgrevink Coast):
Revised Management Plan

The Representatives,

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

Recalling

- Measure 1 (1998), which designated the Cape Adare Historic Site and its environs as Specially Protected Area ("SPA") No. 29 and annexed a Management Plan for the Area;

- Decision 1 (2002), which renamed and renumbered SPA 29 as ASPA 159;

- Measure 2 (2005), which adopted a revised Management Plan for ASPA 159;

Recalling that Measure 1 (1998) has not become effective;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 159;

Noting that Measure 9 (2010) withdraws Measure 1 (1998);

Desiring to replace the existing Management Plan for ASPA 159 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 159 (Cape Adare, Borchgrevink Coast), which is annexed to this Measure, be approved; and

2) the Management Plan for ASPA 159 annexed to Measure 2 (2005) shall cease to be effective.

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 159 in Decision 1 (2002).

There are three main structures in the Area. Two huts were built in February 1899 during the British Antarctic Southern Cross Expedition led by Carsten E. Borchgrevink (1898-1900). One hut served as a living hut and the other as a store. They were used for the first winter spent on the Antarctic continent. The collapsing remains of a third hut built in February 1911 for the Northern party led by Victor L.A. Campbell of Robert Falcon Scott's British Antarctic Terra Nova Expeditions (1910-1913), is situated 30 meters to the north of Borchgrevink's hut. The Northern party wintered in this hut in 1911.

In addition to these features there are numerous other historic relics located in the Area. These include stores depots, a latrine structure, two anchors from the ship Southern Cross, an ice anchor from the ship Terra Nova, and supplies of coal briquettes. Other historic items within the Area are buried in guano. Collectively, the three huts and associated historic relics are listed as Historic Site and Monument No. 22.

Cape Adare is one of the principal sites of early human activity in Antarctica as it includes the first building erected on the continent. It is an important symbol of the Heroic Age of Antarctic exploration and, as such, has considerable historical significance. Some of the earliest advances in the study of earth sciences, meteorology, 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 value.

The Management Plan was reviewed and a revised version was adopted by means of Measure 2 (2005).

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 historic huts 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.
- Copies of this Management Plan, including maps of the Area, shall be made available at adjacent operational research/field stations.

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*) colonies in Antarctica. The 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 east of Borchgrevink's stores hut. The north east corner of the boundary is 71° 18.502'S, 170° 11.735'E and the south east corner of the boundary is 71° 18.633'S 170°11.735'E;
- West, a north-south line drawn 50 metres to the west of Borchgrevink's living hut. The north west corner of the boundary is 71° 18.502'S, 170° 11.547'E and the south west corner of the boundary is 71° 18.591'S, 170° 11.547'E; and
- South, the high tide mark of Ridley Beach.

Skuas (*Catharacta maccormicki*) nest in the vicinity and Weddell seals (*Leptonychotes weddellii*) 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(iii) 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(iv) Location of other Protected Areas in the vicinity

The nearest Protected Area is ASPA 106 (previously SPA No. 7), approximately 115 km to the south, on the western side of Cape Hallett.

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 Management Plan;
- activities related to educational or recreational activities including tourism, providing they do not conflict with the objectives of this Management Plan; and

- any other activity specifically provided for in 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 guides and 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 (average 193 per year between 1998 and 2009) but the effect of visitors to other historic huts in the Ross Sea region suggests that similar limits should apply. The annual maximum number of visitors shall be: 2,000 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 and only use tripods or monopods with flat bottomed rubber bases as opposed to those with metal spikes which can damage the floor;

- 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 and when the maximum number of visitors (4) are in the hut at one time the use of tripods or monopods is prohibited;

- When moving around the sites, take great care not to tread on any items which may be obscured by snow and remain on established walking tracks;

- 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 section 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 introduced 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 Management 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 Management 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.

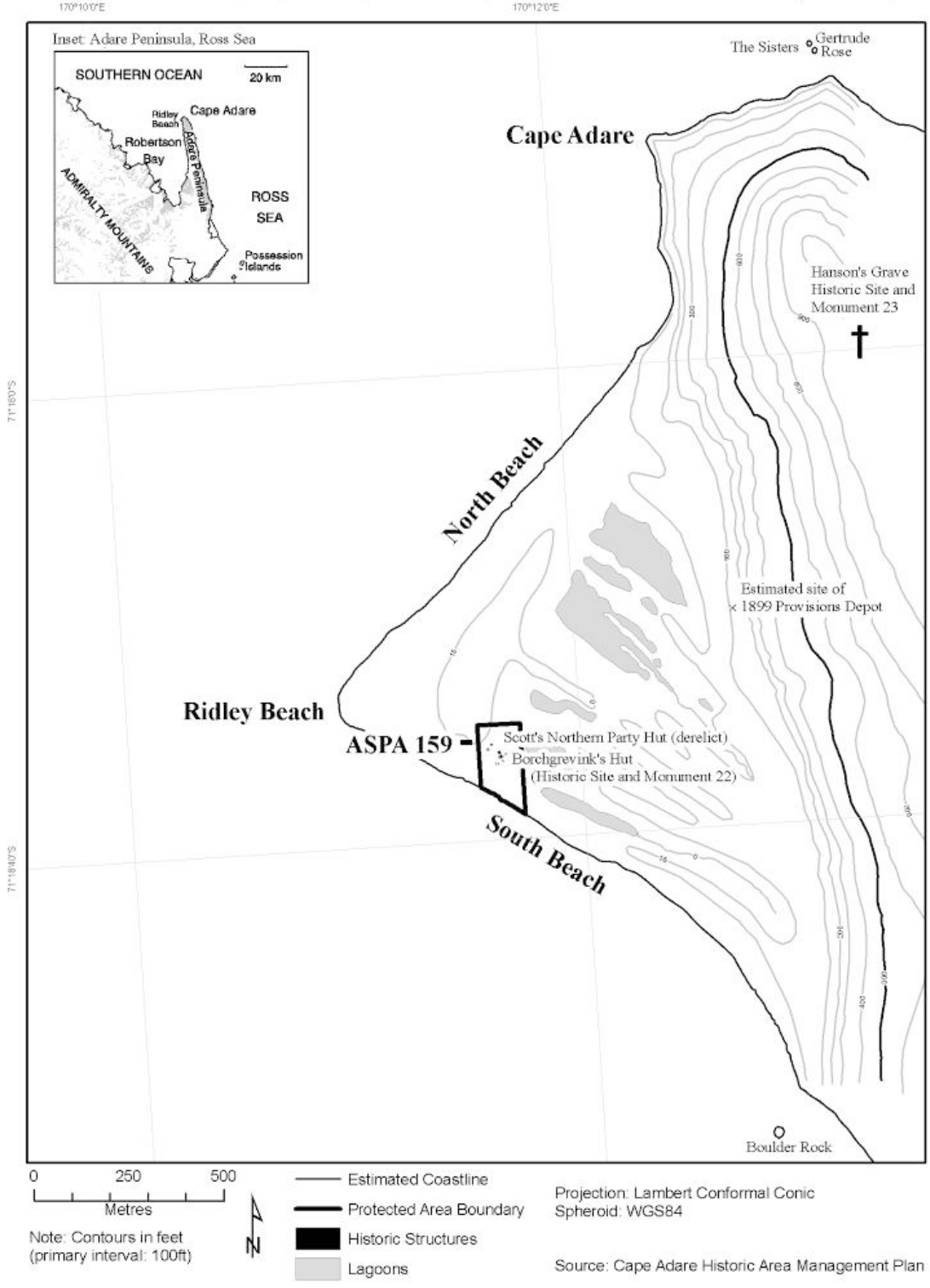
- Parties shall consult and coordinate to develop skills and resources, particularly those related to conservation techniques, to assist with the protection of the Area's values.

7(x) Requirements for reports

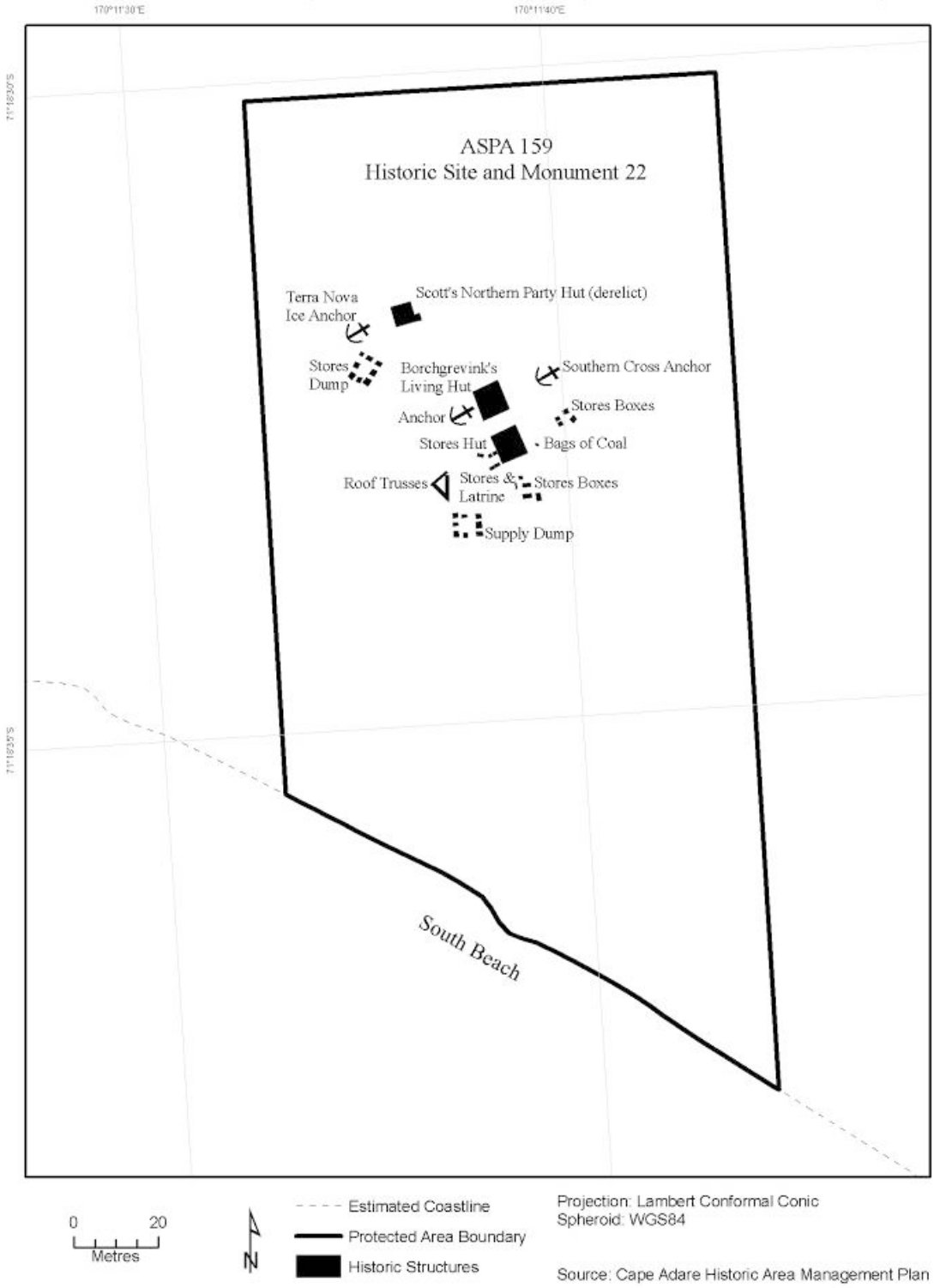
Parties shall ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports shall include, as appropriate, the information identified in the Visit Report Form provided in Appendix 4 of Resolution 2 (1998). In addition,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



Map B - Historic Hut, Cape Adare, Antarctic Specially Protected Area 159: Site Map



Antarctic Specially Protected Area No. 163
(Dakshin Gangotri Glacier, Dronning Maud Land):
Revised Management Plan

The Representatives,

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

Recalling Measure 2 (2005), which designated Dakshin Gangotri Glacier, Dronning Maud Land as ASPA 163 and annexed a Management Plan for the Area;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 163;

Desiring to replace the existing Management Plan for ASPA 163 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 163 (Dakshin Gangotri Glacier, Dronning Maud Land), which is annexed to this Measure, be approved; and

2) the Management Plan for ASPA 163 annexed to Measure 2 (2005) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area (ASPA) No 163:

Dakshin Gangotri Glacier, Dronning Maud Land

1. Introduction

India introduced a Working Paper at XXV ATCM (WP47) on a draft management plan for a proposed site of Special Scientific Interest for snout of Dakshin Gangotri Glacier, Schirmacher Hills (also known as Vassfjellet), Dronning Maud Land. The Committee noted that this should be termed an ASPA rather than SSSI. Accordingly, during XXVI ATCM India submitted a draft management plan for Antarctica Specially Protected Area (XXVI ATCM/WP-38) and thereafter submitted revised management plan during XXVII-ATCM (WP 33). The management plan was adopted by Measure 2 (2005) and designated ASPA 163 during XXVIII ATCM (WP 25).

Dakshin Gangotri glacier has significant value in terms of glacier retreat monitoring. A snout is being monitored since 1983 to understand the effect of climate change on glacier. This area is also important for study of algae, moss, cynobacteria and lichen which are wide spread in Schirmacher Hills and especially within the ASPA site. Cynobacteria contribute significantly to the nitrogen fixation, and many species have been identified so far from this area. Many species of lichens are also indentified in this area according to study conducted since 2003.

2. Description of values to be protected

i. *Historic Value*

Dakshin Gangotri Glacier is a small tongue of polar continental ice sheet, overriding the Schirmacher Hills in central Dronning Maud Land (CDML). It was identified by the second Indian Antarctic Expedition in 1982-83 and since then its snout is being monitored regularly for fluctuation w.r.t. retreat/advance.

ii. *Scientific Value*

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

Global positioning system (GPS) campaigns were conducted during the 2003 and 2004 austral summer seasons to obtain insight into the velocity and strain-rate distribution on the margin of the continental ice sheet overriding southern part of Schirmacher Hills in CDML. GPS data were collected for two years at 21 sites and

analyzed to estimate the site coordinates baselines and velocities. Horizontal velocities of the glacier sites lie between 1.89±0.01 and 10.88±0.01 m a-1 to the north-northeast, with an average velocity of 6.21±0.01 m a-1. The principal strain rates provide a quantitative measurement of extension rates, which range from (0.11±0.01) &times 10-3 to (1.48±0.85) × 10-3 a-1, and shortening rates, which range from (0.04±0.02) × 10-3 to (0.96±0.16) × 10-3 a-1 (Sunil et al., 2007).

iii. *Environmental Value*

At the designated area, exploration showed abundant faunal diversity of the moss-inhabiting terrestrial invertebrate fauna. Schirmacher Hills is also an important area for the algae and cyanobacterial diversity. Terrestrial mosses are quite widespread in the Schirmacher Hills colonizing on a wide range of habitats. The mosses, because of their poikilohydric nature and alternative strategy of adaptation, are one of the plant groups which grow in Antarctica. Mosses play role in habitat modification, nutrient cycling and providing shelter and security to associated invertebrate animals. Studies on mosses in Schirmacher Hills revealed that distribution of mosses is significant at central part and at designated area as compare to eastern and western part.

Distribution of algae and cyanobacteria and flora of fresh water streams of the Hills at the designated area have been studied. The species reported are *G.magma, Chaemosiphon subglobosus, Oscillatoria limosa, O.limnetica,P. frigidum, P. autumnale, Nostoc commune, N.punctiforme, Calothrix gracilis, C.brevissima, Uronema* sp.,and *Cosmarium* leave. Among the cyanobacteria encountered in the stream of Schirmacher Hills, N2 –fixing species might play a significant role in nitrogen economy of the ecosystem through N2 –fixation. Studies on polar Skuas were also conducted at Schirmacher Hills and their nesting and breeding success have been reported around the designated place.

Further study on the Lichens carried out since 2003-04 within the protected area site, revealed occurance of species such as; *Acarospora geynnii* , C.W.Dodge & E.D.Rudolph, *Acarospora williamsii*, Filson, *Amandinea punctata*,(Hoffm.) Coppins & Scheid, *Buellia frigida*, Darb., *Buellia grimmiae*, Filson, *Candelaria murrayi*, Poelt, *Candelariella flava* , (C.W.Dodge & G.E. Baker), Castello & Nimis, *Carbonea vorticsa*, (Florke) Hertel, *Lecanora expectans* , Darb., *Lecanora fuscobrunnea* , C.W. Dodge & G.E. Baker, *Lecanora geophila* (Th. Fr.) Poelt, *Lecidea andersonii*, Filson, *Lecidea cancriformis* , C.W.Dodge & G.E. Baker, *Lecidella siplei* , (C.W. Dodge & G.E. baker) May., *Lepraria cacuminum* , (A. Massal.) Lohtander, *Physcia caesia* , (Hoffm.) Furnr., *Pseudephebe minuscule* , (Nyl. Ex Arnold) Brodo & D. Hawksw., and *Rhizoplaca melanophtalma*, (Ram.) Luckert & Poelt (Olech et al., 2010).

3. Aims and Objectives

Management of Dakshin Gangotri Glacier is aimed to:

- avoid degradation of values of the Area by preventing undue human interference

- allow glaciological and environmental scientific research, while ensuring protection 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

- minimize the possibility of introduction of alien plants, animals and microbes into the Area

4. Management Activities

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

- A detailed map showing the location and boundaries of the Area and stating the special restrictions that apply would be displayed prominently at Maitri (India) and Novolazarevskaya (Russia) research stations; copies of this management plan will also be made available at both the stations.

- Two signs displaying the location and boundaries of the Area with clear statements of entry restrictions will be placed on prominent rocks near both the entrance points to the valley, 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.

5. Period of Designation

The ASPA is designated for an indefinite period.

6. Maps

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

Map 1: Location of Schirmacher Hills in central Dronning Maud Land, East Antarctica.

Map 2: Map of Schirmacher Hills, showing locations of Maitri Research Station (India) and Novolazarevskaya Research Station (Russia).

Map 3: Classification and Numbering of Lakes of Schirmacher Hills. (after Ravindra et al, 2001)

Map 4: Topographic map of the Area. (contour interval 10 m)

Map 5: Paths of Fossil Glaciers in Schirmacher Hills. (after Beg et al, 2000)

Map 6: Aerial view of the Snout of Dakshin Gangotri Glacier.

Figure 1: Image showing the markers showing boundary location of ASPA

7. Description of the Area

i. *Geographical coordinates, Boundary markers and Natural features*

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

The Area proposed under ASPA is bounded by Eastern longitudes 11° 33' 30" and 11° 36' 30" 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 Hills at the snout point; less than 50 m only. The eastern and western sides of the hills slope towards the snout, making a wide valley. The contours descend from 150 m to msl at the northern margin of the rock outcrops.

The central part of the Area is occupied by Lake B7. It is a lake of glacial origin. The 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, NNESSW trending lineament. The fractures in the ice are also aligned parallel to this lineament.

Schirmacher Hills exposes a granulite to amphibolite facies metamorphic terrain. The rock types 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.

The Area comprises mostly charnockite-Khondalite type of rocks (quartz-garnet-sillimaniteperthite±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 65.3cm 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.

Further monitoring were carried out and data revealed that average yearly recession for 2003, 2004, 2005 and 2006, gradually increased to 68.0, 69.4, 71.3, 72.8 cm per annum. However during the year 2006-2007, the average retreat of the Dakshin Gangotri polar ice front was only 0.6 m, but the data collected from the western margin of Schirmacher Hills showed an average annual retreat of around 1.4 m during the year 2006-07. The average annual retreat of the snout of Dakshin Gangotri was recorded to be about 1m in 2008, whereas the average annual retreat for the western extension of polar ice front was recorded to be about 2m. The maximum recession was observed at observation-point-14, which recorded a cumulative recession of 17.21 meters in ten years (1996-2006).

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 was possible to record the movement of the Glacier with an accuracy of 1 cm. Precise monitoring on cm-scale is also available for the years 1996-2002. Access to this zone should be restricted. To protect the accuracy of scientific observations, it is proposed that a 100 m radius all along the periphery of the Glacier should have limited admittance.

