Miscellaneous No. 7 (2007)

The Antarctic Treaty

Measures adopted at
the Twenty-ninth Consultative Meeting
held at Edinburgh 12 – 23 June 2006

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

Cm 7167 £17.00

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MEASURES ADOPTED AT THE TWENTY-NINTH CONSULTATIVE MEETING HELD AT EDINBURGH 12 - 23 JUNE 2006

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

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

The approval procedures set out in Article 6 (1) of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty[2] apply to Measures 1 and 2 (2006), and the approval procedures set out in Article 8(2) of Annex V to the Protocol apply to Measure 3 (2006).

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

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

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

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

The Command Paper is not accompanied by an Explanatory Memorandum.

Measure 4 (2006) is not included and will be published in the Treaty Series at a later date.

MEASURES ADOPTED AT THE XXIXth Consultative Meeting held at Edinburgh 12-23 June 2006

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

Measure 1 (2006)

Antarctic Specially Protected Areas: Designations and Management Plans

The Representatives,

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

Recalling

- Recommendation VIII-4 (1975), which designated Haswell Island as Site of Special Scientific Interest ("SSSI") No 7 and annexed a management plan for the site;

- Recommendation XIII-8 (1985), which designated Caughley Beach as SSSI No 10 and annexed a management plan for the site, Recommendation XIII-12 (1985), which designated New College Valley as Specially Protected Area ("SPA") No 20, Recommendation XVII-2 (1992), which annexed a management plan for the area, and Measure 1 (2000), which expanded SPA No 20 to incorporate Caughley Beach, annexed a revised management plan for the area, and provided that thereupon SSSI No 10 shall cease to exist;

- Recommendation XIII-8 (1985), which designated Canada Glacier as SSSI No 12 and Cierva Point as SSSI No 15 and annexed management plans for these sites, and Measure 3 (1997), which annexed revised management plans for both sites;

- Recommendation XIII-8 (1985), which designated Clark Peninsula as SSSI No 17 and annexed a management plan for the site, and Measure 1 (2000) which annexed a revised management plan for the site;

- Decision 1 (2002), which renamed and renumbered these areas and sites as Antarctic Specially Protected Areas;

Recalling Recommendation XIII-16 (1985), which designated Port-Martin base as Historic Monument No 46, and Measure 3 (2003), which revised and updated the "List of Historic Sites and Monuments" in which Historic Site and Monument ("HSM") No 46 is listed;

Noting that the Committee for Environmental Protection has advised that three areas, namely: Edmonson Point, Wood Bay, Ross Sea; Port-Martin, Terre Adélie; and Hawker Island, Vestfold Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica, be

designated as new Antarctic Specially Protected Areas, and has endorsed the Management Plans for those areas annexed to this Measure;

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

Desiring to approve Management Plans for these areas, and to replace the Management Plans for Antarctic Specially Protected Areas No 116, 127, 131, 134 and 136, with revised and updated Management Plans;

Noting that Edmonson Point, Wood Bay, Ross Sea contains marine areas and that the Commission for the Conservation of Antarctic Marine Living Resources approved the designation of those areas as an Antarctic Specially Protected Area at its 24th meeting;

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

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

(a) Antarctic Specially Protected Area No. 165: Edmonson Point, Wood Bay, Ross Sea;

(b) Antarctic Specially Protected Area No. 166: Port-Martin, Terre Adélie; and

(c) Antarctic Specially Protected Area No. 167: Hawker Island, Vestfold Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica.

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

(a) Antarctic Specially Protected Area No. 116: New College Valley, Caughley Beach, Cape Bird, Ross Island;

(b) Antarctic Specially Protected Area No.127: Haswell Island (Haswell Island and Adjacent Emperor Penguin Rookery on Fast Ice);

(c) Antarctic Specially Protected Area No 131: Canada Glacier, Lake Fryxell, Taylor Valley, Victoria Land;

(d) Antarctic Specially Protected Area No 134: Cierva Point and offshore islands, Danco Coast, Antarctic Peninsula;

(e) Antarctic Specially Protected Area No. 136: Clark Peninsula, Budd Coast, Wilkes Land;

(f) Antarctic Specially Protected Area No. 165: Edmonson Point, Wood Bay, Ross Sea;

(g) Antarctic Specially Protected Area No. 166: Port-Martin, Terre Adélie; and

(h) Antarctic Specially Protected Area No. 167: Hawker Island, Vestfold Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica.

3. all prior management plans for Antarctic Specially Protected Areas No. 116, 127, 131, 134 and 136 shall cease to be effective, or, if any such plans have not yet become effective, they are hereby withdrawn.

II. Measures

Management Plan for Antarctic Specially Protected Area No. 116

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

1. Description of values to be protected

An area of 0.33 km^2 at Cape Bird was originally designated in Recommendations XIII-8 (1985, SSSI No. 10, Caughley Beach) and XIII-12 (1985, SPA No. 20, New College Valley) after proposals by New Zealand on the grounds that these areas contain some of the richest stands of mosses and associated microflora and fauna in the Ross Sea region of Antarctica. This is the only area on Ross Island where protection is specifically given to these 'cold' ground plants. SPA No. 20 was originally enclosed within SSSI No. 10 in order to provide more stringent access conditions within this part of the Area. SSSI No. 10 and SPA No. 20 have been merged in the current plan, and a Restricted Zone provides the more stringent access conditions within the former SPA. The boundaries of the Area have been revised in view of improved mapping and to follow more closely the ridges enclosing the catchment of New College Valley. Caughley Beach itself was adjacent to, but never a part of, the original Area, and for this reason the entire Area has been renamed as New College Valley, which was within both of the original sites.

Mosses (bryophytes) are the most highly evolved terrestrial plant life in this region, restricted to small, localised areas of water-flushed ground. In addition to rich moss cushions and carpets up to 20m^2, a diverse range of algal species inhabit streams in the Area, and collembolans (*Gomphiocephalus hodgsoni*) and mites (*Nanorchestes antarcticus* and *Stereotydeus mollis*) are plentiful on water surfaces and underneath rocks. The absence of lichens makes the species assemblage in this Area unique on Ross Island.

The proximity of the Cape Bird Hut (New Zealand) and the possibility of visits by tourists to Cape Bird mean that this vulnerable area could easily be damaged by human impact if not provided with adequate protection. Designation of this Area is designed to ensure examples of this habitat type are adequately protected from casual visitors and overuse from scientific investigations. The susceptibility of mosses to disturbance by trampling, sampling, pollution or alien introductions is such that the Area requires long-term special protection. The ecosystem at this site is of exceptional scientific value for ecological investigations and the Restricted Zone is valuable as a reference site for future comparative studies.

2. Aims and objectives

Management at New College Valley aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- preserve a part of the natural ecosystem as a reference area for the purpose of future comparative studies;
- allow scientific research on the ecosystem, in particular on plants, algae and invertebrates in the Area, while ensuring protection from over-sampling;

- allow other scientific research provided it is for compelling reasons which cannot be served elsewhere;
- minimise the possibility of introduction of alien plants, animals and microbes into the Area;
- allow visits for management purposes in support of the aims of the management plan.

3. Management activities

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

- Signs showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, in all of the research hut facilities located within 10 km of the Area.
- Signs showing the location, boundaries and clearly stating entry restrictions shall be placed at appropriate locations at the boundaries of the Area and the Restricted Zone within to help avoid inadvertent entry.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition.
- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- National Antarctic Programmes operating in the region are encouraged to consult together with a view to ensuring these steps are carried out.
- Up to date Management Plans, maps and other relevant information shall be made available on National Programme websites.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

- Figure 1: Perspective view of Cape Bird. The perspective is from an elevation of 350 m, 3. 8 km out from the Area at a bearing of 190° SW. The perspective is from almost directly over Inclusion Hill looking north toward Cape Bird.
- Figure 1a: An alternative perspective shows the preferred aircraft approach path from approximately 200 m offshore. The perspective is from an altitude of 420 m (1378 ft), 4 km out from the Area at a bearing of 210° SW.
- Map A: New College Valley, Cape Bird, Ross Island, regional topographic map. Map specifications: Projection - Lambert conformal conic. Standard parallels - 1st 76° 40' 00" S; 2nd 79° 20' 00"S. Central Meridian - 166° 30' 00" E. Latitude of Origin - 78° 01' 16. 211" S. Spheroid - WGS84.
- Map B: New College Valley protected area topographic map. Specifications are the same as those for Map A. Contours prepared at 1:2500 with a positional accuracy of ± 1. 25 m (horizontal) and ± 1. 25 m (vertical). Map includes vegetation and streams mapped in the northern zone of the ASPA.

- Map C: New College Valley site topographic map – enlargement. Details include an enlargement of the northern zone of ASPA 116 showing vegetation and stream locations. Also shown are the approximate penguin distribution of the northern colony and helicopter landing pads.

6. Description of the Area

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

Cape Bird is at the NW extremity of Mt. Bird (1800 m), an inactive volcanic cone which is probably the oldest on Ross Island. New College Valley is located south of Cape Bird on ice-free slopes above Caughley Beach, which lies between two Adélie penguin rookeries known as the Cape Bird Northern and Middle Rookeries (Maps A and B). The Area, comprising veneered glacial moraines at the fore of the Cape Bird Ice Cap, consists of seaward dipping olivine-augite basalts with scoriaceous tops erupted from the main Mt. Bird cone.

The NW corner of the north boundary of the Area is approximately 100 m south of the Cape Bird hut, while the southern boundary is about 700 m north of Middle Rookery (Map A). The north boundary of the Area extends upslope and eastward toward a prominent terminal moraine ridge 20 m from the Cape Bird Ice Cap. The boundary follows this ridge SE until the ridge disappears where it joins the glacier, from where the boundary continues SE following the glacier edge to the southern boundary. The south boundary is a straight line crossing the broad southern flank of New College Valley, and is marked at either end by two cairns, one in the western corner of the Area and the other on the hilltop 100 m from the Cape Bird Ice Cap glacier edge. The west boundary of the Area follows the top of the coastal cliffs of Caughley Beach for a distance of 650 m.

Northwest-facing New College Valley carries meltwater from the Cape Bird Ice Cap during the summer. Streams in the Area are fed by melt from persistent summer snow drifts and have eroded their own shallow gullies and channels. The ground is largely covered by stones and boulders of volcanic origin which have been reworked by glacial action.

The Area contains the most extensive ephemeral stream course distributions of the moss *Hennediella heimii* on Ross Island. Surveys have shown that this moss, together with much lower occurrences of two other species – *Bryum subrotundifolium* and *Bryum pseudotriquetrum* – are confined almost entirely to the stream courses across the steep till and scoria covered slopes. The Area includes the full course of three stream systems that contain significant growths of algae, together with the mosses. The mosses are generally associated with algal growths, namely rich, red-brown oscillatorian felts and occasional reddish-black growths of *Nostoc commune*.

The microfauna consists of abundant populations of Collembolans (*Gomphiocephalus hodgsonii*) and mites (*Nanorchestes antarcticus* and *Stereotydeus mollis*) found on water surfaces and beneath rocks. Nematodes, rotifers, tardigrades and protozoa are also found within the Area.

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

6(ii) Restricted and managed zones within the Area

Restricted Zone

An area of New College Valley is designated a Restricted Zone in order to preserve part of the Area as a reference site for future comparative studies, while the remainder of the Area (which is similar

in biology, features and character) is more generally available for research programmes and sample collection. The Restricted Zone encompasses ice-free slopes within New College Valley above Caughley Beach some of which are north-facing with snow drifts which provide a ready supply of melt water to foster moss and algal growth.

The NW corner of the Restricted Zone is 60 m to the south and across a small gully from the NW corner of the Area. The north boundary of the zone extends 500 m upslope from the NW corner, following a faint but increasingly prominent ridge SE to a point in the upper catchment of New College Valley marked by a cairn approximately 60 m from the ice terminus of the Cape Bird Ice Cap. The Restricted Zone boundary extends 110 m SW across the valley to a cairn marking the SE corner of the zone. The south boundary of the Restricted Zone extends in a straight line from this cairn 440 m NW down a broad and relatively featureless slope to the west boundary of the Area. A cairn is placed on the SW boundary of the Restricted Zone to mark the lower position of the south boundary.

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

6(iii) Structures within and near the Area

Structures known to exist in the Area include a United States Navy Astrofix marker, cairns marking the boundaries of the Area and the Restricted Zone, a signpost situated at the NW corner of the Area and an approximately one metre square wooden frame marking the site of an experimental oil spill from 1982. The toilet and stores hut are located 40 m north of the NW corner of the Area with the Cape Bird hut located a further 20 m north. (Map B and C). A water tank and associated hosing servicing the hut were removed from the Area in the 1995-96 season.

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

The nearest protected areas are: Lewis Bay, Mount Erebus, Ross Island (ASPA No. 156), approximately 25 km SE; Tramway Ridge, Mount Erebus, Ross Island (ASPA No. 130) 30 km SSE; Cape Crozier, Ross Island (ASPA No. 124) 75 km SE; Cape Royds, Ross Island (ASPA No. 121) and Cape Evans, Ross Island (ASPA No. 155) 35 km and 45 km south on Ross Island respectively; and Beaufort Island, Ross Island (ASPA No. 105) 40 km to the north.