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.

iv. *Location of other Protected Areas within close proximity of the Area*

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

8. Permit Conditions

a) Access to and movement within the Area

Entry into the Area would be prohibited except in accordance with a permit issued by an appropriate National Authority as designated under Annex V, Article 7 of the Protocol 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. Access to the area is permitted only by foot, access to site using land vehicle or helicopter landing is prohibited within the area.

b) 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.

c) 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 with name of principal investigator, year of installation and expected date of completion of the study. Details are to be included in the visit report. All such equipment should be made of materials that pose minimum risk of contamination and must be removed immediately after completion of the study. Removal of specific equipment for which the permit has expired shall be a condition of the permit.

d) Location of field camps

Camping is not allowed in the Area. The field parties can camp either 1000 meters away from the eastern edge of Lake B7 (Sbrosovoye Lake) or 500 meters away from the western edge of same lake

e) 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. 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.

f) 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 shall be used as a minimum standard.

g) Collection or removal of anything not brought into the Area by the Permit holder

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

Material of human origin, not brought into the Area by the permit holder, but which is likely to compromise the values of the Area may be removed from the Area unless the impact of removal is likely to be greater than leaving the material in situ. If this is the case the appropriate authority should be notified.

h) Disposal of Waste

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

i) 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.

j) Requirements for Reports

The principal permit holder would submit to the appropriate National Authority a visit report describing the activities undertaken by those issued permit. Reports are due and shall be submitted as soon as possible after the expiration of the permit, and include the types of information 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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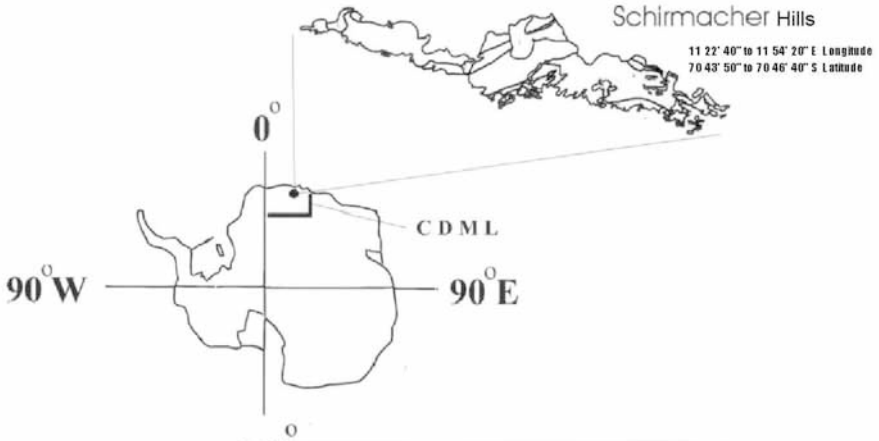
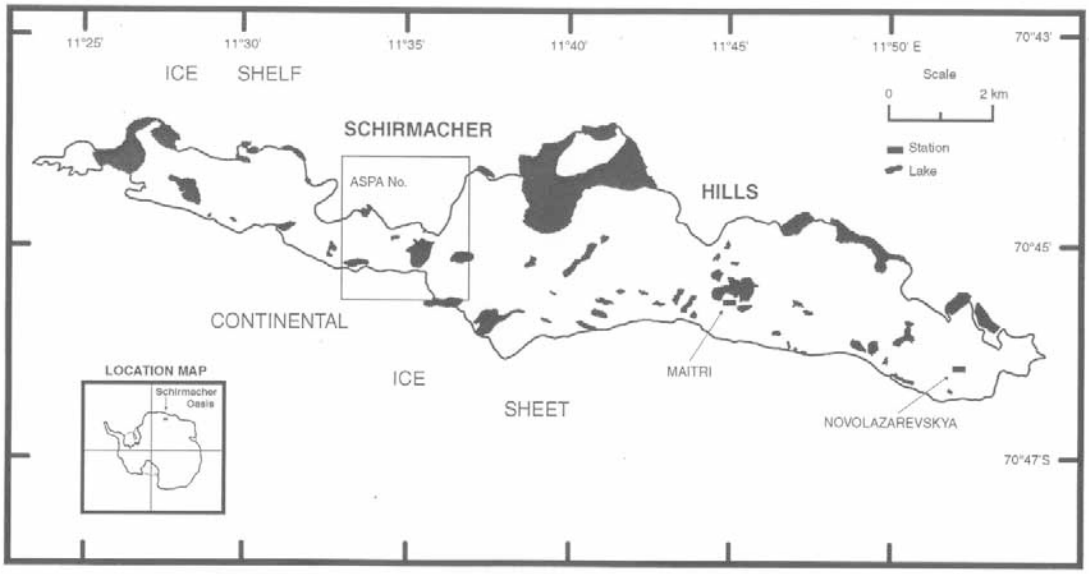
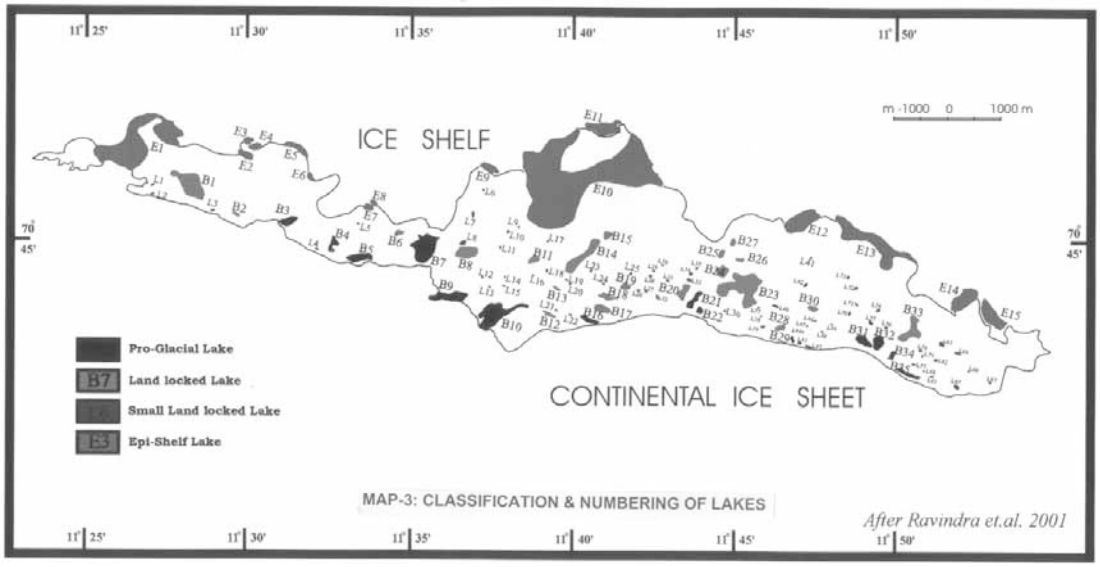


MAP-1: LOACTION MAP OF SCHRIMACHER Hills

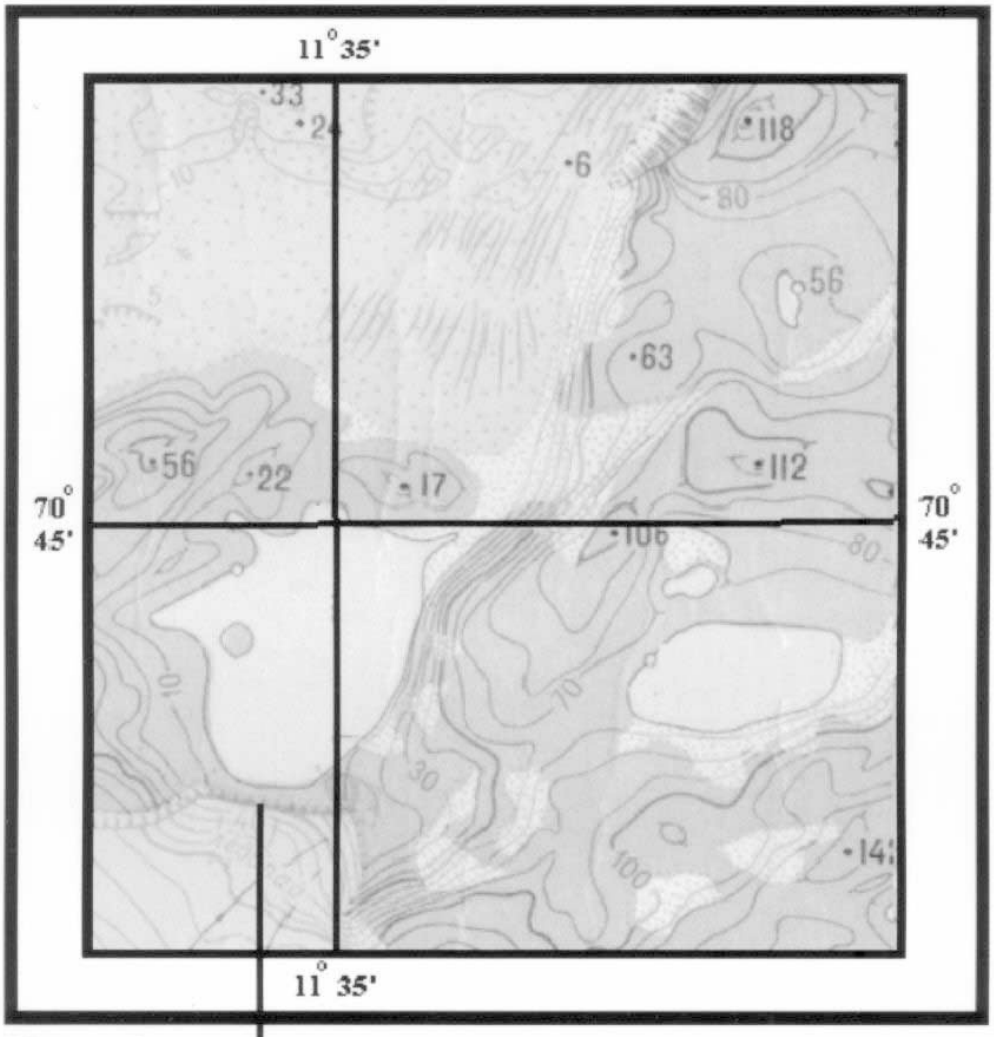


MAP-2: MAP SHOWING LOCATION OF MAITRI (INDIA) & NOVOLAZAREVSKAYA RUSSIA

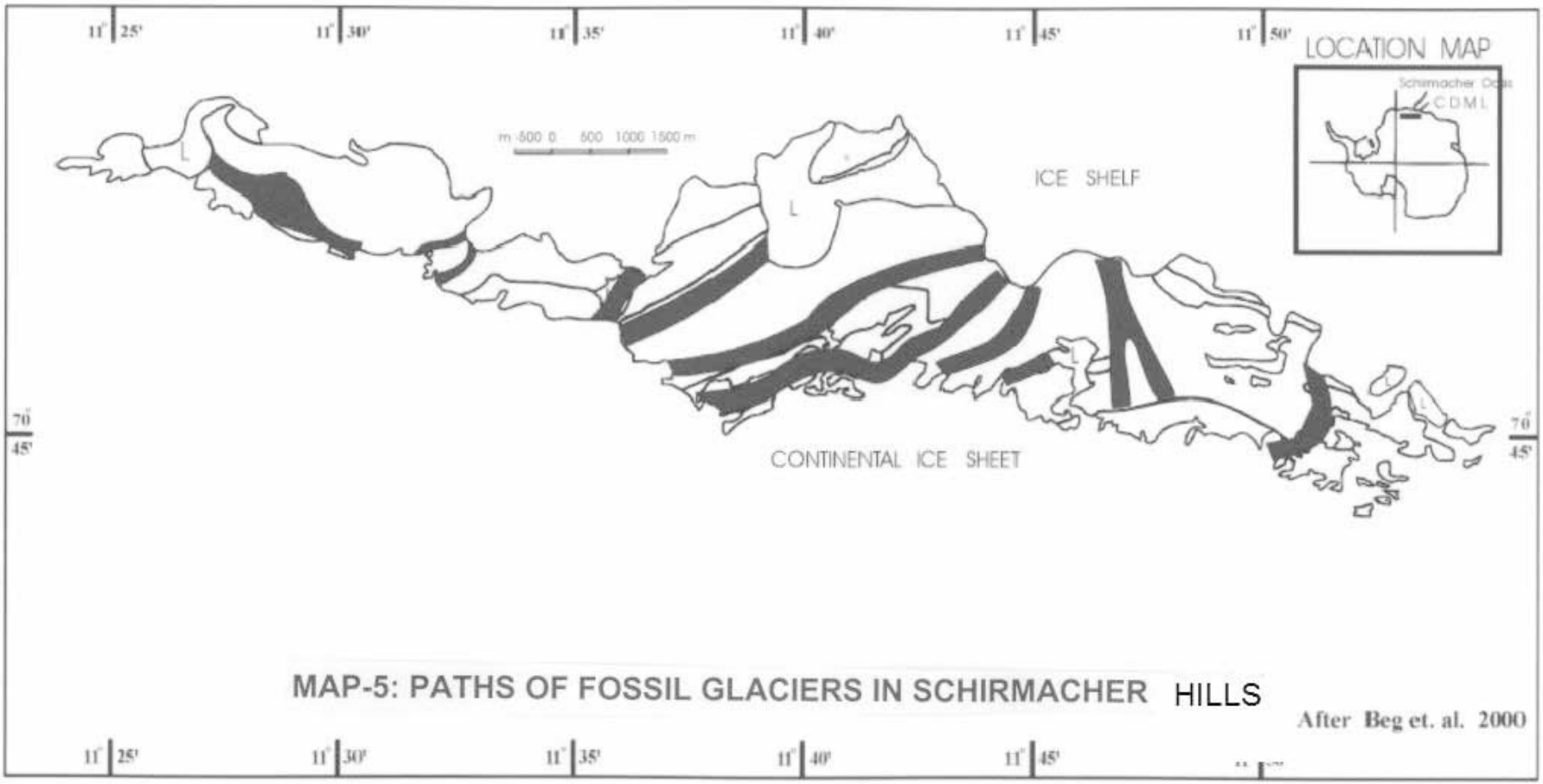


MAP-3: CLASSIFICATION & NUMBERING OF LAKES

After Ravindra et.al. 2001



MAP-4: TOPOGRAPHIC MAP OF THE AREA


11° 25'
11° 30'
11° 35'
11° 40'
11° 45'
11° 50'
LOCATION MAP
Schirmacher Oasis
C D M L
m -500 0 500 1000 1500 m
ICE SHELF
CONTINENTAL ICE SHEET
70° 45'
MAP-5: PATHS OF FOSSIL GLACIERS IN SCHIRMACHER HILLS
After Beg et. al. 2000

MAP-6: Snout of Dakshin Gangotri Glacier

Figure 1 : Images of secured marker at two different locations at the boundary of ASPA 163

Antarctic Specially Protected Area No. 164
(Scullin and Murray Monoliths, Mac.Robertson Land):
Revised Management Plan

The Representatives,

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

Recalling Measure 2 (2005), which designated Scullin and Murray Monoliths, Mac.Robertson Land, East Antarctica as ASPA No. 164 and annexed a Management Plan for the Area;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASPA 164;

Desiring to replace the existing Management Plan for ASPA 164 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Protected Area No. 164 (Scullin and Murray Monoliths, Mac.Robertson Land), which is annexed to this Measure, be approved; and

2) the Management Plan for ASPA 164 annexed to Measure 2 (2005) shall cease to be effective.

Management Plan for Antarctic Specially Protected Area No. 164

SCULLIN AND MURRAY MONOLITHS, MAC.ROBERTSON LAND

Introduction

Scullin Monolith (67° 47'S, 66° 42'E) and Murray Monolith (67° 47'S, 66° 53'E) (Map A) were designated as Antarctic Specially Protected Area (ASPA) No 164 under Measure 2(2005), following a proposal by Australia. The Area is designated to protect the greatest concentration of breeding colonies of seabirds in East Antarctica. Seven species occupy territories in the Area: five species of petrel (Antarctic petrels *Thalassoica antarctica*, Cape petrels *Daption capense*, southern fulmars *Fulmarus glacialoides*, snow petrels *Pagodroma nivea*, Wilson's storm petrel *Oceanites oceanicus*), one penguin (Adelie penguin *Pygoscelis adeliae*) and one larid (south polar skua *Catharacta maccormicki*).

Compared to some other 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). Scullin and Murray Monoliths were first visited during the second British, Australian and New Zealand Antarctic Research Expedition (BANZARE) voyage in 1930-31, on 13 February 1931. Sir Douglas Mawson named both monoliths during this visit. 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.

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. The Norwegian Lars Christensen landed on 30 January 1937 and visited Scullin Monolith. Australian Antarctic program personnel have made a 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 to 6 February 1987), when comprehensive ornithological surveys were conducted. The first visit by a commercial tourist vessel to the Area was made on 10 December 1992, and a small number of brief visits have been made in subsequent years.

With little activity conducted during previous visits the Area, particularly with regard to the avifauna, the Area is of particular value as a relatively undisturbed area suitable as a reference site for other areas that experience a greater level of human visitation and extent of activities.

1. Description of values to be protected

The Area is primarily designated to protect the outstanding ecological and scientific values associated with the important assemblage of seabirds found at Scullin Monolith and Murray Monolith.

With at least 160,000 pairs, the Antarctic petrel colony on Scullin Monolith is second in population size only to the colony at Svarthameren in the Mühlig Hofmannfjella, in Dronning Maud Land. Thus, about a third of the estimated global population of approximately half a million pairs breeds at Scullin Monolith.

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 occupied by the other petrel species. Extensive breeding colonies occur on many of the steeper, higher-altitude slopes of both monoliths. South polar skuas nest throughout the Area, making use of the high density of breeding seabirds as prey during their breeding season.

Some larger colonies of seabirds are known from elsewhere in East Antarctica (e.g. the Rauer Group). However, the combined breeding population conservatively estimated at 230,000 pairs and the rich species diversity within the two very small ice-free areas of Scullin and Murray Monoliths (about 1.9 and 0.9 km2, respectively) mean that the monoliths support the greatest concentration of breeding seabirds and one of the most diverse seabird breeding localities in East Antarctica (Appendix 1).

In addition to the outstanding ecological and scientific values, the Area possesses outstanding aesthetic values arising from the geomorphology of the two monoliths, which are occupied by a large number of nesting seabirds, and have as a spectacular backdrop of glaciers that descend from the continental plateau and flow around the monoliths to end in calving glaciers.

The very large and diverse breeding assemblage of seabirds in a setting of high aesthetic and wilderness values warrants the highest level of protection.

2. Aims and Objectives

Management of Scullin and Murray Monoliths aims to:

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

- maintain the undisturbed nature of the Area to permit its future use as a reference area;

- allow scientific research on the ecosystem and values of the Area, providing it is for compelling reasons which cannot be served elsewhere and will not impact on the values of the Area, particularly ornithological values;

- accord high priority to the collection of seabird census data from representative sample areas, reference breeding groups (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 Area;

- accord high priority to the collection of other biological survey data, in particular flora and invertebrate surveys. These survey data will be incorporated into future revisions of the management strategy for the Area;

- allow visits for management purposes in support of the aims of the management plan; and

- minimise the potential for introduction of non-native plants, animals and micro-organisms, particularly avian pathogens.

3. Management Activities

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

- where practical, the Area shall be visited as necessary, and preferably no less than once every five years, to conduct censuses of seabird breeding populations, including mapping of colonies and nest sites;

- information on the Scullin and Murray Monoliths ASPA, including copies of this management plan, will be made available at both Davis and Mawson stations and to all visitors;

- national Antarctic programs operating in the vicinity or intending to visit the Area shall consult with other national programs to ensure that research projects do not overlap or conflict; and

- where practical, management visits will be made to remove unnecessary materials currently located within the Area.

4. Period of Designation

The Area is designated for an indefinite period.

5. Maps and Photographs

Map A: Antarctic Specially Protected Area No 164, Scullin and Murray Monoliths, Mac.Robertson Land, East Antarctica. The inset map indicates the location in relation to the Antarctic continent.

Map B: Antarctic Specially Protected Area No. 164, Scullin Monolith: Topography and Bird Distribution.

Map C: Antarctic Specially Protected Area No. 164, Murray Monolith: Topography.

Map D: Antarctic Specially Protected Area No. 164: Scullin Monolith: Helicopter approach and landing site.

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

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 some 160 km east of Mawson station (Map A). The monoliths are approximately seven kilometres 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 above sea level. It encloses a broad north-facing cove with an entrance approximately two kilometres wide. All upper slopes of the monolith are 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 from the sea to a dome-shaped summit at 243 m above sea level. On the western side of Murray Monolith, the lower slopes drop to a coastal platform. The Area extends over all ice-free areas associated with the two monoliths, and includes a portion of the adjacent continental ice. There are no boundary markers delimiting the site.

The Scullin and Murray Monoliths ASPA comprises two sectors (see Map B and Map C):

- Scullin Monolith: the boundary commences at a coordinate on the coastline at 67º47’01”S, 66º40’31”E, then in a southerly direction to a coordinate at 67º48’03”S, 66º40’26”E, east to a coordinate at 67º48’06”S, 66º 44’33”E then north to a coordinate on the coast at 67º46’41”S, 66º44’37”E, then west following the coast line at the low tide mark to the coordinate 67º48’03”S,66º 40’26”E.