7. Permit conditions

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

- outside of the Restricted Zone, it is issued only for scientific study of the ecosystem, or for compelling scientific reasons that cannot be served elsewhere, or for essential management purposes consistent with plan objectives such as inspection or review;
- access to the Restricted Zone is allowed only for compelling scientific or management reasons that cannot be served elsewhere in the Area;
- the actions permitted are not likely to jeopardise the ecological or scientific values of the Area or other permitted activities;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or a copy, shall be carried within the Area;

- a visit report shall be supplied to the authority named in the Permit;
- the Permit shall be issued for a stated period.

7(i) Access to and movement within the Area

Vehicles are prohibited within the Area and access shall be by foot. Helicopters are prohibited from landing within the Area. A helicopter landing site is located outside the Area below the cliffs on Caughley Beach, 100 m west of the west boundary of the Area. Between October and February the preferred flight path is an approach from the south above Middle Rookery. Flights north of the helicopter pad may be necessary under certain wind conditions but should follow the recommended aircraft approach and departure routes. See Figures 1 and 1a and Map A for the recommended aircraft approach routes into and out of Cape Bird. Overflight of the Area lower than 50 m (~150 ft) above ground level is prohibited. Hovering over the Area is not permitted lower than 100m (~300 ft) above ground level. Use of helicopter smoke grenades within the Area is prohibited.

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

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

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;
- Essential management activities, including monitoring and inspection.

7(iii) Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a Permit. All scientific equipment installed in the Area must be authorised 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 within the Area is prohibited.

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 precautions shall be taken against accidental introductions. No live poultry shall be brought into the Area. Dressed poultry should be free of disease or infection before shipment to the Antarctic and, if introduced into the Area for food, all parts and waste of poultry shall be completely removed from the Area, and incinerated or boiled for long enough to kill any potentially infective bacteria or viruses. No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Fuel is not to be stored in the Area, unless 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

This is prohibited, except in accordance with a Permit. 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 from any part of the Area, including the Restricted Zone, unless the impact of removal is likely to be greater than leaving the material *in situ*: if this is the case the appropriate authority should be notified.

7(viii) Disposal of waste

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

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

- Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, which may involve the collection of small samples for analysis or review, to erect or maintain signposts or for management activities.
- Any specific sites of long-term monitoring shall be appropriately marked.
- To help maintain the ecological and scientific values of the isolation and relatively low level of human impact at the Area visitors shall take special precautions against introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other Antarctic sites, including stations, or from regions outside Antarctica. To minimise the risk of introductions, visitors shall thoroughly clean footwear and any equipment to be used in the area — particularly sampling equipment and markers — before entering the Area.

7(x) Requirements for reports

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

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Figure 1 - New College Valley, Cape Bird, Ross Island, Antarctic Specially Protected Area 116: Perspective View

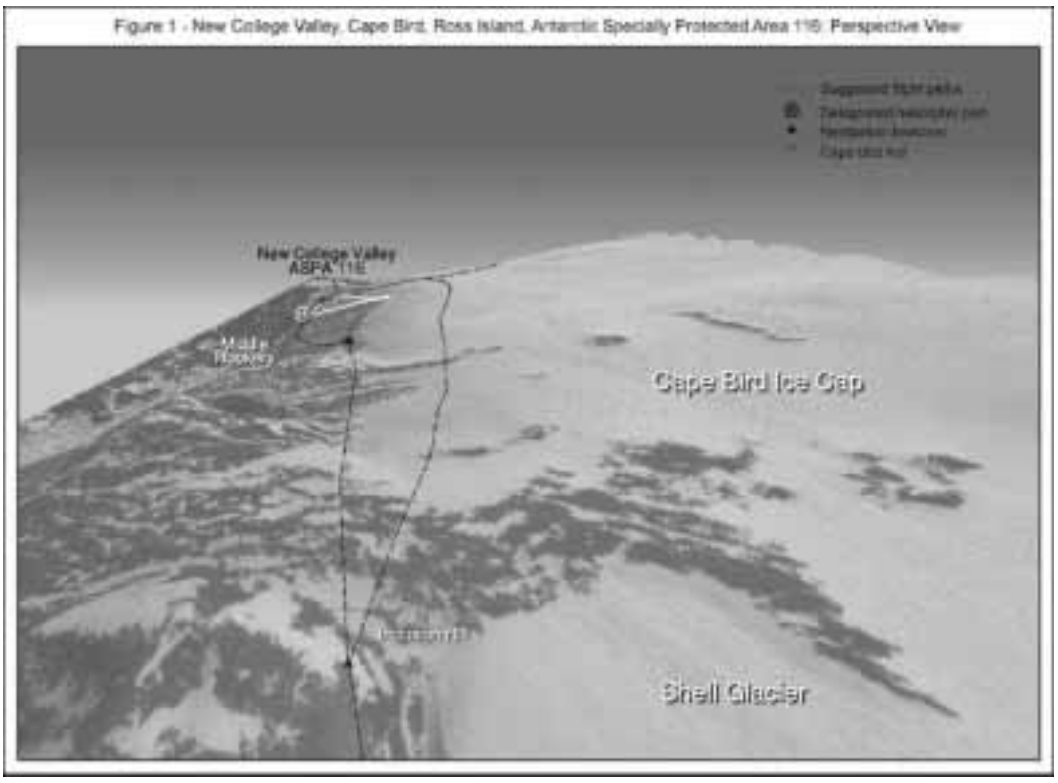
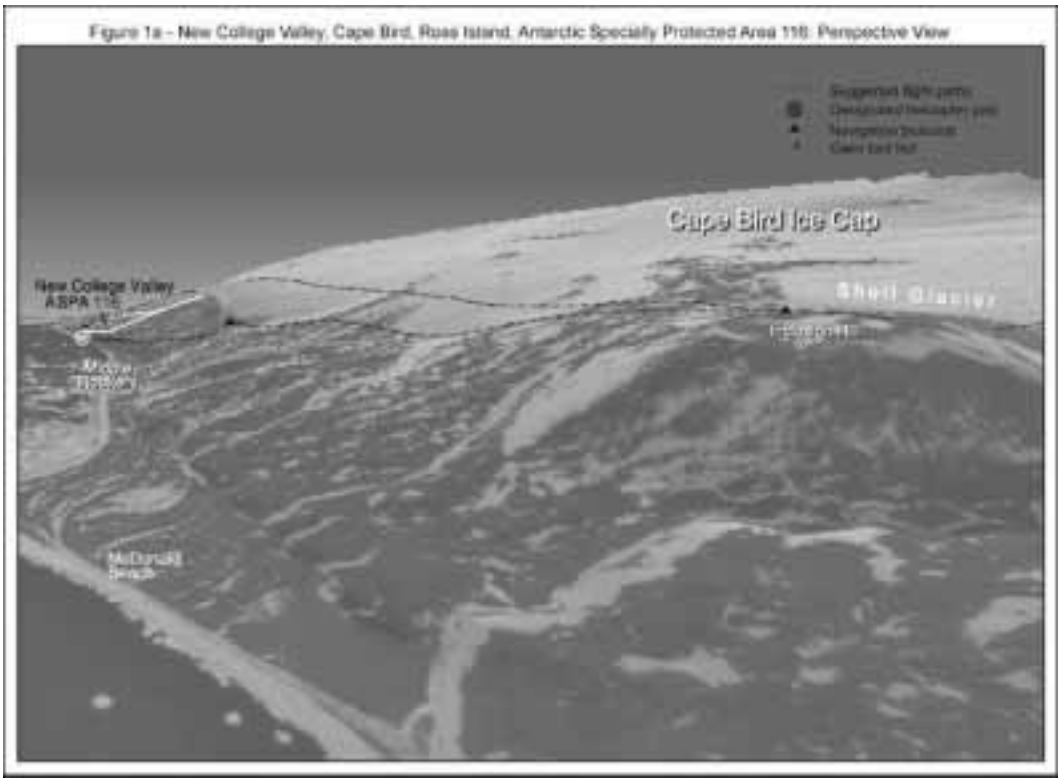
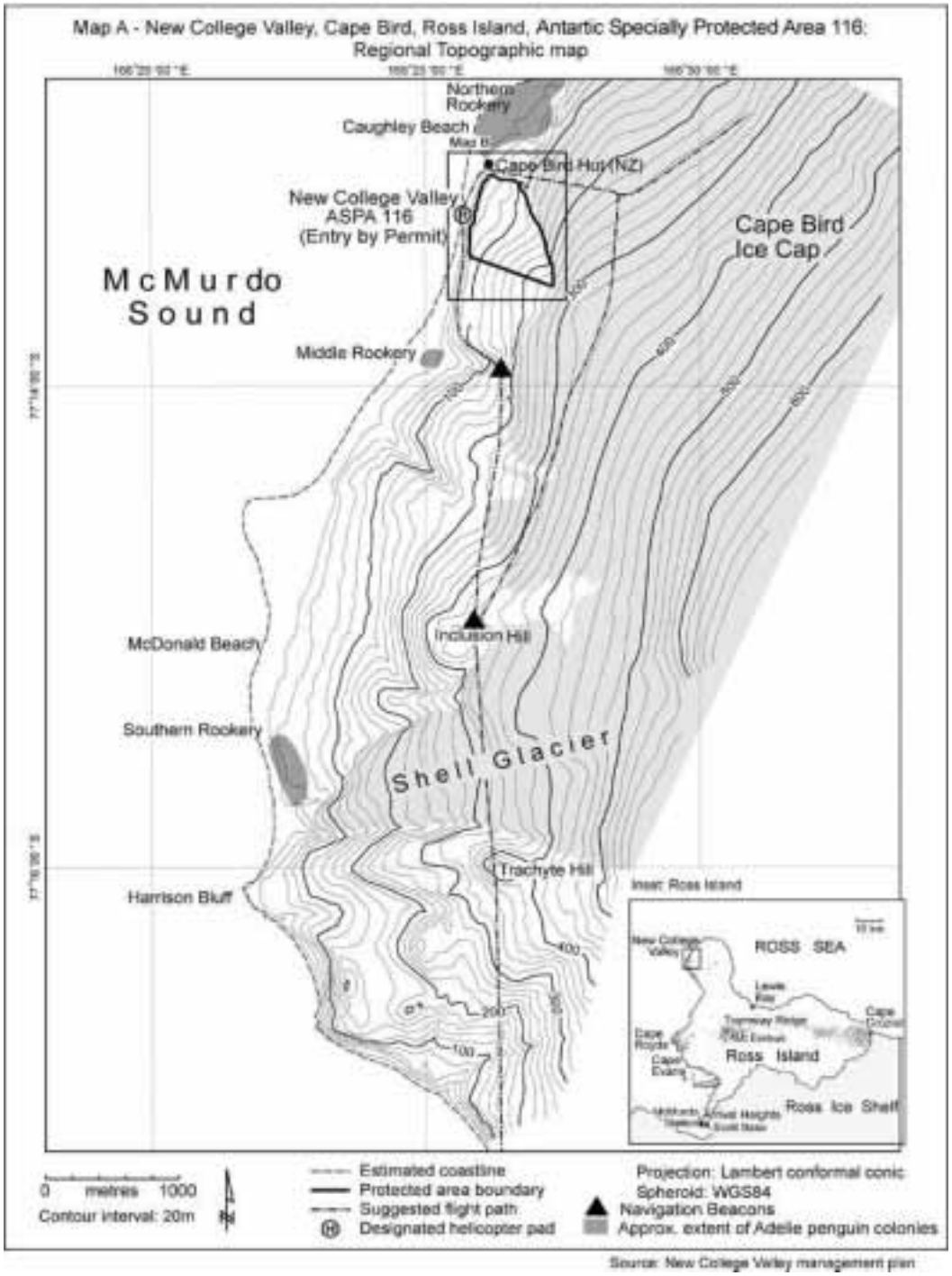