- Murray Monolith: the boundary commences on the coastline at 67º46'29"S, 66º51'01"E, then continuous in a southerly direction to 67º48'03"S, 66º 50'55"E, extends east to 67º48'05"S, 66º53'51"E, and north to 67º46'42"S, 66º53'59"E, then west following the coast line at the low tide mark to the coordinate 67º46'29"S, 66º51'01"E.

Birds

Seven species occupy territories in the Area: five species of petrel (Antarctic petrels *Thalassoica antarctica*, Cape petrels *Daption capense*, southern fulmars *Fulmarus glacialoides*, snow petrels *Pagodroma nivea*, Wilson's storm petrel *Oceanites oceanicus*), one penguin (Adelie penguin *Pygoscelis adeliae*) and one larid (south polar skua *Catharacta maccormicki*). Scullin Monolith hosts the second largest colony of Antarctic petrels with a population of at least 160,000 pairs and significant Adélie penguin colonies of approximately 50,000 pairs. Less is known about the species diversity of Murray Monolith; however approximately 20,000 Adélie penguins have been observed (Appendix 1).

There are no data on population trends available, and 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 but there have been no surveys of these RBGs for more than a decade. Many breeding populations of Adélie penguin have increased throughout East Antarctica in the last 20 or so years; it is possible that the Adélie penguin population at the Scullin and Murray Monoliths is greater than the 70,000 pairs reported in 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.

Geology

The geology of the two monoliths is poorly understood, as they have been neither the subject of dedicated study nor specific geological mapping. The geology of the monoliths appears to be similar in general terms to that of the region around Mawson station. 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. An age range of between 1254Ma and as young as 625Ma have been documented for the gneisses from Scullin Monolith. 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. The 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.

Environmental domains analysis

Based on the Environmental Domains Analysis for Antarctica (Resolution 3(2008)) Scullin and Murray Monoliths are located within Environments D East Antarctic coastal geologic and L Continental coastal-zone ice sheet.

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 (Appendix 2). Vegetation on Scullin Monolith is restricted mainly to the western plateau and associated nunataks. The coastal slopes are generally void 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. Although not recorded, it is likely that vegetation at Murray Monolith is similar to that found at Scullin Monolith.

Other biota

There have been no comprehensive invertebrate studies at Scullin or Murray Monoliths. A leopard seal *Hydrurga leptonyx* was sighted during a visit in 1936 and several Weddell seals *Leptonychotes weddellii* were observed during visits in 1997 and 1998; no further observations of biota have been reported.

6(ii) Access to the Area

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

6(iii) Structures within and adjacent to the Area

At the time of writing (March 2010), a fibreglass 'Apple' refuge is situated on the south western summit ridge of Scullin Monolith (approximately 67° 47.2'S, 66° 41.5'E) (Map B and Map D). There are four 200-litre drums of helicopter fuel and one 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 suitable opportunity. It is unknown if this refuge is still suitable for use.

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; ASPA No. 102, Rookery Islands, is approximately 180 km to the west (c.20 km west of Mawson), and ASPA No. 101, Taylor Rookery, is located approximately 75 km further west of the ASPA No. 102.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Permit conditions

7(i) General permit conditions

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

- it is issued only for compelling scientific or management purposes 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 are in accordance with this management plan and will not jeopardise the values of the Area;
- it is issued for a specified period;
- it will authorise the entry into the Area of no more than 10 people at any one time during the seabird breeding season, and no more than 15 people at any one time during the remainder of the year;
- 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; and
- the appropriate national authority shall be notified of any activities/measures undertaken that were not included in the authorised permit.

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

- Travel to the Area is possible by small boat, by over-snow/ice vehicles or by aircraft.
- Any movement within and around the Area shall observe the minimum specified wildlife approach distances (Appendix 3); closer approach may be allowed specifically under permit.
- Movement by visitors within the Area shall be by foot only.
- Small boats used to approach the Area must be operated at or below five knots within 500 m of the shore.
- It is recommended that visitors not permitted to enter the Area do not approach within 50 m of the shoreline.

- 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:

- disturbance of the colonies by aircraft shall be avoided at all times
- during the breeding season (1 October to 31 March) there shall be no overflights of the Area below 1500 m (5000 ft) for twin-engined helicopters and below 930 m (3050 ft)for single-engined helicopters and fixed-wing aircraft;
- landings within the Area shall only occur at the designated landing site at Scullin monolith (Map D) and only by single-engined helicopters;
- single-engined helicopters shall approach the landing site from the south-west (as shown by the approved flight corridor in Map D);
- during the breeding season, twin-engined helicopters shall not land, take off or fly within 1500 m of the Area;
- during the breeding season, fixed wing aircraft shall not land or take off within 930 m or fly within 750 m (2500 ft) of the Area;
- under no circumstances are aircraft to fly within the Scullin Monolith amphitheatre during the breeding season;
- twin-engined helicopters may land at the designated landing site outside the breeding season (1 October to 31 March); and
- refuelling of aircraft is not to take place within the Area.

7(iii) 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 as authorised by permit:

- compelling scientific research that cannot be undertaken elsewhere, including the initiation or continuance of ongoing monitoring programmes; and
- other scientific research and essential management activities consistent with this Management Plan that will not affect the values of the Area or its ecosystem integrity.

7(iv) Installation, modification or removal of structures

No permanent structures or semi-permanent structures (in place beyond the end of the seabird breeding season) are to be erected within the Area.

Markers, signs and other indicators of the Area's extent shall not be erected, to maintain the aesthetic values and undisturbed nature of the Area.

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

- A small amount of fuel is permitted within the Area for cooking purposes while field parties are present. Otherwise, fuel is not to be stored within the Area.

- 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 radionucleides and stable isotopes within the Area is prohibited.

- The highest level precautions shall be employed to prevent the introduction to the Area of microorganisms, 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 and after leaving the Area. Research equipment shall be disinfected, to prevent possible contamination of the Area.

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

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

7(viii) 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 Area, 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 permit issuing authority 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 Area as authorised in a permit and should be limited to the minimum necessary to meet scientific or management needs.

7(ix) Disposal of waste

All wastes, including human wastes, shall be removed from the Area. Wastes from field parties shall be stored in such a manner to prevent scavenging by wildlife (e.g. skuas) until such time as the wastes can be disposed or removed. Wastes are to be removed no later than the departure of the field party. Human wastes and grey water may be disposed into the sea outside the Area.

7(x) Measures that may be necessary to 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.

- Ornithological 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 Party responsible for developing the management plan (if different).

- These data shall be lodged in the Antarctic Master Data Directory.

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

7(xi) Requirements for reports

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

Such visit reports should include, as applicable, the information identified in the recommended visit report form contained in Appendix 4 of the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas appended to Resolution 2 (1998).

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

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

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 and copies of relevant photographs taken of the Area should also be included.

7(xii) Emergency provision

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

8. Supporting documentation

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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:

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 & Seppelt 1990).

LICHENS **Acarosporaceae**	**Teloschistaceae**
Biatorella cerebriformis (Dodge) Filson	*Caloplaca citrina* (Hoffm.) Th. Fr.
*Acarosporagwynii*Dodge&Rudolph	*Xanthoriaelegans*(Link.)Th.Fr.
Lecanoraceae *Lecanora expectans* Darb *Rhizoplaca melanophthalma* (Ram.) Leuck.	*Xanthoria mawsonii* Dodge **Candelariaceae** *Candellariella hallettensis* Murray
Lecideaceae	**Umbilicariaceae**
Lecidea phillipsiana Filson	*Umbilicaria decussata* (Vill.) Zahlbr.
Lecidea woodberryi Filson **Physciaceae** *Physcia caesia* (Hoffm.) Hampe	**Usneaceae** *Usnea antarctica* Du Rietz *Pseudophebe miniscula* (Nyl. Ex Arnold) Brodo et Hawksw.
Buellia frigida Darb	
Buellia grimmiae Filson *Buellia lignoides* Filson	**BRYOPHYTES**
Rinodina olivaceobrunnea Dodge & Baker	**Grimmiaceae** *Grimmia lawiana* Willis **Pottiaceae** *Sarconeurum glaciale* (C. Muell.) Card. Et Bryhn

Appendix 3:

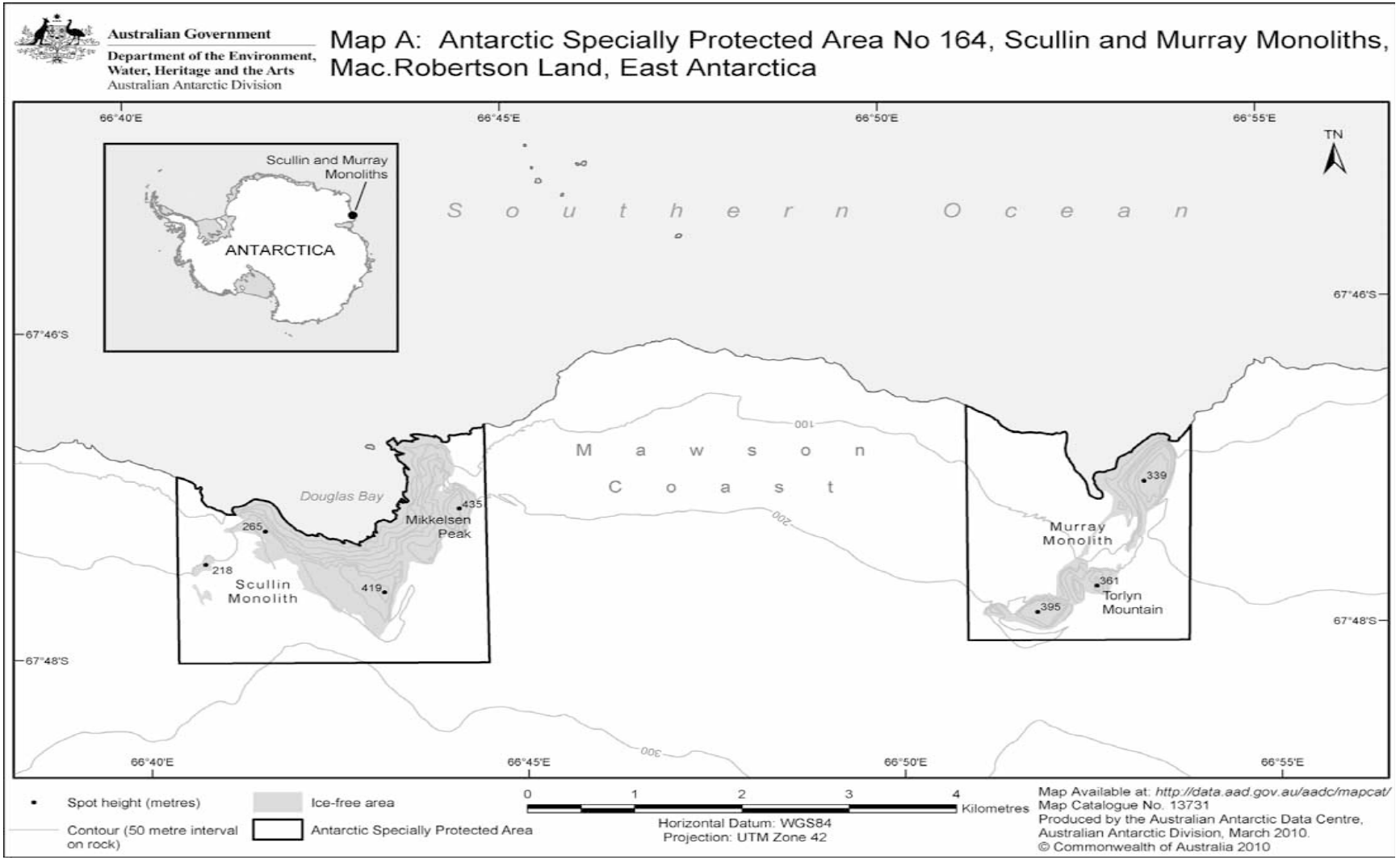
Approach distances guide: minimum distances (m) to maintain when approaching wildlife without permit.

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. 'Prions and petrels' comprises Cape petrels, Antarctic petrels, Wilson's storm petrels, snow petrels and southern fulmars.


Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map A: Antarctic Specially Protected Area No 164, Scullin and Murray Monoliths, Mac.Robertson Land, East Antarctica
66°40'E
66°45'E
66°50'E
66°55'E
TN
Scullin and Murray Monoliths
ANTARCTICA
S o u t h e r n O c e a n
67°46'S
67°48'S
M a w s o n C o a s t
Douglas Bay
Mikkelsen Peak
435
265
218
Scullin Monolith
419
339
Murray Monolith
361
Torlyn Mountain
395
100
200
300
Spot height (metres)
Contour (50 metre interval on rock)
Ice-free area
Antarctic Specially Protected Area
0 1 2 3 4 Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 42
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13731
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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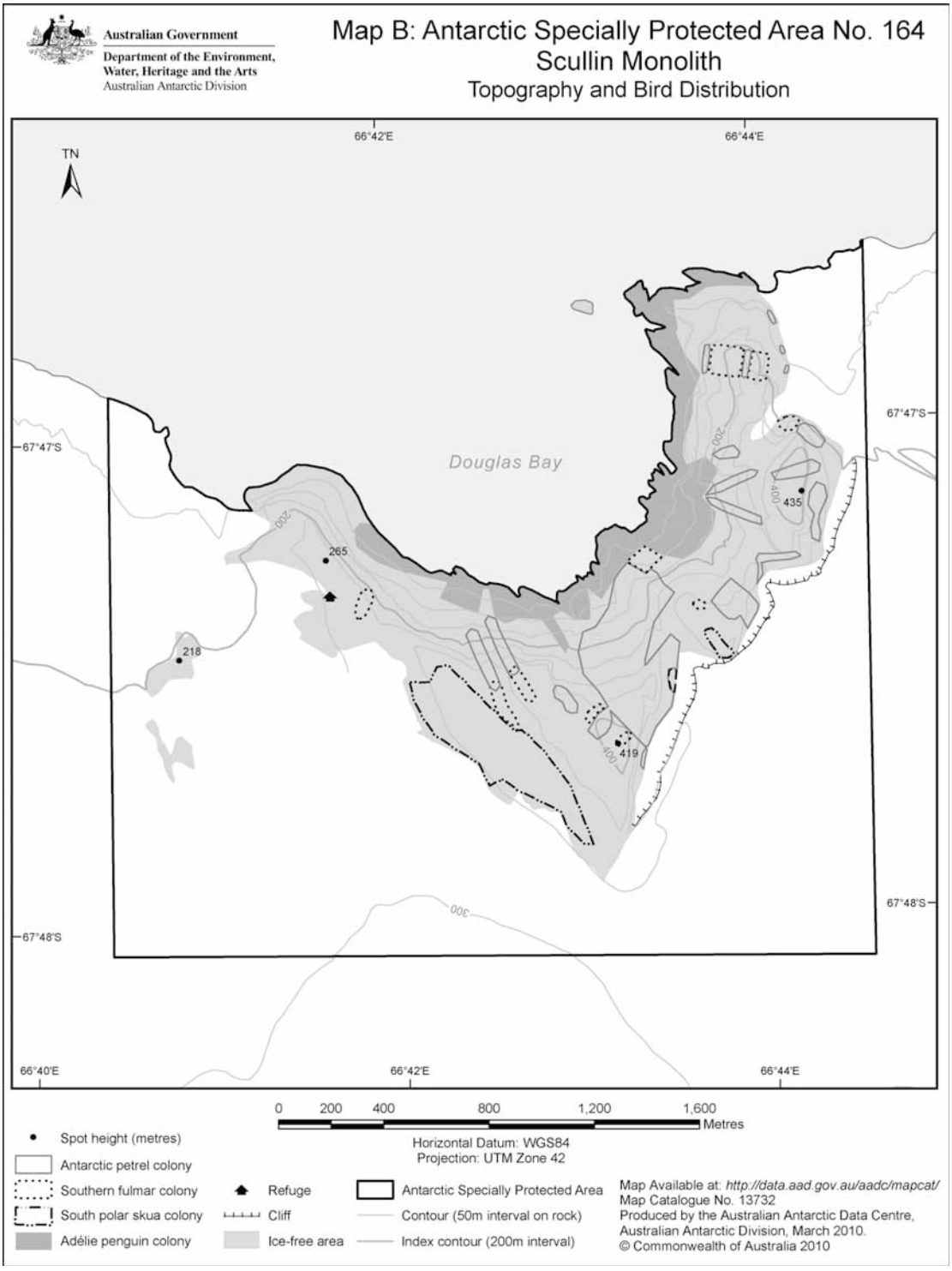
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No. 164
Scullin Monolith
Topography and Bird Distribution
66°42'E
66°44'E
TN
67°47'S
67°48'S
Douglas Bay
265
218
435
419
200
400
300
66°40'E
0 200 400 800 1,200 1,600
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 42
Spot height (metres)
Antarctic petrel colony
Southern fulmar colony
South polar skua colony
Adélie penguin colony
Refuge
Cliff
Ice-free area
Antarctic Specially Protected Area
Contour (50m interval on rock)
Index contour (200m interval)
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13732
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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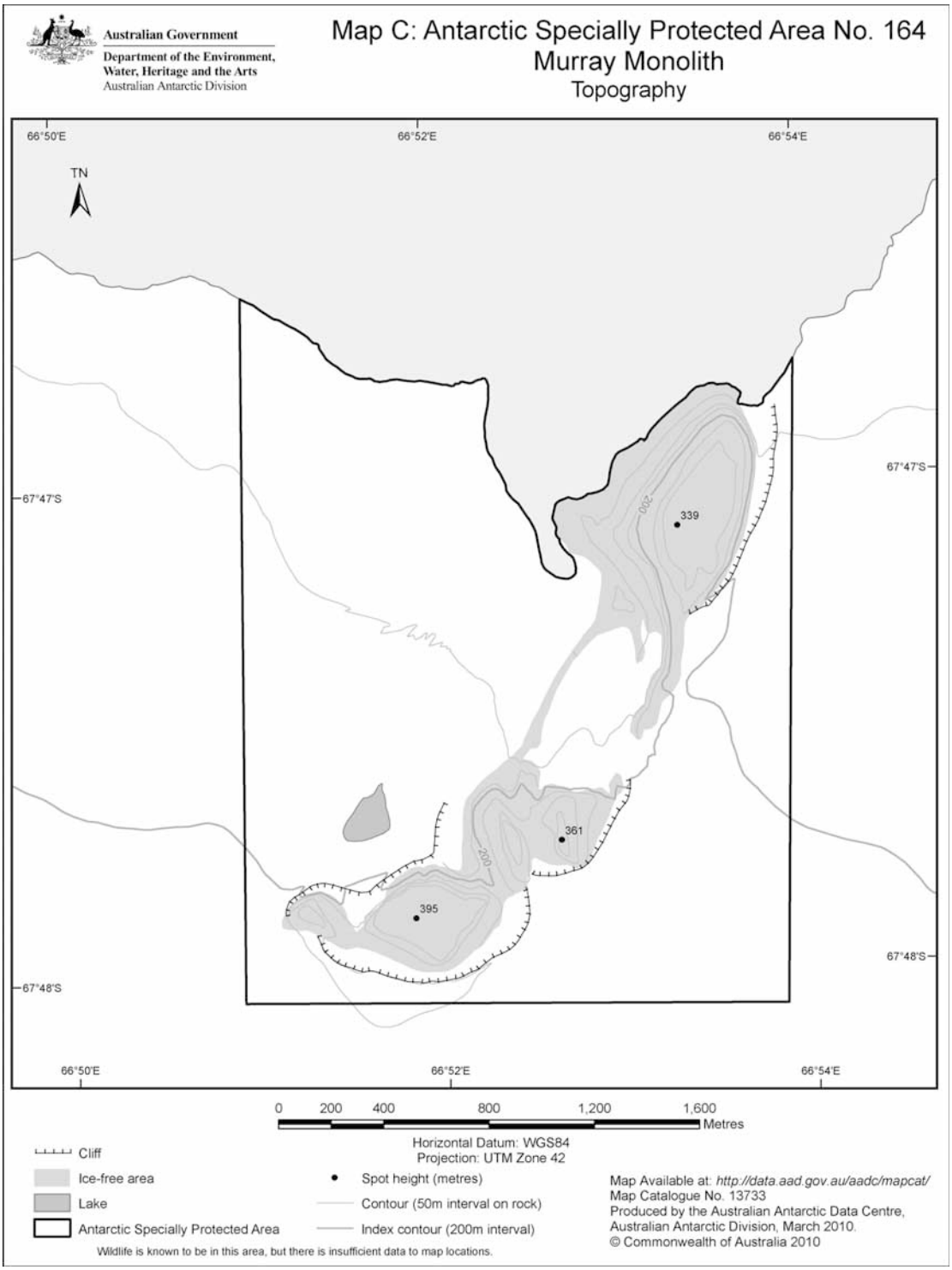
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map C: Antarctic Specially Protected Area No. 164
Murray Monolith
Topography
66°50'E
66°52'E
66°54'E
TN
67°47'S
67°48'S
339
361
395
200
0 200 400 800 1,200 1,600
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 42
Cliff
Ice-free area
Lake
Antarctic Specially Protected Area
Spot height (metres)
Contour (50m interval on rock)
Index contour (200m interval)
Wildlife is known to be in this area, but there is insufficient data to map locations.
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13733
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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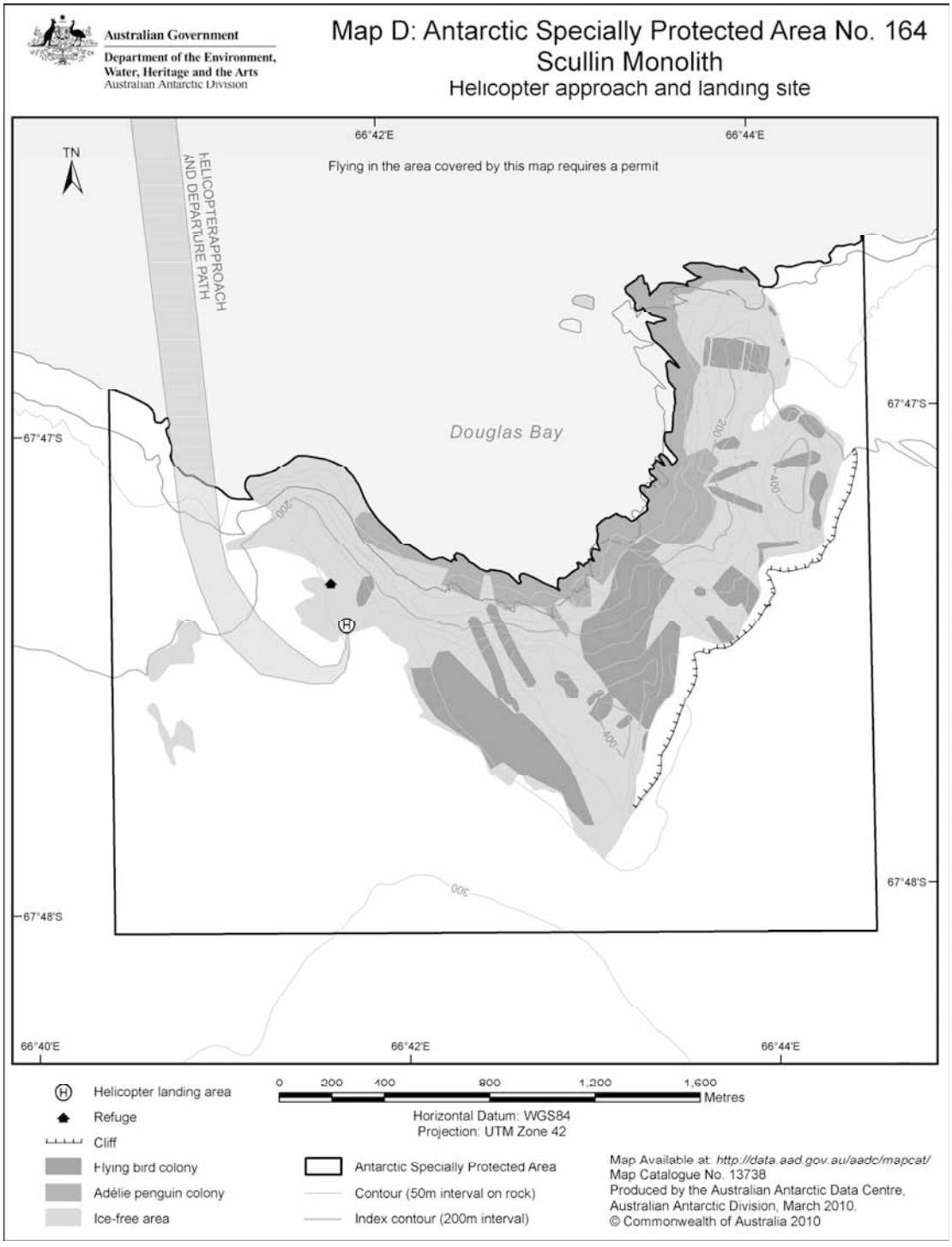
Australian Government
Department of the Environment, Water, Heritage and the Arts
Australian Antarctic Division
Map D: Antarctic Specially Protected Area No. 164
Scullin Monolith
Helicopter approach and landing site
66°42'E
66°44'E
TN
Flying in the area covered by this map requires a permit
HELICOPTER APPROACH AND DEPARTURE PATH
Douglas Bay
67°47'S
67°48'S
66°40'E
Helicopter landing area
Refuge
Cliff
Flying bird colony
Adélie penguin colony
Ice-free area
0 200 400 800 1,200 1,600
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 42
Antarctic Specially Protected Area
Contour (50m interval on rock)
Index contour (200m interval)
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 13738
Produced by the Australian Antarctic Data Centre, Australian Antarctic Division, March 2010.
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Antarctic Specially Managed Area No. 7
(Southwest Anvers Island and Palmer Basin):
Revised Management Plan