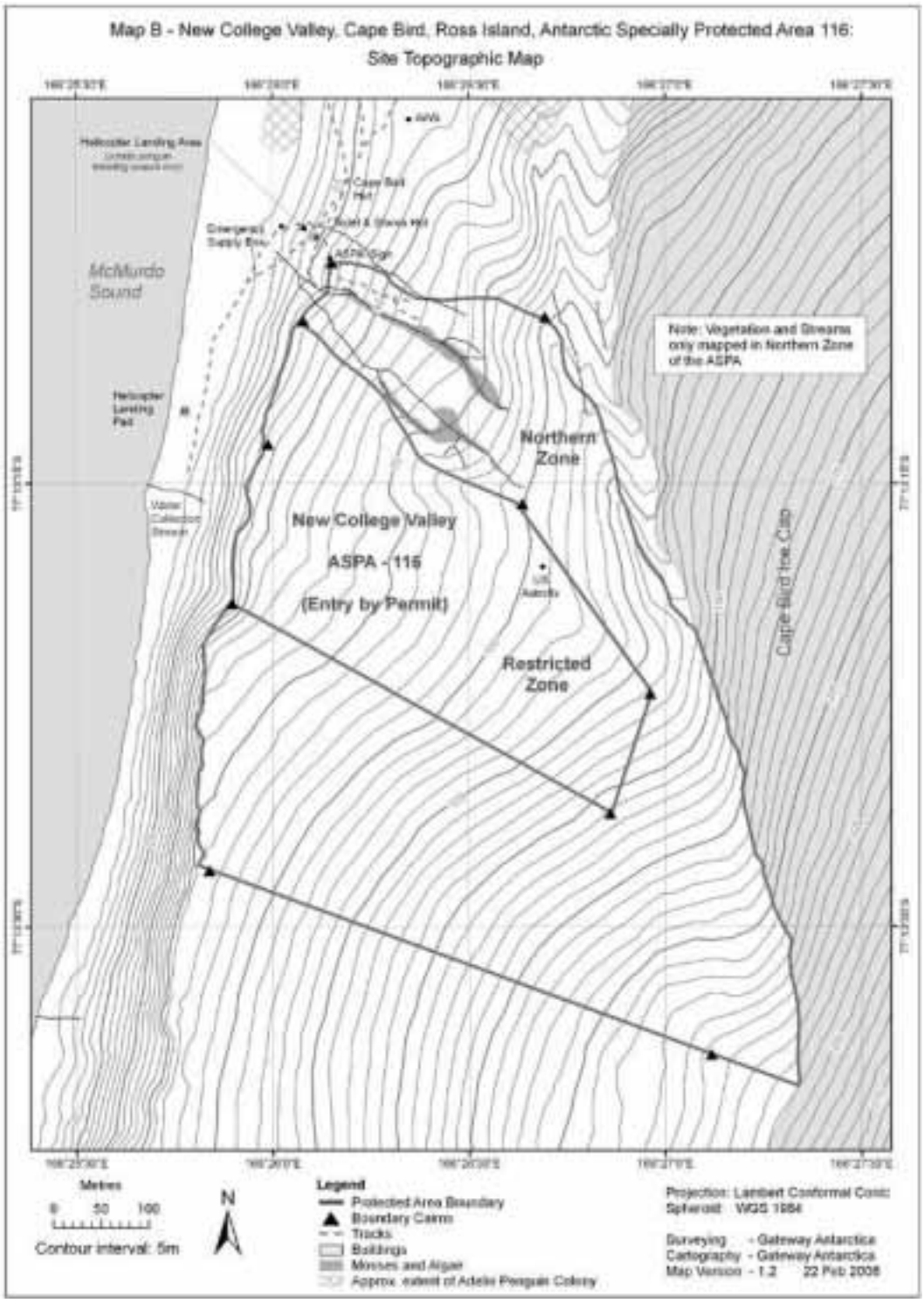
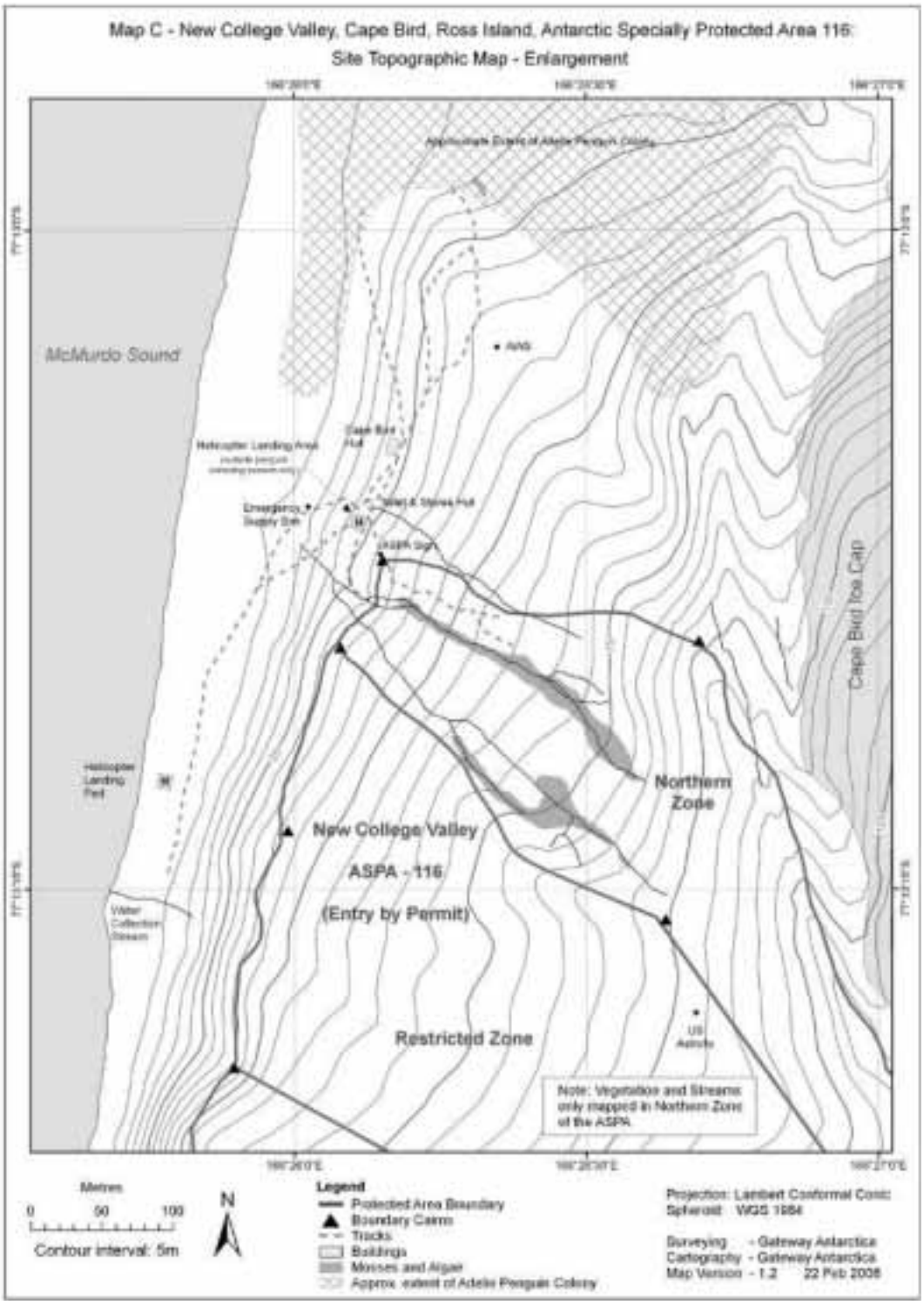


Figure 1a - New College Valley, Cape Bird, Ross Island, Antarctic Specially Protected Area 116: Perspective View




Map A - New College Valley, Cape Bird, Ross Island, Antartic Specially Protected Area 116:
Regional Topographic map
Northern Rockery
Caughley Beach
Cape Bird Hut (NZ)
New College Valley
ASPA 116
(Entry by Permit)
Cape Bird
Ice Cap
McMurdo
Sound
Middle Rockery
Inclusion Hill
McDonald Beach
Southern Rockery
Shell Glacier
Trachyte Hill
Harrison Bluff
Inset: Ross Island
ROSS SEA
Ross Island
Ross Ice Shelf
0 metres 1000
Contour interval: 20m
Estimated coastline
Protected area boundary
Suggested flight path
Designated helicopter pad
Projection: Lambert conformal conic
Spheroid: WGS84
Navigation Beacons
Approx. extent of Adelie penguin colonies
Source: New College Valley management plan


Map B - New College Valley, Cape Bird, Ross Island, Antarctic Specially Protected Area 116:
Site Topographic Map
Helicopter Landing Area
McMurdo Sound
Helicopter Landing Pad
Water Collection Stream
Note: Vegetation and Streams only mapped in Northern Zone of the ASPA
Northern Zone
New College Valley
ASPA - 116
(Entry by Permit)
Restricted Zone
Cape Bird Ice Cap
Metres
0 50 100
Contour interval: 5m
N
Legend
Protected Area Boundary
Boundary Cairn
Tracks
Buildings
Mosses and Algae
Approx. extent of Adelie Penguin Colony
Projection: Lambert Conformal Conic
Spheroid: WGS 1984
Surveying - Gateway Antarctica
Cartography - Gateway Antarctica
Map Version - 1.2 22 Feb 2008


Map C - New College Valley, Cape Bird, Ross Island, Antarctic Specially Protected Area 116:
Site Topographic Map - Enlargement
McMurdo Sound
Cape Bird Ice Cap
New College Valley
ASPA - 116
(Entry by Permit)
Northern Zone
Restricted Zone
Helicopter Landing Pad
Water Collection Stream
Emergency Supply Cache
Cape Bird Hut
Wind & Stores Hut
AWS
US Astro
Note: Vegetation and Streams only mapped in Northern Zone of the ASPA
Metres
0 50 100
Contour interval: 5m
N
Legend
Protected Area Boundary
Boundary Cairns
Tracks
Buildings
Masses and Algae
Approx. extent of Adelie Penguin Colony
Projection: Lambert Conformal Conic
Spheroid: WGS 1984
Surveying - Gateway Antarctica
Cartography - Gateway Antarctica
Map Version - 1.2 22 Feb 2008

II. Measures

Management Plan for Antarctic Specially Protected Area No. 127

HASWELL ISLAND
(Haswell Island and Adjacent Emperor Penguin Rookery on Fast Ice)

1. Description of values to be protected

Haswell Island is a unique breeding site for almost all breeding bird species in East Antarctica including the Antarctic petrel (*Talassoica antarctica*), Antarctic fulmar (*Fulmarus glacioloides*), Cape petrel (*Daption capense*), Snow petrel (*Pagodroma nivea*), Wilson's storm petrel (*Oceanites oceanicus*), South Polar skua (*Catharacta maccormicki*), and Adelie penguin (*Pygoscelis adeliae*). The Area supports five species of pinnipeds, including the Ross seal (*Ommatophoca rossii*) which is a Specially Protected Species.

South-east of the island, there is a large colony of Emperor penguins (*Aptenodytes forsteri*) on fast ice.

The Area consists of Haswell Island (66º31'S, 93º00'E), about 1 km^2 in area, the largest of a group of islands lying close to Mirny station, together with its littoral zone and the area of fast ice, when present. ATCM VIII (Oslo, 1975) approved its designation as SSSI 7 on the aforementioned grounds after a proposal by the USSR. Map 1 shows the location of the Haswell Islands (except Vkhodnoy Island), Mirny Station, and logistic activity sites. It was renamed and renumbered as ASPA No. 127 by Measure 1 (2002).

The boundaries of the Antarctic Specially Protected Area, Haswell Island (66º31'S, 93º00'E, about 1 km^2 in area) and the adjacent section of Davis Sea fast ice of approximately 5 km^2 (when present), which supports a colony of Emperor penguins are detailed in Map 2. It is one of a few Emperor penguin colonies in the vicinity of a permanent Antarctic station, and therefore it has advantages for the study of the species and its habitat.

Described by biologists during the first Soviet expeditions, the Area was studied in the 1970s and recent years, providing valuable materials for comparative analyses and monitoring of the long-term environmental impact of a large Antarctic station.

2. Aims and objectives

Research in the ASPA is conducted to provide a better understanding of how natural and anthropogenic environmental changes affect the status and dynamics of local populations of flora and fauna, and how these changes affect the interaction between key species of the Antarctic ecosystem.

Management at Haswell Island aims to:

- Avoid direct impact of logistic activities on the Area;
- Regulate access to the Area;
- Avoid anthropogenic changes in the structure and abundance of local populations of flora and fauna;
- Allow scientific research, provided it is for compelling scientific reasons that cannot be served elsewhere;

- Facilitate scientific research on the environment in the context of monitoring and assessment of human impact on populations:
- Encourage environmental education and awareness.

3. Management activities

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

- When a vessel is approaching Mirny station and upon arrival at the station, all persons arriving shall be informed of the existence and location of the ASPA and the relevant provisions of the Management Plan.
- Copies of the Management Plan and maps of the Area showing its location shall be available at all units engaged in logistic and scientific activities on the Haswell Islands.
- A sign showing the Area boundaries, with clear statements of entry restrictions ("No entry! Antarctic Specially Protected Area"), shall be placed at the crossing point of the lines Gorev Island – Fulmar Island and Cape Mabus – eastern extremity of Haswell Island to help avoid inadvertent entry into the Area following the formation of fast ice which is safe for pedestrian and vehicle traffic. Information signs shall be installed at the top of Cape Mabus slope, and at station activity sites in the direct vicinity of the Area.
- Markers and signs erected within the Area shall be secured, maintained in good condition, and will have no impact on the environment.
- Overflight shall only be allowed under those conditions as set out under *7. Permit Conditions*

The Management Plan shall be revised periodically to ensure that the values of the Antarctic Specially Protected Area are adequately protected. Any activity in the Area shall be preceded by an environmental impact assessment.

4. Period of designation

Designated for an indefinite period.

5. Maps

- Map 1: Location of the Haswell Islands, Mirny Station, and logistic activity sites.
- Map 2: Boundaries of Antarctic Specially Protected Area 127, Haswell Island.
- Map 3: Location of breeding seabird colonies.
- Map 4: Topographic map of Haswell Island.