The Representatives,

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

Recalling

- Measure 1 (2008), which designated Southwest Anvers Island and Palmer Basin as Antarctic Specially Managed Area No. 7 and annexed a Management Plan for the Area;

- Measure 2 (2009), which adopted a revised Management Plan for ASMA 7;

Noting that the Committee for Environmental Protection has endorsed a revised Management Plan for ASMA 7;

Noting Measure 7 (2010) concerning Antarctic Specially Protected Area ("ASPA") No. 139 (Biscoe Point, Anvers Island), which is located within ASMA 7;

Desiring to replace the existing Management Plan for ASMA 7 with the revised Management Plan;

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

That:

1) the revised Management Plan for Antarctic Specially Managed Area No. 7 (Southwest Anvers Island and Palmer Basin), which is annexed to this Measure, be approved; and

2) Measure 2 (2009) shall cease to be effective.

Management Plan for

Antarctic Specially Managed Area No. 7

SOUTHWEST ANVERS ISLAND AND PALMER BASIN

Introduction

The region that includes southwest Anvers Island and the Palmer Basin and its fringing island groups has a wide range of important natural, scientific and educational values and is an area of considerable and increasing scientific, tourist and logistic activities. The importance of these values and the need to provide an effective means to manage the range of activities was recognised with adoption of the area as a Multiple-Use Planning Area for voluntary observance at the XVIth Antarctic Treaty Consultative Meeting (1991). With the acquisition of new data and information and changes to logistics and the pressures arising from human activities in the region, the original plan has been comprehensively revised and updated to meet current needs as an Antarctic Specially Managed Area (ASMA).

In particular, scientific research being undertaken within the Area is important for considering ecosystem interactions and long-term environmental changes in the region, and how these relate to Antarctica and the global environment more generally. This research is important to the work of the Committee for Environmental Protection, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and the Antarctic Treaty System as a whole. There is a risk that these globally important research programs and long-term datasets could be compromised if activities were to occur in the marine area that were not appropriately managed to avoid potential conflicts and possible interference. While marine harvesting activities are not currently being conducted within the Area, and the marine component of the Area represents only 0.5% of CCAMLR Subarea 48.1, it is important that should harvesting be undertaken within the Area then it should be carried out in such a way that it would not impact on the important scientific and other values present within the Area.

Important values present in the proposed ASMA in the vicinity of Palmer Station and key activities to be managed are summarised as follows:

1. Values to be protected and activities to be managed

(i) *Scientific values*

The diverse and easily accessible assemblages of marine and terrestrial flora and fauna in the southwest Anvers Island and Palmer Basin area are particularly valuable for science, with some datasets spanning the past 100 years and intensive scientific interest beginning in the 1950s. Studies have been carried out on a wide variety of topics, including long-term monitoring of seal and bird populations, surveys of plants and animals in both the terrestrial and sub-tidal environments, investigations of the physiology and biochemistry of birds, seals, terrestrial invertebrates and zooplankton,

the behavior and ecology of planktonic marine species, physical oceanography, and marine sedimentology and geomophology. While the United States (US) maintains the only permanent research station within the Area, research in these fields has been undertaken by scientists from a broad range of Antarctic Treaty Parties, often as collaborative projects with US scientists. Some important recent examples from the Palmer Long Term Ecological Research (LTER) program are described below.

The southwest Anvers Island and Palmer Basin area has exceptional importance for long-term studies of the natural variability in Antarctic ecosystems, the impact of world-wide human activities on Antarctica and on the physiology, populations and behaviour of its plants and animals. Research in this region is essential for understanding the linkages among avifauna, krill dynamics and the changing marine habitat.

In particular, the United States Antarctic Program (USAP) has a major and ongoing commitment to ecosystem research in the Antarctic Peninsula region, which was formalized through the designation in 1990 of the area around Palmer Station (US) as a Long Term Ecological Research (LTER) site. The Palmer LTER (PAL-LTER) site is part of a wider network of LTER sites, and one of only two in the Antarctic, designed specifically to address important research questions related to environmental change over a sustained period spanning more than several decades. Since 1991, the PAL-LTER program has included spatial sampling during annual and seasonal cruises within a large-scale (200,000 km2) regional grid along the west coast of the Antarctic Peninsula, as well as temporal sampling from October to March in the local area adjacent to Palmer Station. The Palmer LTER and the British Antarctic Survey are collaborating on research comparing the marine ecosystem in the Palmer Basin region with that in Marguerite Bay approximately 400 km further to the south. In the Palmer region, the ecosystem is changing in response to the rapid regional warming first documented by BAS scientists. In addition, recent collaboration has been established as part of the International Polar Year with scientists from France and Australia using metagenomic tools to understand microbial community adaptations to the polar winter.

A major theme in the PAL-LTER is the study of sea-ice dynamics and related impacts on all aspects of the ecosystem (Smith et al. 1995). The annual advance and retreat of sea-ice is a major physical determinant of spatial and temporal changes in the structure and function of the Antarctic marine ecosystem, from total and annual primary production to breeding success in seabirds. The Western Antarctic Peninsula (WAP) is a premier example of a region experiencing major changes in species abundance, range and distribution, in response to regional climate change. This change is manifested primarily as a southern migration of regional climate characteristics (Smith et al. 1999, 2001). Paleoecological records on sea-ice, diatom stratigraphy and penguin colonization have also placed the current LTER data into a longer-term context (Smith et al. 1999, 2001). In particular, the Palmer Basin has been the site of extensive paleoecological and climate change studies. The Palmer Basin also exhibits a variety of geomorphological features of value.

Extensive seabird research has focused on the ecology of Adélie penguins and their avian predators and scavengers within the inshore 50 km2 PAL-LTER grid close to Palmer Station. Colonies on 18 islands in this area are visited every 2-7 days in the summer season, and three more distant control sites within the ASMA are also visited infrequently to assess the extent of possible disturbance from activities around Palmer Station. Sea ice forms a critical winter habitat for Adélie penguins, and interdisciplinary research has focused on the impacts of changes in the frequency, timing and duration of sea-ice on the life histories of this and other bird species, as well as on prey populations.

Torgersen Island is the site of a study on the impacts of tourism, and has been divided into two areas, one open to visitors and the other closed as a site for scientific reference. This site together with other nearby islands not visited by tourists provide a unique experimental setting to examine the relative effects of natural versus human-induced variability on Adélie penguin populations. The long-term data sets obtained from this site are of particular value in understanding the impacts of tourism on birds.

The southwest Anvers Island and Palmer Basin region also hold particular scientific interest in terms of newly-exposed terrestrial areas that have been subject to vegetation colonization after glacial retreat. With continuing trends of glacial retreat, these areas are likely to be of increasing scientific value.

Seismic monitoring at Palmer Station contributes to a global seismic monitoring network, and the remote location of the station also makes it a valuable site for long-term monitoring of global levels of radionuclides.

It is important that the region is carefully managed so that these scientific values can be maintained and the results of the long-term research programs are not compromised.

(ii) *Flora and fauna values*

The southwest Anvers Island and Palmer Basin region is one of the most biologically diverse in Antarctica, with numerous species of bryophytes, lichens, birds, marine mammals and invertebrates (Appendix C). These organisms are dependent on both the marine and terrestrial ecosystems for food and habitat requirements, with the Palmer Basin exerting a substantial influence on regional ecological processes.

Breeding colonies of birds and seals are present on ice-free areas along the coast of Anvers Island, as well as on many of the offshore islands within the region. Eleven species of birds breed in the Area, with Adélie penguins (*Pygoscelis adeliae*) the most abundant, and several other species are frequent non-breeding visitors. Five species of seals are commonly found in the Area, but are not known to breed there. Palmer Basin is an important foraging area for birds, seals and cetaceans.

The two native Antarctic vascular plants, *Deschampsia antarctica* and *Colobanthus quitensis*, are commonly found on surfaces with fine soil in the area around Arthur Harbor, although they are relatively rare along the Antarctic Peninsula (Komárková et al. 1985). The vascular plant communities found at Biscoe Point (ASPA No. 139) and on the Stepping Stones are some of the largest and most extensive in the Anvers Island region, and are particularly abundant for such a southerly location. Dense communities of mosses and lichens are also found on Litchfield Island (ASPA No. 113) – a site specially protected for exceptional vegetation values – and at several other locations around Arthur Harbor.

The soils and plant communities provide an important habitat for invertebrates, and the ice-free islands and promontories close to Palmer Station are particularly valuable for their abundant populations of the endemic wingless midge *Belgica antarctica*, the southernmost, free-living true insect. This is also of significant value for scientific studies, since this species has not been found to the same extent close to other research stations on the Antarctic Peninsula.

(iii) *Educational and visitor values*

The southwest Anvers Island area holds a special attraction to tourists because of its biological diversity, accessibility and the presence of Palmer Station. These features offer tourists the opportunity to observe wildlife, and gain an appreciation of Antarctic environments and scientific operations. Outreach to tourists via local tours and shipboard lectures given by scientists is a valuable educational tool, and information is also made available to high school students in the US by initiatives through the LTER program.

2. Aims and objectives

The aim of this Management Plan is to conserve and protect the unique and outstanding environment of the southwest Anvers Island and Palmer Basin region by managing the variety of activities and interests in the Area. The Area requires special management to ensure that these important values are protected and sustained in the long-term, especially the extensive scientific data sets collected over the last 100 years.

Increasing human activity and potentially conflicting interests have made it necessary to manage and coordinate activities more effectively within the Area.

The specific objectives of management in the Palmer Basin region are to:

- Facilitate scientific research while maintaining stewardship of the environment;

- Assist with the planning and coordination of human activities in the region, managing potential or actual conflicts of interest among different values, activities and operators, including between different areas of scientific research;

- Ensure that any marine harvesting activities are coordinated with scientific research and other activities taking place within the Area. This coordination could include the development of a plan for harvesting within the Area in advance of any such activities taking place.

- Ensure the long-term protection of scientific, ecological, and other values of the Area through the minimization of disturbance to or degradation of these values, including disturbance to fauna and flora, and to minimize the cumulative environmental impacts of human activities;

- Minimize the footprint of all facilities and scientific experiments established in the Area, including the proliferation of field camps and boat landing sites;

- Promote the use of energy systems and modes of transport that have the least environmental impact, and minimize the use of fossil fuels for the conduct of activities in the Area;

- Encourage communication and co-operation between users of the Area, in particular through dissemination of information on the Area and the provisions that apply.

3. Management activities

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

- National Programs operating within the Area should establish a Southwest Anvers Island and Palmer Basin Management Group to oversee coordination of activities in the ASMA. The Management Group is established to:

- facilitate and ensure effective communication among those working in or visiting the Area;

- provide a forum to resolve any potential conflicts in uses;

- maintain a record of activities and, where practical, impacts in the Area;

- develop strategies to detect and address cumulative impacts;

- evaluate the effectiveness of management activities; and

- disseminate information on the values and objectives of the ASMA to those working in or visiting the Area.

The Management Group should convene on an annual basis to review past, existing, and future activities and to make recommendations on the implementation of this Management Plan, including its revision when necessary.

- To guide activities in the Area, a general Code of Conduct for activities is included in this Management Plan (see Section 7) and further Guidelines relating to specific activities and zones are included in the Appendices.

- National Programs operating within the Area and tour operators visiting should ensure that their personnel (including staff, crew, visiting scientists and passengers) are briefed on, and are aware of, the requirements of this Management Plan;

- The USAP determines annually the number of tourist vessel visits to Palmer Station (approximately 12 per season) through a pre-season scheduling and approval process;

- Signs and markers shall be erected where necessary and appropriate to show the boundaries of Antarctic Specially Protected Areas (ASPAs) and other zones within the Area. Signs shall be secured and maintained in good condition, and removed when no longer necessary;

- Copies of this Management Plan and supporting documentation will be made available at Palmer Station (US). In addition, the Management Group shall make this information freely available in electronic form to enable visitors to consult plan requirements in advance and to enable them to carry a copy when visiting;

- Visits should be made to the Area as necessary (no less than once every 5 years) to evaluate the effectiveness of the Management Plan, and to ensure that management and maintenance measures are adequate. The Management Plan, Code of Conduct and Guidelines will be revised and updated as necessary.

Note: any activity planned inside an ASPA within the Area requires a permit and must refer to the appropriate management plan for guidance.

4. Period of Designation

Designated for an indefinite period.

5. Maps and photographs

Map 1. Regional map and ASMA boundary.

Map 2. SW Anvers Island Restricted Zones: Rosenthal, Joubin and Dream islands.

Map 3. Arthur Harbor & Palmer Station access.

Map 4. Palmer Station Operations Zone.

Map 5. Torgersen Island Zones.

Map 6.Dream Island Restricted Zone.

Map 7. Litchfield Island, ASPA No.113.

Map 8. Biscoe Point, ASPA No.139.

6. Description of the Area

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

General description

Anvers Island is the largest and most southerly island in the Palmer Archipelago, located approximately 25 km west of the Antarctic Peninsula. It is bounded by Neumayer Channel and Gerlache Strait in the southeast and Bismarck Strait to the south (Map 1). Anvers Island is heavily glaciated, the southwestern half being dominated by the Marr Ice Piedmont, a broad expanse of permanent ice rising gently from the coast to around 1000 m elevation. The southern and western coastlines of Anvers Island within the Area comprise mainly ice cliffs on the edge of the Marr Ice Piedmont, punctuated by small rocky outcrops, ice-free promontories and numerous small near-shore islands. Other prominent land features within the Area include ice-free Cape Monaco at the southwestern extremity of Anvers Island, and Cape Lancaster in the southeast.

These ice-free areas form important sites for animal and plant colonisation.

Six main island groups exist within the Area: in the north are the Rosenthal Islands (~22 km NW of Palmer Station). Fringing the Palmer Basin are the Joubin Islands, the Arthur Harbor island group (location of Palmer Station), the Wauwermans Islands, the Dannebrog Islands and the Vedel Islands. These island groups are of low relief, generally of less than 100 m in elevation, although local topography can be rocky and rugged together with small relict ice-caps.

Palmer Station (US) (64°46'27"S, 64°03'15"W) is located within Arthur Harbor on Gamage Point, an ice-free promontory on the southwestern coast of Anvers Island at the edge of the Marr Ice Piedmont (Maps 3 & 4). Immediately to the south of the station are Hero Inlet and Bonaparte Point. Norsel Point lies 2.7 km from Palmer Station at the NW extremity of the largest island in Arthur Harbor, which until recently was joined to Anvers Island by an ice-bridge. Other islands within a few km west of the station include Torgersen (Map 5), Humble, Breaker and Litchfield (Map 7) islands, the latter designated as ASPA No. 113. Those nearby to the southeast include Shortcut, Christine, Hermit, Limitrophe, Laggard and Cormorant islands (Map 3). More distant, Biscoe Point, ASPA No. 136, lies on a small island ~14 km to the southeast that was until recently also joined by an ice-bridge to Anvers Island (Map 8). To the west, Fraser, Halfway (Map 2) and Dream (Map 6) islands lie 5.9, 6.4 and 9.4 km respectively NW of Palmer Station in Wylie Bay.

There are three dominant marine features in the Palmer Basin region:

1. Shallow shelves: extend from Anvers Island and the adjacent island groups to depths of 90-140 m.

2. Bismarck Strait: located south of Palmer Station and north of the Wauwermans Islands on an east–west axis, with depths generally between 360 to 600 m, connecting the southern entrances to Gerlache Strait and Neumayer Channel to Palmer Basin.

3. Palmer Basin: the only deep basin in the area, located 22 km southwest of Palmer Station and with a maximum depth of ~1400 m. It is bordered by the Joubin Islands to the north, the Wauwermans Islands to the east, and the Dannebrog and Vedel island groups in the southeast, and is surrounded by shelves shallower than 165 m. A channel of ~460 m depth connects Palmer Basin to the continental shelf edge west of the Area.