6. Description of the Area

6(i) Geographic coordinates and boundary markers

The Area occupies a territory inside polygon ABFEDC (66º 31'10" S, 92º 59'20" E; 66º 31'10" S, 93º 03' E; 66º 32'30" S, 93º 03' E; 66º 32'30" S, 93º 01'E; 66º 31'45" S, 93º 01'E; 66º 31'45" S,

92º 59'20'' E) (Map 2). The marked section of fast ice in the Davis Sea encompasses the most likely routes taken by Emperor penguins during the breeding season.

The Area boundaries on fast ice closer to the station can be broadly (visually) identified on site as directions EF (Vkhodnoy Island – Fulmar Island) and ED (Cape Mabus – eastern extremity of Haswell Island). A sign showing the directions of the Area boundaries, with clear statements of entry restrictions ("No entry! Antarctic Specially Protected Area"), shall be placed in point E. Information signs showing distance to the Area boundary shall be installed at station activity sites in the direct vicinity of the Area (at the top of Cape Mabus slope, and on Buromsky, Zykov, Fulmar, and Tokarev Islands).

It is highly unlikely that the outlying marine boundaries of the Area will be crossed inadvertently, as there is presently no activity this far away from the station. These boundaries have no visual features and shall be identified by the map.

There are no paths or roads within the Area.

6(ii) Natural features

The Area comprises Haswell Island (the largest island in the archipelago), its littoral zone, and the adjacent section of fast ice in the Davis Sea. Russia's Mirny Observatory on Mirny Peninsula, located in coastal nunataks south of the ASPA, has been operational since 1956.

For the larger part of the year, the sea within the Area is covered with fast ice, whose width reaches 30-40 km by the end of winter. Fast ice breaks up between December 17 and March 9 (February 3, on average) and freezes between March 18 and May 5 (April 6, on average). The probability that the ice-free period off Mirny will last more than 1 month is 85%, more than 2 months 45%, and more than 3 months 25%. The Area is always full of icebergs frozen in the ice. In summer, when fast ice disappears, icebergs drift westward along the coast. Seawater temperature is always below zero. The tide has an irregular daily pattern.

Coastal waters support a rich benthic fauna. Fish fauna in the Area is dominated by various icefish species, while Antarctic toothfish (*Dissostichus mawsoni*) and Antarctic silverfish (*Pleuragramma antarcticum*) are less abundant. An ample forage base and the availability of suitable nesting sites create a favorable environment for numerous seabirds. According to records, there are 12 bird species in the vicinity of Mirny (Table 1).

Table 1: The avifauna of the Haswell Islands (ASPA 127).

1	Emperor penguin (*Aptenodytes forsteri*)	B, M
2	Adelie penguin (*Pygoscelis adeliae)*	B, M
3	Chinstrap penguin (*Pygoscelis antarctica*)	V
4	Macaroni penguin (*Eudyptes chrysolophus*)	V
5	Southern fulmar (*Fulmarus glacioloides*)	B
6	Antarctic petrel (*Thalassoica antarctica*)	B
7	Cape petrel (*Daption capense*)	B
8	Snow petrel (*Pagodroma nivea*)	B
9	Wilson's storm petrel (*Oceanites oceanicus*)	B
10	Pomarine skua (*Stercorarius pomarinus*)	V
11	South-polar skua (*Catharacta maccormicki*)	B
12	Kelp gull (*Larus dominicanus*)	V

Notes: B – breeding species; M – molting sites in the vicinity of the station; V – vagrant species.

The coastal fauna is mainly represented by pinnipeds, among which Weddell seals (*Leptonychotes weddelli*) are most abundant. Other Antarctic seal species can be seen occasionally in very small numbers. Minke whales (*Balaenoptera acutorostrata*) and killer whales (*Orcinus orca*) have frequently been observed near Mirny.

At present, seabirds nest on six out of seventeen archipelago islands. Seven species breed directly on the islands, and one species – the Emperor penguin (*Aptenodytes forsteri*) – on fast ice. A few vagrant species have also been observed in the Area.

Emperor penguin *(Aptenodytes forsteri)*

The Emperor penguin colony of the Haswell Islands is located on fast ice in the Davis Sea 2 to 3 km north-east of the Mirny Observatory and usually within 1 km of Haswell Island. The colony was discovered and described by the Western Party of the Australasian Antarctic Expedition on November 25, 1912. However, a detailed study of the colony was initiated only after the establishment of the Mirny Observatory. Since its foundation in 1956, the observatory has been conducting periodic monitoring of the size of the breeding population. The first round-the-year observation of the colony was initiated by E.S. Korotkevich in 1956 (Korotkevich, 1958), continued until 1962 (Makushok, 1959; Korotkevich, 1960; Prior, 1968), and was then resumed by V.M. Kamenev in the late 1960s-early 1970s (Kamenev, 1977). After a long break, observations of the avifauna were resumed at the observatory in 1999-2004.

Table 2 shows a schedule of various phenological events in the Emperor penguin colony of the Haswell Islands.

Table 2: Dates of phenological events in the Emperor penguin colony, Haswell Islands.

Penguins arrive at the colony site	Last 10 days in March
Peak of the mating period	Late April – first ten days in May
Commencement of egg laying	First 5 days in May
Commencement of hatching	July 5–15
Chicks start leaving brood pouches	Last 10 days in August
Chicks start getting together in creches	First 10 days in September
Chicks start molting	Late October – early November
Adult birds start molting	Last 10 days in November – first 5 days in December
The colony starts disintegrating	Last 10 days in November – mid-December
Birds abandon the colony site	Last 5 days in December – first 10 days in January

The most recent data on the colony status were obtained during 2003-2004 when the colony consisted of 3 subcolonies located within 500-1,700 m of each other and separated by icebergs (Map 3). Single adult birds and those with eggs and chicks migrated between the subcolonies.

The estimated local population in the season 2003/2004 was approximately 9,000 birds during the egg laying period, the highest figure obtained from censusing over the last decade (1994–2001: 5,700-7,000 adult birds, RAE unpublished reports). According to estimates and censuses conducted in 1956–1966, the total population varied from 14,000 to 20,000 birds (Korotkevich, 1958, Makushok, 1959, Prior, 1964, Kamenev, 1977).

Available data on changes in population size indicate that the Haswell Island colony is characterized by a negative long-term trend: the population decreased by about 50% over the period 1950-2000 (from 14,000–20,000 to 7,000–9,000 birds). Short-term trend (last decade) is considered to be fluctuating. Systematic monitoring studies should continue on the Haswell Islands to reveal the causes of changes in the breeding population of Emperor penguins.

Table 3: Factors affecting the population of Emperor penguins on the Haswell Islands and relevant mitigation actions.