Boundaries of the Area

The Southwest Anvers Island and Palmer Basin ASMA encompasses an area of approximately 3275 km2, including both terrestrial and marine components. For ease of navigation, the boundaries of the Area follow geographic features where practical and latitude/longitude lines in open ocean areas remote from prominent land features. The northeastern boundary of the Area is defined as a line extending parallel to and approximately one kilometer inland from the southwest Anvers Island coastline. This terrestrial boundary extends from a northerly location at 64°33'S, 64°06'03"W, ~3.1 km north of Gerlache Island, to 64°51'21"S, 63°42'36"W at Cape Lancaster in the south. From Cape Lancaster, the eastern boundary is defined as the 63°42'36"W line of longitude extending 7.9 km across Bismarck Strait to 64°55'36"S on Wednesday Island, the most easterly of the Wauwermans Islands. The boundary then follows a general southwesterly direction to 65°08'33"S, 64°14'22"W at the southern extremity of the Vedel Islands, following the eastern coastlines of the Wauwermans, Dannebrog and Vedel island groups. The southern boundary of the area is defined as the 65°08'33"S line of latitude extending due west from 64°14'22"W in the Vedel Islands to 65°00'W.

The northern boundary is defined as the line of latitude extending from 64°33'S, 64°06'03"W to the coast (~3.1 km north of Gerlache Island) and thence due west to the 65°00'W line of longitude. The western boundary of the Area is defined as the 65°00'W line of longitude, extending between 64°33'S in the north and 65°08'33"S in the south.

The boundaries of the Area have been designed to include areas of high ecological value while also maintaining a practical configuration for ease of use and navigation. The original Multiple-use Planning Area boundary has been extended northwards to include the Rosenthal Islands, which contain several large colonies of chinstrap and gentoo penguins that may function as source populations for other colonies in the southwest Anvers Island region (W. Fraser pers. comm. 2006). The original boundary

has also been extended westwards and southwards to include the full extent of the Palmer Basin, because of the biological, palaeoecological and oceanographic importance of this feature.

The extent of the terrestrial component has been revised from the original Multiple-use Planning Area boundary to exclude extensive ice fields on the Marr Ice Piedmont, which do not possess values related to the core objectives of the management plan. The boundary encompasses all ice-free coastal areas, the Palmer Basin which plays a key role in regional ecosystem processes, and the nearby associated island groups, which are biologically important and also the focus of most human activity in the region.

Climate

The western Antarctic Peninsula is experiencing the most rapid warming of any marine ecosystem on the planet (Ducklow et al. 2007). The mean annual temperature at Palmer Station between 1974-96 was –2.29° C, with an average minimum monthly air temperature over this period of –7.76° C in August, and a maximum of 2.51° C in January (Baker 1996). Data from Faraday / Vernadsky Station 53 km to the south demonstrate a statistically significant trend of annual average temperature rise, from –4.4º in 1951 to –2.0º in 2001, an average rate of 0.057º C per annum (Smith et al. 2003). The minimum recorded temperature at Palmer Station as of 2006 is –31° C, and the maximum is 9° C. Storms and precipitation are frequent, with approximately 35-50 cm water equivalent of precipitation received annually in the form of snow and rain (Smith et al. 1996). Winds are persistent but generally light to moderate in strength, prevailing from the northeast.

Glaciology, geology and geomorphology

The dominant glacial feature within the Area is the Marr Ice Piedmont. Smaller glaciers and ice-caps are found on many of the islands and promontories, the largest of which is located on Gerlache Island in the Rosenthal Islands (Map 2). Recent observations show the local glaciers to be retreating by approximately 10 m annually, with a number of ice-bridges between the Marr Ice Piedmont and offshore islands having collapsed.

Anvers Island and the numerous small islands and rocky peninsulas along its southwestern coast are composed of late-Cretaceous to early-Tertiary age granitic and volcanic rocks belonging to the Andean Intrusive Suite. These rocks dominate the Anvers Island area (Hooper 1962) and similar rock types extend into the island groups further south.

The main marine geomorphological feature within the Area is Palmer Basin, an erosional, inner-shelf trough located at the convergence of former ice-flows that once drained across the continental shelf from three distinct accumulation centers on the Antarctic Peninsula and Anvers Island (Domack et al. 2006). Seafloor features include relict terraces, sub-glacial lake deltas, channels, debris slopes and morainal banks. These remain as evidence of the development of a sub-glacial lake within the

Palmer Basin during, or prior, to the last glacial maximum, its subsequent drainage, and the recession of the Palmer Basin ice stream system (Domack et al. 2006).

Freshwater habitat

Throughout the Area there are no significant lakes or streams, although there are numerous small ponds and temporary summer melt streams (Lewis Smith 1996). These are mainly on Norsel Point and some of the offshore islands in Arthur Harbor: notably on Humble Island, and also found on Breaker, Shortcut, Laggard, Litchfield and Hermit islands, and at Biscoe Point (W. Fraser, pers. comm. 2006), although many are heavily contaminated by neighboring penguin colonies and groups of non-breeding skuas. The streams possess few biota other than marginal mosses (e.g. *Brachythecium austrosalebrosum, Sanionia uncinata*), which are a favored habitat for the larvae of the Antarctic wingless midge, *Belgica antarctica*. However, the ponds support a diverse micro-algal and cyanobacterial flora, with over 100 taxa being recorded, although numbers vary considerably between ponds (Parker 1972, Parker & Samsel 1972). Of the freshwater fauna there are numerous species of protozoans, tardigrades, rotifers, and nematodes, and a few free-swimming crustaceans of which the *anostracan Branchinecta gaini* (Antarctic fairy shrimp) and copepods *Parabroteus sarsi* and *Pseudoboeckella poppii* are the largest and most conspicuous (Heywood 1984).

Flora

The Area lies within the cold maritime Antarctic environment of the western Antarctic Peninsula, where conditions of temperature and moisture availability are suitable to support a high diversity of plant species, including the two native flowering plants Antarctic hairgrass (*Deschampsia antarctica*) and Antarctic pearlwort (*Colobanthus quitensis*) (Longton 1967; Lewis Smith 1996, 2003). In Antarctica these flowering plants occur only in the western Peninsula region, South Shetland and South Orkney Islands, occurring most frequently on sheltered, north-facing slopes, especially in gullies and on ledges near sea level. In a few favourable sites the grass has developed locally extensive closed swards (Lewis Smith 1996), notably at Biscoe Point (ASPA No. 139), where closed swards cover up to 6500 m2. Throughout the maritime Antarctic, and especially in the Arthur Harbor area, the warming trend since the early 1980s has resulted in populations of both species rapidly increasing in number and extent, and numerous new colonies becoming established (Fowbert & Lewis Smith 1994; Day et al. 1999).

Vegetation within the Area is otherwise almost entirely cryptogamic (Lewis Smith 1979), with bryophytes dominating moist to wet habitats and lichens and some cushion-forming mosses occupying the drier soils, gravels and rock surfaces (Komárková et al. 1985). Dense communities of mosses and lichens are found at several locations around Arthur Harbor, including Norsel Point, Bonaparte Point and Litchfield Island, as well as some of the outer islands and Cape Monaco. In particular, sheltered north-facing slopes support locally extensive communities of the moss turf sub-formations up to 30 cm in depth, with stands of the *Polytrichum strictum–Chorisodontium aciphyllum* association predominating (Lewis Smith 1982). In Arthur

Harbor large banks of these mosses can be found overlying an accumulation of peat exceeding a meter in depth and radio-carbon dated at almost 1000 years old. These are particularly apparent on Litchfield Island (ASPA No. 113), which is protected principally because of its outstanding vegetation values. Smaller examples are found on Laggard Island, Hermit Island and on Norsel Point, with small banks occurring on coastal promontories and islands throughout the Area. The largest of the Joubin Islands has a peat bank composed solely of Chorisodontium (Fenton & Lewis Smith 1982). From the late 1970s relictual patches of centuries-old peat formed by these mosses became exposed below the receding ice cliffs of Marr Ice Piedmont, notably on Bonaparte Point (Lewis Smith 1982). Wet level areas and seepage slopes usually support communities of the moss carpet and mat sub-formation in which *Sanionia uncinata, Brachythecium austrosalebrosum* and *Warnstorfia* spp. are usually dominant. One exceptionally extensive stand on Litchfield Island was destroyed by the increasing summer influx of fur seals during the 1980s.

Lichen-dominated (e.g. species of *Usnea, Pseudephebe, Umbilicaria* and many crustose forms) communities of the fruticose and foliose lichen sub-formation (often referred to as fellfield) are widespread on most stable, dry stony ground and exposed rock surfaces, often with associated cushion-forming mosses (e.g. species of *Andreaea, Hymenoloma, Orthogrimmia* and *Schistidium*) (Lewis Smith & Corner 1973). Rocks and boulders close to the shore, especially where influenced by nutrient (nitrogen) input from nearby penguin and petrel colonies, usually support various communities of the crustose and foliose lichen sub-formation. Many of the species (e.g. *Acarospora, Amandinea, Buellia, Caloplaca, Haematomma, Lecanora, Lecidea*, *Xanthoria*) are brightly coloured (orange, yellow, gray-green, brown, white).

The green foliose alga Prasiola crispa develops a conspicuous zone on the highly nutrient enriched soil and gravel around penguin colonies. In late summer melting ice fields and permanent snow patches develop a reddish hue as huge aggregations of unicellular snow algae accumulate in the melting firn. Elsewhere, green snow algae give the surface a distinctive coloration.

A checklist of flora observed in the Area is included in Appendix C.

Invertebrates

The vegetation communities found within the Area serve as important habitat for invertebrate fauna. As is common elsewhere on the Antarctic Peninsula, springtails and mites are especially prominent. Colonies of the mite *Alaskozetes antarcticus* are frequently observed on the sides of dry rocks, while other species are associated with mosses, fruticose lichens and Antarctic hairgrass. The most common springtail, *Cryptopygus antarcticus*, is found in moss beds and under rocks. Springtails and mites are also found in other habitats, including bird nests and limpet accumulations (Lewis Smith 1966).

The islands near Palmer Station are notable for their abundant populations of the wingless midge *Belgica antarctica*, a feature not found to the same extent close to other research stations on the Antarctic Peninsula.

This endemic species is significant because it is the southernmost, free-living true insect. It inhabits a wide range of habitats including moss, the terrestrial alga *Prasiola crispa* and nutrient-enriched microhabitats adjacent to elephant seal wallows and penguin colonies. Larvae are exceptionally tolerant of freezing, anoxia, osmotic stress and desiccation.

Colonies of the seabird tick *Ixodes uriae* are frequently found beneath well-drained rocks adjacent to seabird nests and especially Adélie penguin colonies. This tick has a circumpolar distribution in both hemispheres and exhibits the greatest range of thermal tolerance (-30 to 40°C) of any Antarctic terrestrial arthropod. The abundance of this tick has decreased during the past three decades concomitantly with observed decreases in Adélie penguin populations (R. Lee pers. comm. 2007).

Birds

Three species of penguins, Adélie (*Pygoscelis adeliae*), chinstrap (*P. antarctica*) and gentoo (*P. papua*), breed in the southwest Anvers Island area (Parmelee & Parmelee 1987, Poncet & Poncet 1987, Woehler 1993). The most abundant species is the Adélie penguin, which breeds on Biscoe Point, Christine, Cormorant, Dream, Humble, Litchfield and Torgersen islands, as well as the Joubin and Rosenthal islands (Maps 2-8). Numbers of Adélie penguins have declined significantly over the last 30 years, thought to be linked to the effects of the changing climate on sea-ice conditions, snow accumulation and prey availability (Fraser & Trivelpiece 1996, Fraser & Hofmann 2003, Fraser & Patterson 1997, Trivelpiece & Fraser 1996). Numbers of Adélie penguins breeding on Litchfield Island declined from 884 pairs to 143 pairs between 1974/75 and 2002/03, with no pairs breeding in 2006/07 (W. Fraser pers. comm. 2007). Chinstrap penguins are present on Dream Island, on small islands near Gerlache Island, and on the Joubin Islands. The Rosenthal Islands contain source populations of chinstrap and gentoo penguins that are likely to be closely linked to other colonies in the southwest Anvers Island region. Gentoo penguins are thought to be increasing in the region in response to the regional warming, and may be colonising new sites in recently deglaciated areas or sites vacated by Adélie penguins. In particular, small glaciers on the Wauwermans Islands are retreating and may provide important habitat for new gentoo colonies (W. Fraser pers. comm. 2006).

Southern giant petrels (*Macronectes giganteus*) breed at numerous locations within the Area. Blue-eyed shags (*Phalacrocorax [atriceps] bransfieldensis*) breed on Cormorant Island, Elephant Rocks and in the Joubin Islands. Other breeding bird species occurring in the Area include kelp gulls (*Larus dominicanus*), Wilson's storm petrels (*Oceanites oceanicus*), sheathbills (*Chionis alba*), south polar skuas (*Catharacta maccormicki*), brown skuas (*C. loennbergi*) and Antarctic terns (*Sterna vittata*). Common non-breeding visitors include southern fulmars (*Fulmarus glacialoides*), Antarctic petrels (*Thalassoica antarctica*), cape petrels (*Daption capense)* and snow petrels (*Pagadroma nivea*). A full list of breeding, frequent and less common or transient visitors recorded in the Area is provided in Appendix C.

Marine mammals

There are few published data on the marine mammals within the area. Cruises conducted in Gerlache Strait have observed fin (*Balaenoptera physalus*), humpback (*Megaptera novaeangliae*) and southern bottlenose (*Hyperoodon planifrons*) whales (Thiele 2004). Anecdotal observations by Palmer Station personnel and visitors have noted fin, humpback, sei (*Balaenoptera borealis*), southern right (*Eubalaena australis*), minke (*Balaenoptera bonaerensis*) and killer (*Orcinus orca*) whales within the Area, as well as hourglass dolphins (*Lagenorhynchus cruciger*) (W. Fraser pers. comm. 2007). Non-breeding Weddell (*Leptonychotes weddellii*) and southern elephant seals (*Mirounga leonina*) haul out on accessible beaches, and crabeater (*Lobodon carcinophagus*) and leopard seals (*Leptonyx hydrurga*) are also commonly seen at sea and on ice floes within the Area. Numbers of non-breeding Antarctic fur seals (*Arctocephalus gazella*), mainly juvenile males, have increased in recent years, and depending on the time of year hundreds to thousands of individuals may be found on local beaches throughout the Area. Their increasing abundance is damaging vegetation at lower elevations (Lewis Smith 1996, Harris 2001). Despite the lack of published data concerning marine mammals within the Area, their presence is likely to be related to foraging for Antarctic krill, which forms an important component in their diets (Ducklow et al. 2007). A list of marine mammals observed within the Area is provided in Appendix C.

Oceanography

The Western Antarctic Peninsula is unique as the only region where the Antarctic Circumpolar Current (ACC) is adjacent to the continental shelf. The ACC flows in a northeasterly direction off the shelf, and there is also some southward flow on the inner part of the shelf (Smith et al. 1995). Circumpolar Deep Water (CDW) transports macronutrients and warmer, more saline water onto the shelf, which has significant implications for heat and salt budgets in the southwest Anvers Island and Palmer Basin region. Circulation patterns and the presence of the CDW water mass may also affect the timing and extent of sea ice (Smith et al. 1995). The extent of sea ice cover and the timing of the appearance of the marginal ice zone (MIZ) in relation to specific geographic areas have high interannual variability (Smith et al. 1995), although Smith and Stammerjohn (2001) have shown a statistically significant reduction in overall sea-ice extent in the Western Antarctic Peninsula region over the period for which satellite observations are available. The ice edge and the MIZ form major ecological boundaries, and are of particular interest in the region because of their interaction with many aspects of the marine ecosystem, including phytoplankton blooms and seabird habitat. Within the Area, the Palmer Basin is a focal point of biological and biogeochemical activity and an important area of upwelling.

Marine ecology

The marine ecosystem west of the Antarctic Peninsula is highly productive, with dynamics that are strongly coupled to the seasonal and interannual variations in sea ice. The rapid climate changes occurring on the western Antarctic Peninsula, with resultant changes in sea ice, is affecting all levels of the food web (Ducklow et al.

2007). Marine flora and fauna within the Area are strongly influenced by factors including low temperatures, a short growing season, high winds influencing the depth of the mixed layer, proximity to land with the potential for input of micronutrients, and the varying sea-ice coverage. It is a high-nutrient, low-biomass environment.

High levels of primary production are observed within the region, maintained by topography-induced upwellings and stratification by fresh water input from glaciers (Prézelin et al. 2000, 2004; Dierssen et al. 2002). In terms of biomass, the phytoplankton communities are dominated by diatoms and cryptomonads (Moline & Prezelin 1996). Species distribution and composition varies with water masses, fronts and the changing position of the ice edge.

Salps and Antarctic krill (*Euphausia* sp.) often dominate the total zooplankton biomass (Moline & Prezelin 1996). Dominant organisms in the neritic province on the shelf southwest of Anvers Island are E. superba, E. crystallorophias, and fish larvae (Ross et al. 1996). The distribution and abundance of zooplankton is variable over time, and Spiridonov (1995) found krill in the Palmer Archipelago to exhibit a highly variable life cycle as compared with other areas of the western Antarctic Peninsula.

There is a high level of endemism among fish species sampled on the Antarctic continental shelf as compared with other isolated marine communities, with new species still being regularly discovered (Eastman 2005). Examples of fish collected within the Area are six species of Nototheniidae (*Notothenia coriiceps neglecta, N. gibberifrons, N. nudifrons, Trematomus bernachii, T. hansoni and T. newnesi*), one of Bathydraconidae (Parachaenichthys charcoti) and one of Channichthydae (Chaenocephalus aceratus) (De Witt & Hureau 1979, Detrich 1987, McDonald et al. 1992).

The soft-bottomed macrobenthic community of Arthur Harbor is characterised by high species diversity and abundance, being dominated by polychaetes, peracarid crustaceans and molluscs (Lowry 1975, Richardson & Hedgpeth 1977, Hyland et al. 1994). Samples collected during a study of UV effects on marine organisms carried out close to Palmer Station during the austral spring (Karentz et al. 1991) yielded 57 species (1 fish, 48 invertebrates, and 8 algae). Sampling was from a combination of rocky intertidal areas (yielding 72% of organisms), subtidal and planktonic habitats. Of the marine invertebrates collected, the greatest number of species was found in the phylum Arthropoda (12 species). The Antarctic limpet (*Nacella concinna*) is common in Arthur Harbor (Kennicutt et al. 1992b).

Human activities and impact

'Base N' (UK) was built on Norsel Point (Map 3) in 1955 and operated continuously until 1958. The United States established 'Old Palmer' Station nearby on Norsel Point in 1965, although in 1968 transferred the main US operations to the present site of Palmer Station on Gamage Point. 'Base N' was used as a biological laboratory by US scientists from 1965-71, although this burnt to the ground in 1971. 'Old Palmer'

station was removed by the US in 1991, and all that remains of both 'Old Palmer' and 'Base N' are the original concrete footings.

On 28 January 1989, the Argentine vessel Bahia Paraiso ran aground 750 m south of Litchfield Island, releasing more than 600,000 liters (150,000 gallons) of petroleum into the surrounding environment (Kennicutt 1990, Penhale et al. 1997). Contamination was lethal to some of the local biota including krill, intertidal invertebrates and seabirds, particularly Adélie penguins and blue-eyed shags (Hyland et al. 1994, Kennicutt et al. 1992a&b, Kennicutt & Sweet 1992). A summary of the spill, research on the environmental impact, and the joint 1992/1993 clean-up by Argentina –and The Netherlands can be found in Penhale et al. (1997).

All fin-fishing is currently prohibited in the western Antarctic Peninsula region (CCAMLR Statistical Subarea 48.1) under CCAMLR Conservation Measure 32-02 (1998) (CCAMLR 2006a). Krill fishing occurs in the offshore region to the northwest of the Palmer Archipelago, and is currently concentrated mainly around the South Shetland Islands further to the north. The total krill catch for Subarea 48.1 was reported at 7095 tonnes in the 2004/05 season (CCAMLR 2006b), and there has been some limited historical activity in the vicinity of the ASMA. However, fine-scale data show krill catches in the southwest Anvers Island region during only one 3-month period between 2000 and 2005, with a total catch of less than 4 tonnes (Q2, 2002/03)(CCAMLR 2006b: 187). CCAMLR-related activities are therefore occurring within or close to the Area, but are currently minimal.

Current human activities in the Area are mainly related to science and associated logistic activities, and tourism. Palmer Station (US) serves as the base for scientific research and associated logistic operations conducted in the western Antarctic Peninsula and Palmer Archipelago by the United States Antarctic Program (USAP) and collaborators from a number of other Antarctic Treaty Parties. Scientific and logistic support is received from ships operated or chartered by the USAP, which visit the station approximately 15 times per year. Aircraft are not operated routinely from Palmer Station, although helicopters may visit occasionally in summer. Local scientific transport and support is provided using small inflatable boats, which are operated throughout the 3-mile (~5 km) 'safe boating limit' area during the summer season (Map 3). Frequent visits are made to islands within the safe boating limit for scientific research, and also for recreation by base personnel.

Published information on the impacts of science (for example from sampling, disturbance or installations) within the Area is limited. However, numerous welding rods inserted into soil to mark vegetation study sites (Komárková 1983) were abandoned at Biscoe Point (ASPA No. 139) and Litchfield Island (ASPA No. 113) in 1982. Where these remained, surrounding vegetation had been killed as an apparent result of highly localised contamination by chemicals from the rods (Harris 2001).

Between 1984/85 and 1990/91, the number of tour ship visits each season at Palmer Station increased from 4 visits (340 visitors) to 12 (1300 visitors). Since 1991 the number of tour ship visits to Palmer Station has been maintained at approximately 12 vessels annually, with visits arranged prior to the start of the season. Tourists

typically land at the station itself for a tour of the facilities, visit the Visitor Zone on Torgersen Island (Map 5), and make short cruises around the nearshore islands using inflatable boats. Yachts also visit Palmer Station and the surrounding area, with 17 vessels visiting during the 2007/08 season. Studies of changes in penguin populations on Torgersen Island and nearby islands suggest that the impacts of visits by tourists, base personnel, and scientists on breeding performance have been small compared to longer-term climate-related forcing factors (Fraser & Patterson 1997, Emslie et al. 1998, Patterson 2001).

(ii) *Structures within the Area*

Modern Palmer Station (Map 4) consists of two main buildings, a laboratory facility and several ancillary structures including an aquarium, small boathouse, workshops, storage and communications facilities. The station is powered by one diesel-electric generator, the fuel for which is stored in two double-walled tanks. A pier has been constructed adjacent to the station at the entrance to Hero Inlet, which may accommodate medium-sized scientific and logistic support ships. The station is operated year-round and can accommodate approximately 44 people, with a summer occupancy of at least 40, and a winter complement of around 10.

(iii) *Restricted and managed zones within the Area*

Three types of management zones (Restricted, Visitor and Operations) are designated within the Area. Two ASPAs are also located within the Area.

(a) Restricted Zones

Sixteen sites of special ecological and scientific value are designated as Restricted Zones (Maps 2-6). These sites are particularly sensitive to disturbance during the summer months, and are listed as follows:

Table 1: Restricted Zones within the Southwest Anvers Island and Palmer Basin ASMA

Bonaparte Point (incl. 'Diana's Island' and 'Kristie Cove') Christine Island Cormorant Island Dream Island Elephant Rocks Hermit Island Humble Island Joubin Islands	Laggard Island Limitrophe Island Norsel Point Rosenthal Islands Shortcut Island Shortcut Point Stepping Stones Torgersen Island (SW half of island)

The Restricted Zones include a buffer extending 50 m from the shore into any adjacent marine area (Map 2).

A 50 m Restricted Zone buffer also extends around Litchfield Island (ASPA No. 113). In order to protect sensitive bird colonies throughout the breeding season to the maximum extent possible, and also plant communities, access to Restricted Zones between 1 October to 15 April inclusive is restricted to those conducting essential scientific research, monitoring or maintenance. All non-essential small boat traffic should avoid transit of or cruising within the 50 m marine buffers of Restricted Zones.

Specific guidelines for scientific research activities within Restricted Zones are included in the Scientific Guidelines for the ASMA (Appendix A).

(b) Visitor Zone

The northeastern half of Torgersen Island is designated as a Visitor Zone (Map 5). Visitors are currently directed to this part of the island, while access to the Restricted Zone in the southwest part of the island, which is set aside as a scientific reference area, is restricted to those conducting essential scientific research, monitoring or maintenance. Specific guidelines for activities within the Visitor Zone are included in the Visitor Guidelines for the ASMA (Appendix B).

(c) Operations Zone

Palmer Station facilities are largely concentrated within a small area on Gamage Point. The Operations Zone is designated as the area of Gamage Point encompassing the station buildings, together with adjacent masts, aerials fuel storage facilities and other structures and extending to the permanent ice edge of the Marr Ice Piedmont (Map 4).

(d) Antarctic Specially Protected Areas (ASPAs)

Two Antarctic Specially Protected Areas, ASPA No. 113 Litchfield Island and ASPA No. 139 Biscoe Point, are located within the ASMA (Maps 7 and 8). Revised management plans for both sites were adopted by the Antarctic Treaty Parties in 2004. All entry is prohibited unless in accordance with a Permit issued by an appropriate national authority.

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

In addition to ASPA No. 113 and ASPA No. 139 within the Area, the only other protected area within close proximity is ASPA No. 146 South Bay, Doumer Island, 25 km southeast of Palmer Station (Map 1). There are no Historic Sites and Monuments within the Area, with the nearest being HSM No. 61, Base A, Port Lockroy, Goudier Island, 30 km east of Palmer Station (Map 1).

7. General Code of Conduct

The Code of Conduct in this section is the main instrument for the management of activities in the Area. It outlines the overall management and operational principles

for the Area. More specific environmental, scientific and visitor guidelines are provided in the appendices.

(i) *Access to and movement within the Area*

Access to the Area is generally by ship (Map 4), with occasional access by helicopter. There are no special restrictions on the transit of vessels through the Area, with the exception of seasonal buffer zones extending 50 m from the shore at a small number of islands designated as Restricted Zones (see Section 6(iii)(a)). Prior to visiting Palmer Station, radio contact should always be made to obtain guidance on local activities being conducted in the region (Map 3).

Tour ships, yachts and National Program vessels may stand offshore and access Palmer Station and the surrounding coast and islands by small boat, taking into account the access restrictions applying within designated zones. The region of safe small boat operations and preferred small boat landing sites within the area local to Palmer Station are shown on Map 3 (see also Appendix A).

Access to Restricted Zones between 1 October – 15 April inclusive is restricted to those conducting essential scientific research, monitoring or maintenance, including the nearshore marine area within 50 m of the coast of these zones (see Section 6(iii)(a) for details). Access to ASPAs is prohibited except in accordance with a Permit issued by an appropriate national authority.

Aircraft operating within the Area should follow the 'Guidelines for the operation of aircraft near concentrations of birds in Antarctica' (Resolution 4, XXVII Antarctic Treaty Consultative Meeting). The primary helicopter landing site at Palmer Station is a flat, rocky area approximately 400 m east of Palmer Station. Helicopter approach should be high over the peninsula east of Palmer Station or up the channel from SE (refer to Palmer Station page in the Anvers Island section of the Wildlife Awareness Manual (Harris 2006)). Overflight of wildlife colonies should be avoided throughout the Area, and specific overflight restrictions apply at Litchfield Island (ASPA No.113) and Biscoe Point (ASPA No.139) (Maps 7 & 8 and specific provisions in the ASPA management plans).

Movement on land within the Area is generally on foot, although vehicles are used in the Operations Zone. A route leading from Palmer Station up onto the Marr Ice Piedmont is marked by flags to avoid crevassed areas. The precise route varies according to conditions and visitors should obtain the latest information on the route from Palmer Station. In the winter, snowmobiles are sometimes used on this route. All movement should be undertaken carefully to minimise disturbance to animals, soil and vegetated areas.

(ii) *Activities that are or may be conducted within the Area*

Activities that may be conducted in the Area include:

- scientific research, or the logistical support of scientific research, that will not jeopardise the values of the Area;

- management activities, including the maintenance or removal of facilities, clean-up of abandoned work-sites, and monitoring the implementation of this Management Plan; and

- tourist or private expedition visits consistent with the provisions of this Management Plan and the Visitor Guidelines (Appendix B);

- media, arts, education or other official national program visitors;

- harvesting of marine living resources, which should be conducted in accordance with the provisions of this Management Plan and with due recognition of the important scientific and environmental values of the Area. Any such activities should be conducted in coordination with research and other activities taking place, and could include development of a plan and guidelines that would help to ensure that harvesting activities did not pose a significant risk to the other important values of the Area.

All activities in the Area should be conducted in such a manner so as to minimize environmental impacts.

Specific guidelines on the conduct of activities within the Area, including within specific zones, can be found in the Appendices.

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

Site selection, installation, modification or removal of temporary refuges or tents should be undertaken in a manner that does not compromise the values of the Area. Installation sites should be re-used to the greatest extent possible and the location recorded. The footprint of installations should be kept to the minimum practical.

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.

(iv) *Location of field camps*

Temporary field camps may be made where required for research, and in accordance with the Restricted Zone and ASPA provisions. Field camps should be located on non-vegetated sites, or on thick snow or ice cover when practical, and should avoid concentrations of mammals or breeding birds. The location of field camps should be recorded, and previously occupied campsites should be re-used where appropriate. The footprint of campsites should be kept to the minimum practical.

Emergency caches are located on several islands within the Area for safety purposes, and are identified on Map 3. Please respect the caches and only use them in a genuine emergency, reporting any such use to Palmer Station so the cache can be restocked.

(v) *Taking or harmful interference with native flora and fauna*

Taking (including killing or capturing) 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).

(vi) *Collection or removal of anything not brought into the Area*

Material not covered by 7(v) above should only be removed from the area for scientific and associated educational purposes or essential management or conservation purposes, and should be limited to the minimum necessary to fulfill those needs. Material of human origin likely to compromise the values of the Area may be removed unless the impact of removal is likely to be greater than leaving the material in place. If this is the case the appropriate authority should be notified. Do not disturb experimental sites or scientific equipment.

(vii) *Restrictions on materials and organisms which can be brought into the Area*

Visitors should seek to minimize the risk of introduction of non-native species to the maximum extent practical.

(viii) *Waste disposal / management*

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 into the sea below the high water mark. In accordance with Article 4, Annex III of the Protocol on Environmental Protection, wastes shall not be disposed of into freshwater streams or lakes, onto ice-free areas, or onto areas of snow or ice which terminate in such areas or have high ablation.

(ix) *Requirements for Reports*

Reports of activities in the Area should be maintained by the Management Group to the greatest extent possible, and made available to all Parties. In accordance with Article 10 of Annex V of the Protocol on Environmental Protection, arrangements should be made for collection and exchange of reports of inspection visits and on any significant changes or damage within the Area.

Tour operators should record their visits to the Area, including the number of visitors, dates, and any incidents in the Area.

8. Exchange of information

In addition to the normal exchange of information by means of the annual national reports to the Parties of the Antarctic Treaty, and to SCAR and COMNAP, Parties operating in the Area should exchange information through the Management Group. All National Antarctic Programs planning to conduct scientific activities within the Area should, as far as practical, notify the Management Group in advance of their nature, location and expected duration, and any special considerations related to the deployment of field parties or scientific instrumentation within the Area.

All tour ships and yachts should, as far as practical, provide the Management Group with details of scheduled visits in advance.

All those planning to conduct marine harvesting activities within the Area should, as far as practical, notify the Management Group in advance of their nature, location and expected duration, and of any special considerations related to how these activities could impact on scientific investigations being carried out within the Area.

Information on the location of scientific activities within the Area should be disseminated as far as practical.

9. Supporting documentation

This Management Plan includes the following supporting documents as appendices:

- Appendix A: Scientific and Environmental Guidelines (including guidelines for Restricted Zones);
- Appendix B: Visitor Guidelines (including guidelines for the Visitor Zone);
- Appendix C: Plant, bird and mammal species recorded within the Southwest Anvers Island and Palmer Basin ASMA;
- Appendix D: References.

Appendices

Appendix A - Supporting Guidelines and Data

Scientific and Environmental Guidelines (including guidelines for Restricted Zones)

The coastal marine environmental of the West Antarctic Peninsula has become an important site for scientific research, with a history of study going back some fifty years. This code suggests how you can help to protect the values of the area for future generations and ensure that your presence in the region will have as little impact as possible.

- Everything taken into the field must be removed. Do not dump any unwanted material on the ground or in the water.

- Do not collect specimens or any natural material of any kind, including fossils, except for approved scientific and educational purposes.

- For those based at Palmer Station, stay within the safe boating limits: these are approximately 5 km (3 miles) from the station and no closer than 300 m from the glacier front along the Anvers Island coastline (Map 3).

- Visit only approved islands at approved times. Do not harass wildlife. Do not disturb mummified seals or penguins.

- When traveling on foot, stay on established trails whenever possible. Do not walk on vegetated areas or rock formations. Some of the biological communities in them have taken several thousand years to develop.

- Ensure that equipment and supplies are properly secured at all times to avoid dispersion by high winds. High velocity winds can arrive suddenly and with little warning.

- Avoid any activities that would result in the dispersal of foreign substances (e.g., food, fuel, reagents, litter). Do not leave any travel equipment behind.

Fuel and chemicals:

- Take steps to prevent the accidental release of chemicals such as laboratory reagents and isotopes (stable or radioactive). When permitted to use radioisotopes, precisely follow all instructions provided.

- Ensure you have spill kits appropriate to the volume of fuel or chemicals you have and are familiar with their use.

ASMA 7: Southwest Anvers Island and Palmer Basin

Sampling and experimental sites:

- All sampling equipment should be clean before being brought into the field.
- Once you have drilled a sampling hole in sea ice or dug a soil pit, keep it clean and make sure all your sampling equipment is securely tethered.
- Avoid leaving markers (e.g. flags) and other equipment for more than one season without marking them clearly with your event number and duration of your project.

Glaciers:

- Minimize the use of liquid water (e.g., with hot water drills) which could contaminate the isotopic and chemical record within the glacier ice.
- Avoid the use of chemical-based fluids on the ice.
- If stakes or other markers are placed on a glacier, use the minimum number of stakes required to meet the needs of the research; where possible, label these with event number and project duration.

Restricted Zones:

- Research in Restricted Zones should be carried out with particular care to avoid or minimize trampling of vegetation and disturbance of wildlife;
- Minimize any disturbance to birds during the breeding season (1 October to 15 April) except for compelling scientific reasons;
- Access to the mooring adjacent to the Restricted Zone on Bonaparte Point should be by small boat when ice and weather permit. If it is necessary to approach the mooring from within the Restricted Zone, walk as close to the coastline as possible to avoid south polar skua (*Catharacta* [skua] *maccormicki*) nesting territories on the ridge crest.
- All visits to and activities within Restricted Zones should be recorded, in particular records should be kept of the type and quantity of all sampling.

Appendix B

Visitor Guidelines (including guidelines for the Visitor Zone)

These guidelines are for commercial tour operators and private expeditions, as well as for National Antarctic Program staff when undertaking recreational activities within the Area.

- Visitor activities should be undertaken in a manner so as to minimize adverse impacts on the southwest Anvers Island and Palmer Basin ecosystem and/or on the scientific activities in the Area;

- Tour operators should provide visit schedules to National Programs operating in the Area in advance of their visits, which should be circulated to the Management Group as soon as they become available;

- In addition to the above, tour vessels and yachts planning to visit Palmer Station should make contact with the station at least 24 hours before arrival to confirm details of the visit;

- At Palmer Station, no more than 40 passengers should be ashore at any time;

- Small boat cruising should avoid any disturbance of birds and seals, and take account of the 50 m operation limit around Restricted Zones;

- Visitors should maintain a distance of 5 meters from birds or seals, to avoid causing them disturbance. Where practical, keep at least 15 meters away from fur seals;

- Visitors should avoid walking on any vegetation including mosses and lichens;

- Visitors should not touch or disturb scientific equipment, research areas, or any other facilities or equipment;

- Visitors should not take any biological, geological or other souvenirs, or leave behind any litter;

- Within the group of islands in Arthur Harbor, tourist landings should be confined to the designated Visitor Zone.

Visitor Zone (Torgersen Island)

Visits to Torgersen Island should be undertaken in accordance with the general visitor guidelines outlined above. Further site-specific guidelines are as follows:

- Landings on Torgersen Island should be made at the designated small boat landing site at 64°46'17.8"S, 64°04'31"W on the northern shore of the island;

- No more than 40 passengers should be ashore at any time;

- Visitors should limit their visit to the Visitor Zone portion of the island, as the Restricted Zone is a control site for scientific research (Map 5).

Appendix C

Plant, bird and mammal species recorded within the Southwest Anvers Island and Palmer Basin ASMA

Table C.1: Plant species recorded within the Area (extracted from British Antarctic Survey Plant Database (2007)).

Flowering plants	**Lichens**
Colobanthus quitensis *Deschampsia antarctica*	*Acarospora macrocyclos* *Amandinea petermannii* *Buellia anisomera, B. melanostola, B. perlata, B. russa* *Catillaria corymbosa* *Cetraria aculeata* *Cladonia carneola, C. deformis, C. fimbriata, C. galindezii, C. merochlorophaea var. novochloro, C.* *pleurota, C. pocillum, C. sarmentosa, C. squamosa* *Coelopogon epiphorellus* *Haematomma erythromma* *Himantormia lugubris* *Lecania brialmontii* *Lecanora polytropa, L. skottsbergii* *Leptogium puberulum* *Massalongia carnosa* *Mastodia tessellata* *Melanelia ushuaiensis* *Ochrolechia frigida* *Parmelia cunninghamii, P. saxatilis* *Physcia caesia, P. dubia* *Physconia muscigena* *Pseudephebe minuscula, P. pubescens* *Psoroma cinnamomeum, P. hypnorum* *Rhizoplaca aspidophora* *Rinodina turfacea* *Sphaerophorus globosus* *Stereocaulon alpinum* *Umbilicaria antarctica, U. decussata* *Usnea antarctica, U. aurantiaco-atra* *Xanthoria candelaria* *Xanthoria elegans*
Liverworts	
Barbilophozia hatcheri *Cephaloziella varians* *Lophozia excisa*	
Mosses	
Andreaea depressinervis, A. gainii var. gainii, A. regularis M *Bartramia patens* *Brachythecium austrosalebrosum* *Bryum archangelicum, B. argenteum, B. boreale, B.* *pseudotriquetrum* *Ceratodon purpureus* *Chorisodontium aciphyllum* *Dicranoweisia crispula, D. dryptodontoides* *Grimmia reflexidens* *Hymenoloma grimmiaceum* *Kiaeria pumila* *Platydictya jungermannioides* *Pohlia cruda, P. nutans* *Polytrichastrum alpinum* *Polytrichum juniperinum, P.piliferum, P. strictum* *Sanionia uncinata* *Sarconeurum glaciale* *Schistidium antarctici, S. urnulaceum* *Syntrichia magellanica* *Syntrichia princeps, S. sarconeurum* *Warnstorfia laculosa*	

Notes: The number of species recorded within the Area = 83

Table C.2: Bird and mammal species recorded within the Area (Parmelee et al. 1977; W. Fraser pers. comm. 2007).

Common name	Scientific name	Status within Area
Birds		
chinstrap penguin	*Pygoscelis antarctica*	Confirmed breeder
Adélie penguin	*Pygoscelis adeliae*	Confirmed breeder
gentoo penguin	*Pygoscelis papua*	Confirmed breeder
southern giant petrel	*Macronectes giganteus*	Confirmed breeder
blue-eyed shag	*Phalacrocorax [atriceps] bransfieldensis*	Confirmed breeder
kelp gull	*Larus dominicanus*	Confirmed breeder
Wilson's storm petrel	*Oceanites oceanites*	Confirmed breeder
sheathbill	*Chionis alba*	Confirmed breeder
south polar skua	*Catharacta maccormicki*	Confirmed breeder
brown skua	*Catharacta loennbergi*	Confirmed breeder
Antarctic tern	*Sterna vittata*	Confirmed breeder
southern fulmar	*Fulmarus glacialoides*	Frequent visitor
Antarctic petrel	*Thalassoica antarctica*	Frequent visitor
cape petrel	*Daption capense*	Frequent visitor
snow petrel	*Pagadroma nivea*	Frequent visitor
emperor penguin	*Aptenodytes forsteri*	Occasional visitor
king penguin	*A. patagonicus*	Occasional visitor
macaroni penguin	*Eudyptes chrysolophus*	Occasional visitor
rockhopper penguin	*Eudyptes chrysocome*	Occasional visitor
Magellanic penguin	*Spheniscus magellanicus*	Occasional visitor
black-browed albatross	*Diomedea melanophris*	Occasional visitor
gray-headed albatross	*D. chrystosoma*	Occasional visitor
northern giant petrel	*Macronectes halli*	Occasional visitor
black-bellied storm petrel	*Fregetta tropica*	Occasional visitor
red phalarope	*Phalaropus fulicarius*	Occasional visitor
South Georgia pintails	*Anas georgica*	Occasional visitor
black-necked swan	*Cygnus melancoryphus*	Occasional visitor
sandpiper	(sp. unknown)	Occasional visitor
cattle egret	*Bubulcus ibis*	Occasional visitor
Arctic tern	*Sterna paradisaea*	Occasional visitor
Seals (no data on breeding or numbers available)		
Weddell seal	*Leptonychotes weddellii*	Frequent visitor
southern elephant seal	*Mirounga leonina*	Frequent visitor
crabeater seal	*Lobodon carcinophagus*	Frequent visitor
leopard seal	*Leptonyx hydrurga*	Frequent visitor
Antarctic fur seals	*Arctocephalus gazella*	Frequent visitor
Whales and dolphins (no data on breeding or numbers available)		
fin whale	*Balaenoptera physalus*	Observed
humpback whale	*Megaptera novaeangliae*	Observed
sei whale	*Balaenoptera borealis*	Observed
southern right whale	*Eubalaena australis*	Observed
minke whale	*Balaenoptera bonaerensis*	Observed
killer whale	*Orcinus orca*	Observed
hourglass dolphins	*Lagenorhynchus cruciger*	Observed

Appendix D:

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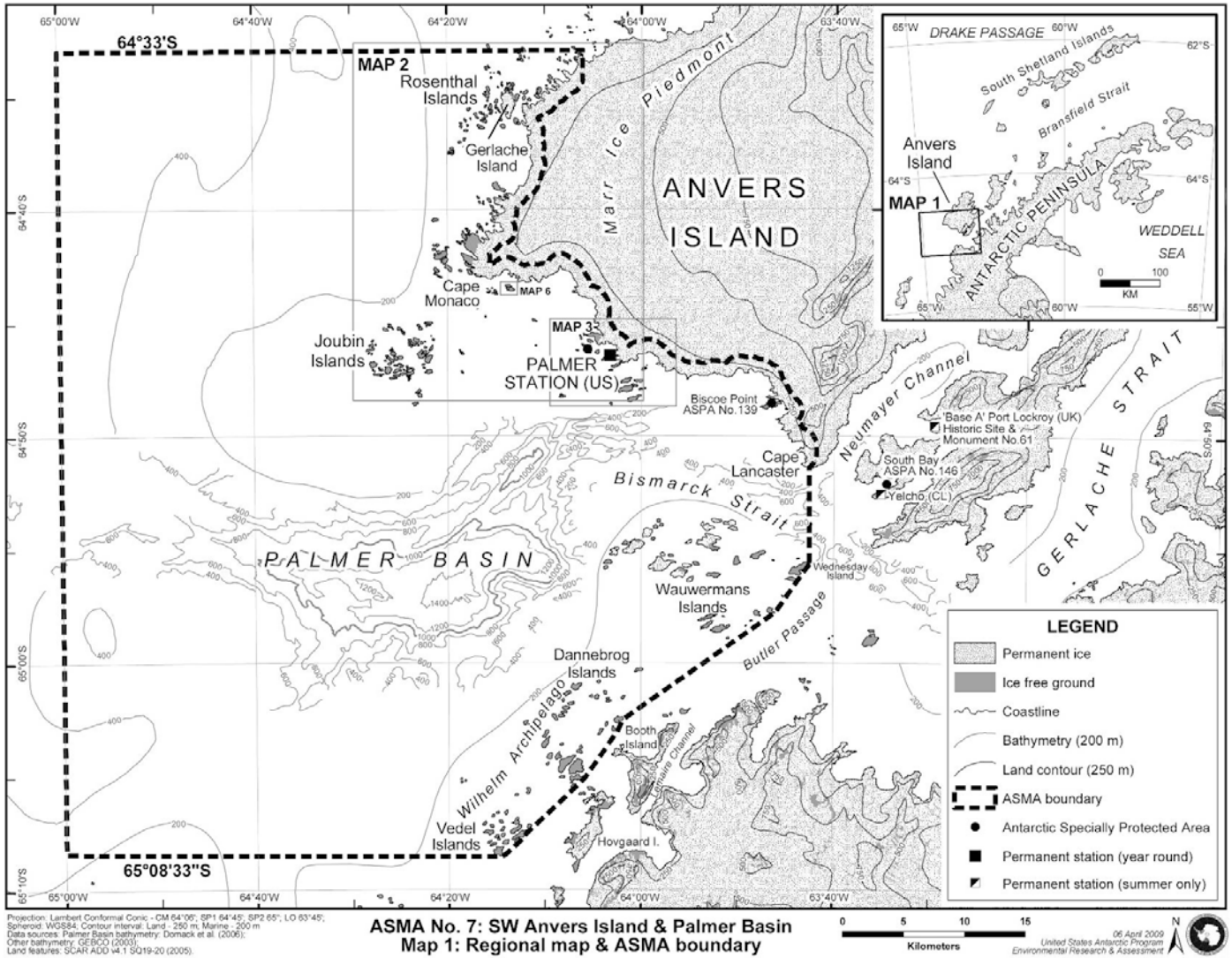
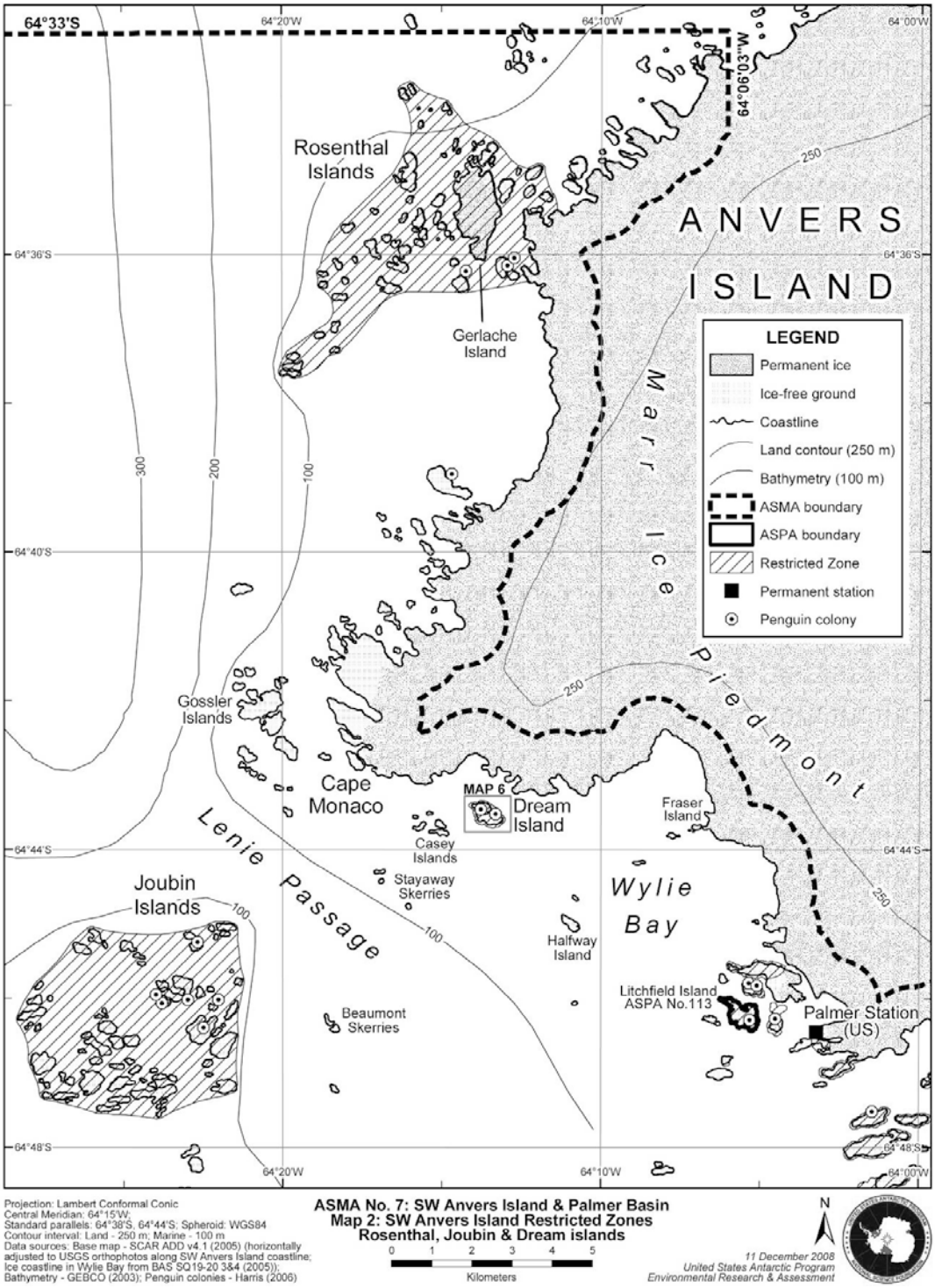

64°33'S
65°08'33"S
MAP 2
MAP 3
MAP 5
MAP 6
Rosenthal Islands
Gerlache Island
Marr Ice Piedmont
ANVERS ISLAND
Cape Monaco
Joubin Islands
PALMER STATION (US)
Biscoe Point ASPA No.139
Neumayer Channel
Base A' Port Lockroy (UK) Historic Site & Monument No.61
South Bay ASPA No.146
Yelcho (CL)
GERLACHE STRAIT
Cape Lancaster
Bismarck Strait
PALMER BASIN
Wednesday Island
Wauwermans Islands
Butler Passage
Dannebrog Islands
Wilhelm Archipelago
Booth Island
Vedel Islands
Hovgaard I.
DRAKE PASSAGE
South Shetland Islands
Bransfield Strait
Anvers Island
MAP 1
ANTARCTIC PENINSULA
WEDDELL SEA
LEGEND
Permanent ice
Ice free ground
Coastline
Bathymetry (200 m)
Land contour (250 m)
ASMA boundary
Antarctic Specially Protected Area
Permanent station (year round)
Permanent station (summer only)
Projection: Lambert Conformal Conic - CM 64°06'; SP1 64°45'; SP2 65°; LO 63°45'; Spheroid: WGS84; Contour interval: Land - 250 m; Marine - 200 m
Data sources: Palmer Basin bathymetry: Domack et al. (2006); Other bathymetry: GEBCO (2003)
Land features: SCAR ADD v4.1 SQ19-20 (2005).
ASMA No. 7: SW Anvers Island & Palmer Basin
Map 1: Regional map & ASMA boundary
Kilometers
06 April 2009
United States Antarctic Program
Environmental Research & Assessment



Projection: Lambert Conformal Conic
Central Meridian: 64°15'W;
Standard parallels: 64°38'S, 64°44'S; Spheroid: WGS84
Contour interval: Land - 250 m; Marine - 100 m
Data sources: Base map - SCAR ADD v4.1 (2005) (horizontally adjusted to USGS orthophotos along SW Anvers Island coastline; Ice coastline in Wylie Bay from BAS SQ19-20 3&4 (2005)); Bathymetry - GEBCO (2003); Penguin colonies - Harris (2006)

ASMA No. 7: SW Anvers Island & Palmer Basin
Map 2: SW Anvers Island Restricted Zones
Rosenthal, Joubin & Dream islands

0 1 2 3 4 5
Kilometers

N

11 December 2008
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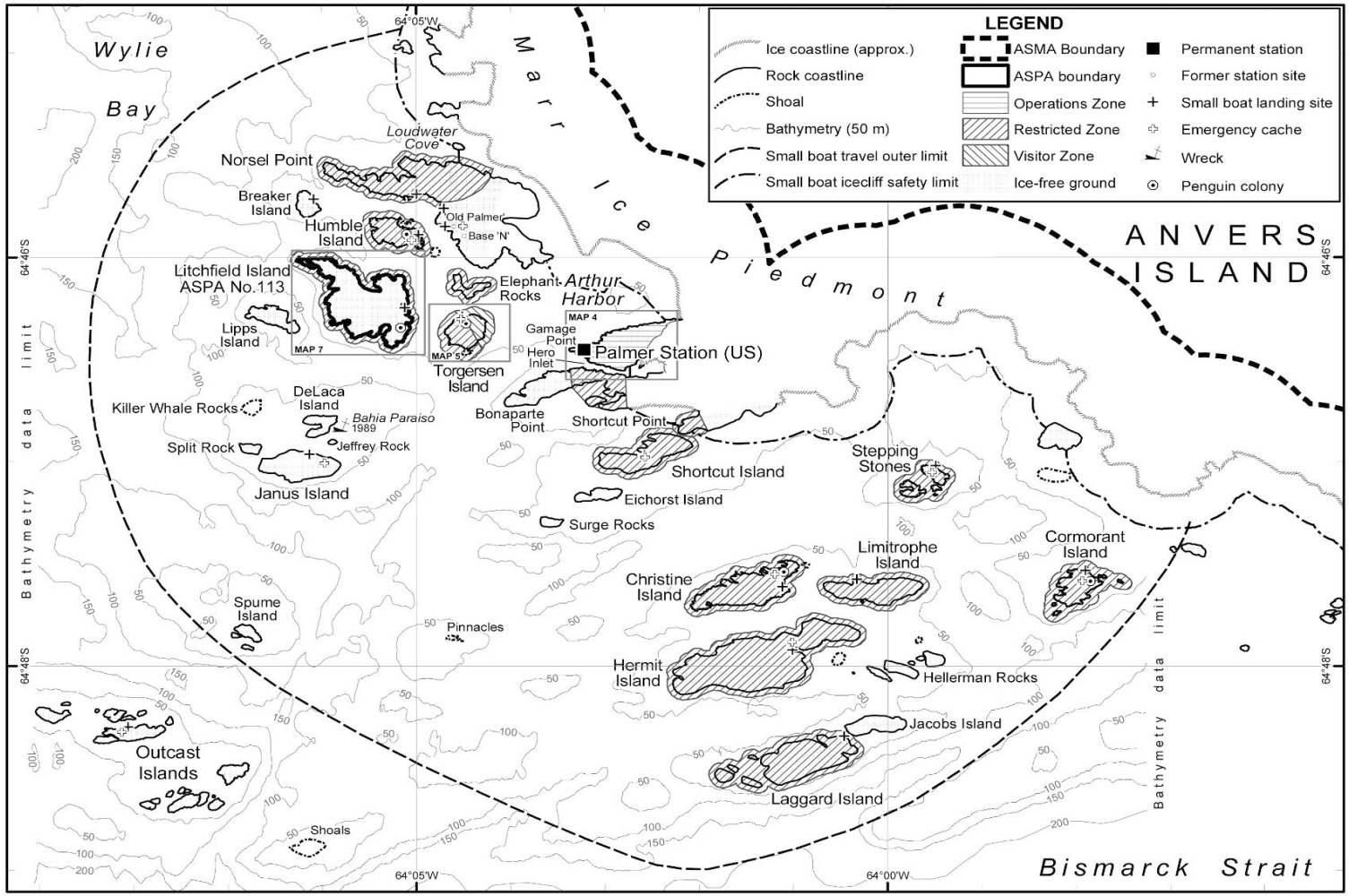

Projection: Lambert Conformal Conic
Central Meridian: 64°02'W; Standard parallels: 64°46'S, 64°48'S;
Spheroid: WGS84; Contour interval: Marine - 50 m;
Data sources: Coast: USGS orthophotos, RPSC Survey & CAD (Gamage Point) & GPS boat surveys (2004); TM3210 24v rectified image (BAS/USGS 1998); Asper & Gallagher PRIMO bathymetric survey (2004); BAS SQ19-20 3&4 (2005) & SCAR ADD 4.1 (horizontally adjusted); Bathymetric contours derived from Asper & Gallagher PRIMO survey data.

ASMA No. 7: SW Anvers Island & Palmer Basin
Map 3: Arthur Harbor & Palmer Station access

0 500 1000 1500 2000
Meters

N

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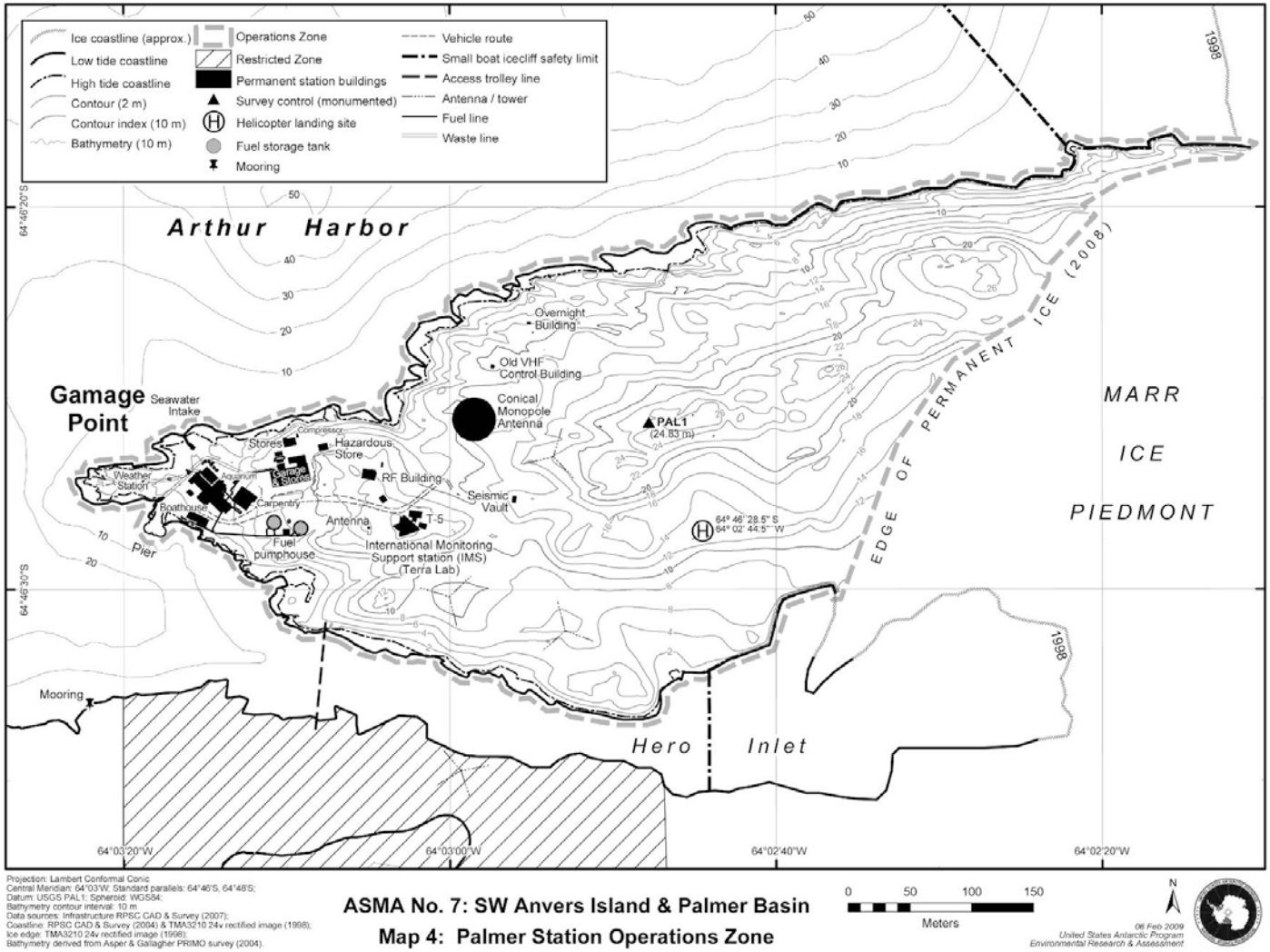
Ice coastline (approx.)
Low tide coastline
High tide coastline
Contour (2 m)
Contour index (10 m)
Bathymetry (10 m)
Operations Zone
Restricted Zone
Permanent station buildings
Survey control (monumented)
Helicopter landing site
Fuel storage tank
Mooring
Vehicle route
Small boat icecliff safety limit
Access trolley line
Antenna / tower
Fuel line
Waste line
Arthur Harbor
Gamage Point
Seawater Intake
Stores
Compressor
Hazardous Store
Weather Station
Museum
Carpentry
Boathouse
RF Building
Seismic Vault
Antenna
T-5
Fuel pumphouse
International Monitoring Support station (IMS) (Terra Lab)
Pier
Overnight Building
Old VHF Control Building
Conical Monopole Antenna
PAL1 (24.83 m)
64° 46' 28.5" S
64° 02' 44.5" W
EDGE OF PERMANENT ICE (2008)
MARR
ICE
PIEDMONT
1998
Mooring
Hero Inlet
64°46'20"S
64°46'30"S
64°03'20"W
64°03'00"W
64°02'40"W
64°02'20"W
Projection: Lambert Conformal Conic
Central Meridian: 64°03'W; Standard parallels: 64°46'S, 64°48'S;
Datum: USGS PAL1; Spheroid: WGS84;
Bathymetry contour interval: 10 m.
Data sources: Infrastructure RPSC CAD & Survey (2007);
Coastline: RPSC CAD & Survey (2004) & TMA3210 24v rectified image (1998);
Ice edge: TMA3210 24v rectified image (1998);
Bathymetry derived from Asper & Gallagher PRIMO survey (2004).
ASMA No. 7: SW Anvers Island & Palmer Basin
Map 4: Palmer Station Operations Zone
0 50 100 150
Meters
N
06 Feb 2009
United States Antarctic Program
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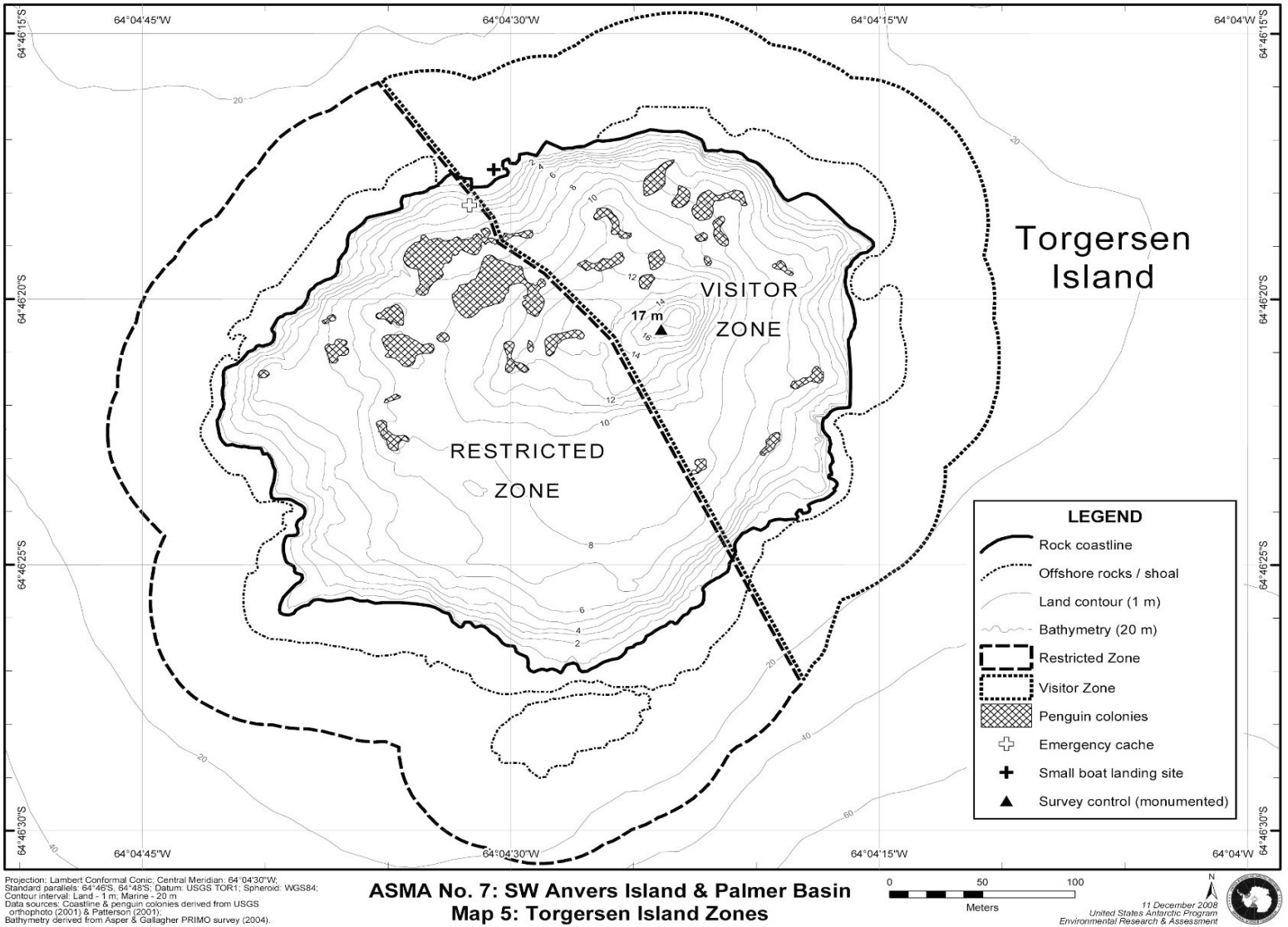
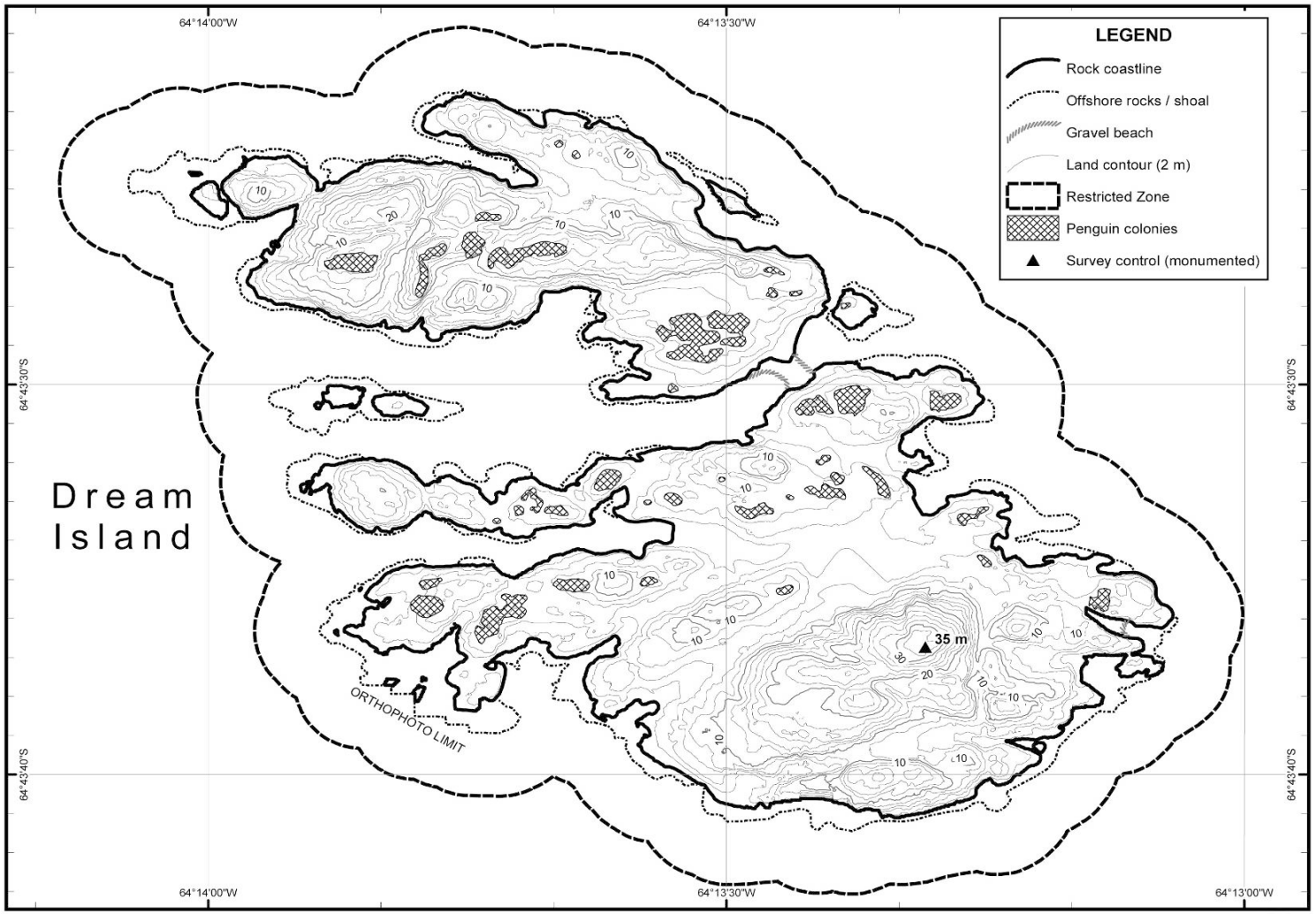

64°04'45"W
64°04'30"W
64°04'15"W
64°04'W
64°46'15"S
64°46'20"S
64°46'25"S
64°46'30"S
Torgersen Island
VISITOR ZONE
RESTRICTED ZONE
17 m
LEGEND
Rock coastline
Offshore rocks / shoal
Land contour (1 m)
Bathymetry (20 m)
Restricted Zone
Visitor Zone
Penguin colonies
Emergency cache
Small boat landing site
Survey control (monumented)
Projection: Lambert Conformal Conic; Central Meridian: 64°04'30"W;
Standard parallels: 64°46'S, 64°48'S; Datum: USGS TOR1; Spheroid: WGS84;
Contour interval: Land - 1 m; Marine - 20 m
Data sources: Coastline & penguin colonies derived from USGS orthophoto (2001) & Patterson (2001);
Bathymetry derived from Asper & Gallagher PRIMO survey (2004).
ASMA No. 7: SW Anvers Island & Palmer Basin
Map 5: Torgersen Island Zones
0
50
100
Meters
N
11 December 2008
United States Antarctic Program
Environmental Research & Assessment



Projection: Lambert Conformal Conic
Central Meridian: 64°13'30"W; Standard parallels: 64°43'S, 64°44'S;
Datum: USGS DRE1 (1999); Spheroid: WGS84;
Contour interval: 2 m
Data sources:
Coastline & penguin colonies derived from USGS orthophoto (2001).

ASMA No. 7: SW Anvers Island & Palmer Basin
Map 6: Dream Island Restricted Zone

0 50 100 150
Meters

N

11 December 2008
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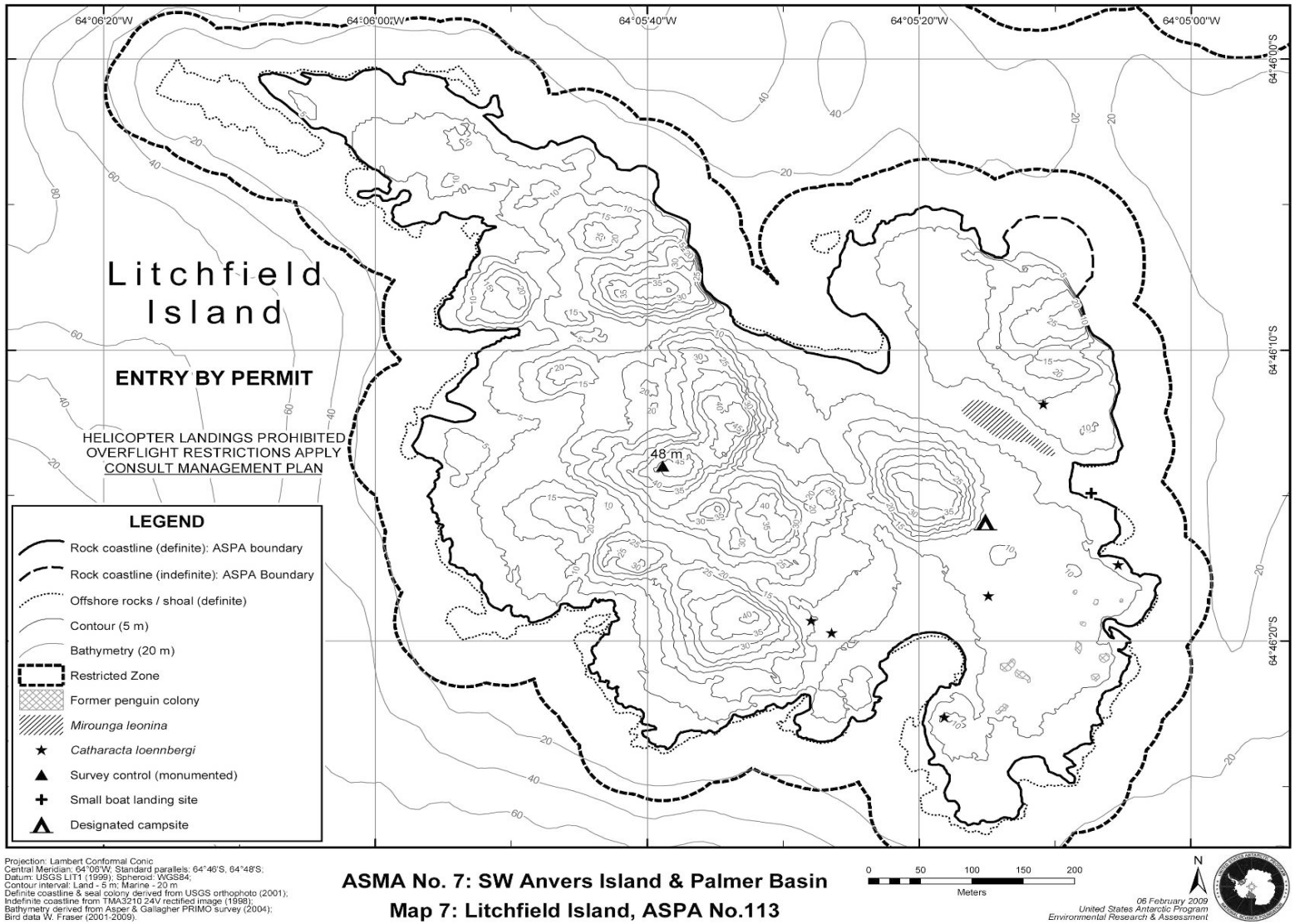
64°06'20"W
64°06'00"W
64°05'40"W
64°05'20"W
64°05'00"W
64°46'00"S
64°46'10"S
64°46'20"S
Litchfield Island
ENTRY BY PERMIT
HELICOPTER LANDINGS PROHIBITED
OVERFLIGHT RESTRICTIONS APPLY
CONSULT MANAGEMENT PLAN
48 m
LEGEND
Rock coastline (definite): ASPA boundary
Rock coastline (indefinite): ASPA Boundary
Offshore rocks / shoal (definite)
Contour (5 m)
Bathymetry (20 m)
Restricted Zone
Former penguin colony
Mirounga leonina
Catharacta loennbergi
Survey control (monumented)
Small boat landing site
Designated campsite
Projection: Lambert Conformal Conic
Central Meridian: 64°06'W; Standard parallels: 64°46'S, 64°48'S;
Datum: USGS LIT1 (1999); Spheroid: WGS84;
Contour interval: Land - 5 m; Marine - 20 m
Definite coastline & seal colony derived from USGS orthophoto (2001);
Indefinite coastline from TMA3210 24V rectified image (1998);
Bathymetry derived from Asper & Gallagher PRIMO survey (2004);
Bird data W. Fraser (2001-2009).
ASMA No. 7: SW Anvers Island & Palmer Basin
Map 7: Litchfield Island, ASPA No.113
0 50 100 150 200
Meters
N
06 February 2009
United States Antarctic Program
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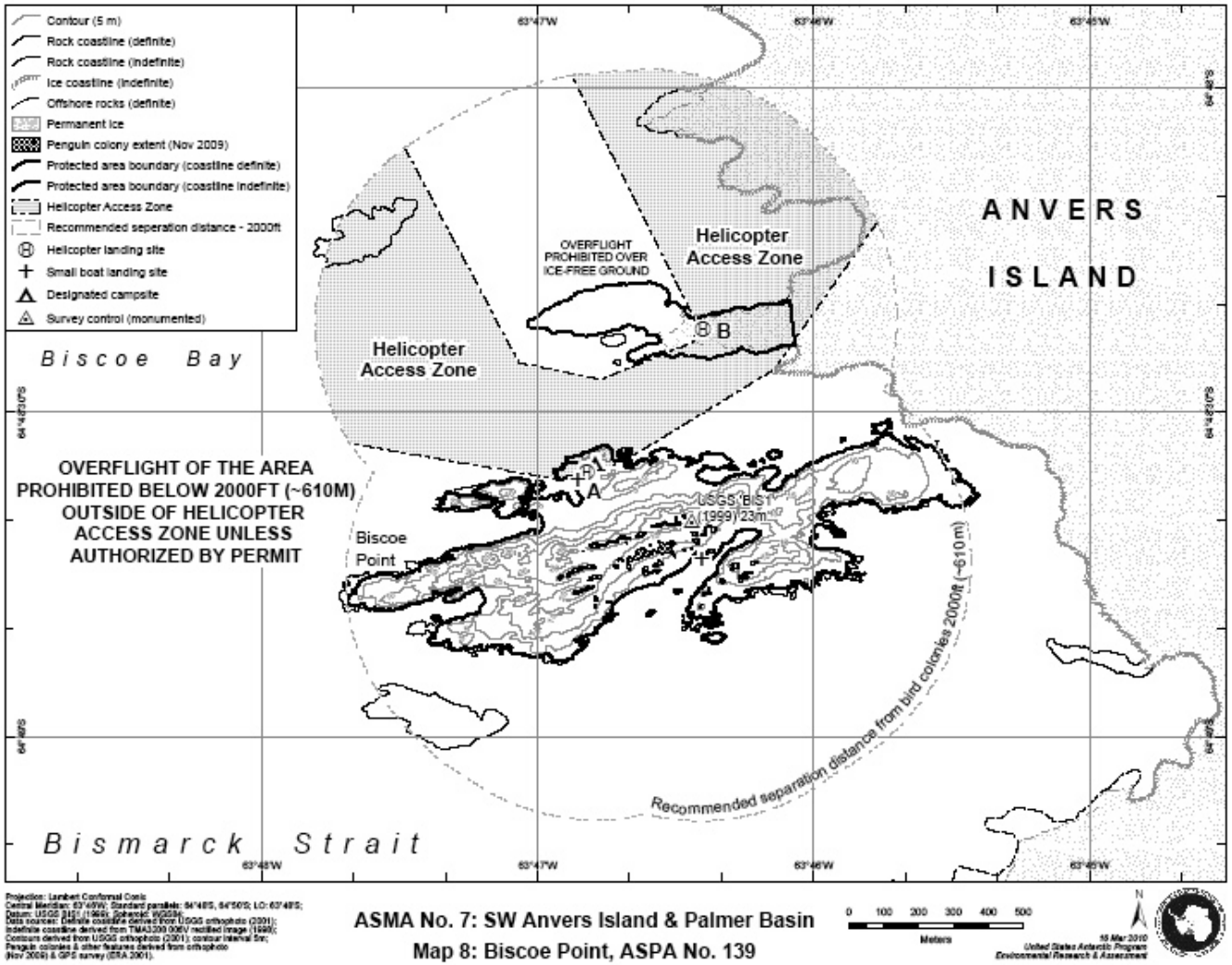
Contour (5 m)
Rock coastline (definite)
Rock coastline (indefinite)
Ice coastline (indefinite)
Offshore rocks (definite)
Permanent ice
Penguin colony extent (Nov 2009)
Protected area boundary (coastline definite)
Protected area boundary (coastline indefinite)
Helicopter Access Zone
Recommended seperation distance - 2000ft
Helicopter landing site
Small boat landing site
Designated campsite
Survey control (monumented)
ANVERS
ISLAND
Biscoe Bay
Bismarck Strait
Helicopter Access Zone
Helicopter Access Zone
OVERFLIGHT PROHIBITED OVER ICE-FREE GROUND
OVERFLIGHT OF THE AREA PROHIBITED BELOW 2000FT (~610M) OUTSIDE OF HELICOPTER ACCESS ZONE UNLESS AUTHORIZED BY PERMIT
Biscoe Point
USGS 'BIS' (1999) 23m
Recommended separation distance from bird colonies 2000ft (~610m)
63°48'W
63°47'W
63°46'W
63°45'W
64°48'S
64°49'S
ASMA No. 7: SW Anvers Island & Palmer Basin
Map 8: Biscoe Point, ASPA No. 139
0 100 200 300 400 500
Meters
N
16 Mar 2010
United States Antarctic Program
Environmental Research & Assessment

Antarctic Historic Sites and Monuments:
Plaque Commemorating the PM-3A Nuclear Power Plant at McMurdo Station

The Representatives,

Recalling the requirements of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty to maintain a list of current Historic Sites and Monuments, 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", as subsequently amended;

Desiring to add a further historic monument to the List of Historic Sites and Monuments;

Recommend to their Governments the following Measure for approval in accordance with paragraph 2 of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That the following historic monument be added to the "List of Historic Sites and Monuments" annexed to Measure 3 (2003):

"No 85: Plaque Commemorating the PM-3A Nuclear Power Plant at McMurdo Station

The plaque is approximately 18 x 24 inches, made of bronze and secured to a large vertical rock at McMurdo Station, the former site of the PM-3A nuclear power reactor. It is approximately half way up the west side of Observation Hill. The plaque text details achievements of PM-3A, Antarctica's first nuclear power plant.

Location: 77o 51' S, 166o 41' E

Original proposing Party: USA

Party undertaking management: USA"

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