		Actions to mitigate the impact of anthropogenic factors
Anthropogenic factors	Disturbance by visitors	Visits to the colony should be strictly regulated
	Collection of eggs	The collection of eggs is prohibited, except in accordance with a permit for research issued by a national authority.
	Disturbance by flights	Flight route and height should be selected in accordance with this Management Plan
Natural factors	Climate changes and variability of food resources (Seasonal changes in ice conditions affect food availability and hence may affect adult survival rate and chick mortality; an early break-up of fast ice increases chick mortality in the corresponding season)	

Data on changes in the size of other populations are less complete (Table 4). Long-term changes may show a negative trend. However, it's not possible to make well-grounded conclusions based just on the two available records which are several decades apart.

Table 4: Long-term changes in the size of bird populations on the Haswell Islands. Trend: 0 = uncertain, -1 = negative, ? = supposed.

Species	**1960s-1970s**	**1999/2000**	**Trend**
Adelie penguin	41,000 adult birds	15-15,850 nests	0 ?
Southern fulmar	9,500-10,000 adult birds	2,300 occupied nests with eggs	-1 ?
Antarctic petrel	?	150-200 occupied nests with eggs	?
Cape petrel	750 adult birds	150 occupied nests with eggs	-1 ?
Snow petrel	600-700 adult birds	60-75 occupied nests	-1
Wilson's storm petrel	400-500 adult birds	30+ occupied nests	-1
Antarctic skua	24 pairs	19 pairs	0
	1950s-1970s	**1990s – early 2000s**	
Emperor penguin	14,000 – 18,000 adults	5,700 – 9,000 adults	-1

The data from Haswell Island area show possible long-term negative trends in different seabird species including both penguins and flying birds. Moreover, there are similar data on population decline of emperor penguins during late 1970s from the same large marine region from Terre Adélie area (Barbroud & Weimerskirch 2001). This suggests large-scaled climate changes may be responsible for the population dynamics in the Haswell Island area.

More research and further monitoring are needed to reveal population trends in the birds of Haswell Island and to understand their causes.

6(iii) Definition of seasons; restricted and prohibited zones within the Area

Entry into any part of the Area is allowed only for holders of a Permit issued by an appropriate National Authority.

Activity in the Area shall be subject to special restrictions during the bird breeding season:

- From mid-April to December in the vicinity of the Emperor penguin colony; and
- From October to March in the vicinity of the nesting sites on Haswell Island.

The location of the breeding colonies is shown in Map 3. Emperor penguins, which are especially sensitive to disturbance, shall also be protected outside the designated breeding site as the breeding site may vary in location.

6(iv) Structures within the Area

A beacon – a metal pole whose base is secured by stones – is located on Haswell Island. There are no other structures on the island.

A heated shack containing an emergency food supply may be located on one of the neighboring islands (but not on Haswell Island).

7. Permit conditions

7(i) Permit conditions

Entry into the Area is prohibited unless in accordance with a Permit issued by an appropriate national authority. Issue of a Permit to enter the Area must satisfy the following conditions:

- A Permit is issued only for purposes specified in para. 2 of the Management Plan;
- Permits shall be issued for a stated period;
- The actions permitted will not jeopardize the ecosystems of the Area or interfere with existing scientific research;
- Visits to the Area under a Permit shall be allowed to organized groups accompanied by an authorized person. Relevant information shall be entered in the Visit Logbook specifying the date and purpose of the visit and the number of visitors. The leader of Mirny station keeps the Logbook. The authorized person is appointed in accordance with national procedure; and
- A visit report shall be supplied to the authority named in the Permit by the end of the stated period or annually.

Permits shall be issued for scientific research, monitoring studies, or inspections that do not require collection of biological materials or fauna samples or that require collecting in small quantities. A Permit for a visit to or stay in the Area shall specify the scope of tasks to be implemented, the implementation period, and the maximum number of staff allowed to visit the Area.

7(ii) Access to and movement within the Area

Vehicles other than skidoos are prohibited within the Area.

When approaching or moving within the Area, care shall be taken to avoid any disturbance to birds and seals, especially during the breeding season. Deterioration of, the conditions of or approaches to the bird nesting sites or seal haulouts shall be prohibited at all times.

Haswell Island. The western or south-western slopes are most suitable for access (Map 4). Movement shall only be on foot.

Fast ice section. During the formation of fast ice which provides pedestrian and vehicle safety, entry into the section shall be at any suitable place from the Mirny Observatory. The use of any vehicles in the Area shall be prohibited during the nest sitting season (May-July). When using skidoos, visitors shall not approach the Emperor penguin colony closer than 500 m (irrespective of its location).

Overflight of the Area is prohibited during the most sensitive period of the Emperor penguin breeding cycle, from April 15 to August 31.

During the remainder of the year, overflight of the Area shall be conducted according to the following restrictions (Table 5). Direct overflights of the seabird breeding colonies should be avoided whenever it is possible.

Table 5: Minimum overflight heights within the Area according to aircraft type.

Aircraft type	**Number of engines**	**Minimum height above ground**	
		Feet	**Meters**
Helicopter	1	*2,460*	750
Helicopter	2	*3,300*	1,000
Fixed-wing	1 or 2	*2,460*	750
Fixed-wing	4	*3,300*	1,000

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

- Research on avifauna and other environmental studies that cannot be conducted elsewhere.
- Management activities, including monitoring.
- Education visits to the Emperor penguins colony except in the early nesting period (May – July).

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

Structures or scientific equipment may be installed in the Area only for compelling scientific or management purposes approved by an appropriate authority pursuant to the effective regulations.

7(v) Location of field camps

Camping shall be allowed only for safety reasons, and every precaution shall be taken to avoid damage to the local ecosystem and disturbance to the local fauna.

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

No living organisms or chemicals other than chemicals required for scientific purposes specified in the Permit shall be introduced into the Area (chemicals introduced for scientific purposes shall be removed from the Area before the Permit expiry).

Fuel is not to be stored in the Area unless it is required for essential needs relating to the permitted activity. Anything introduced shall be for a stated period only, handled so that the risk to the ecosystem is minimized, and removed at the conclusion of the stated period. No permanent storage facilities shall be established in the Area.

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

Taking of or harmful interference with native flora or fauna is prohibited, except by Permit. In the case the activity is determined to have less than a minor or transitory impact, it should be conducted in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica, to be used as a minimum standard.

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

Collection or removal of anything not brought into the Area by the Permit holder shall only be for scientific or management purposes specified in the Permit.

However, human waste may be removed from the Area, and dead or pathological samples of fauna and flora may be removed for laboratory analysis.

7(ix) Disposal of waste

All waste shall be removed from the Area.

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

Permits to enter the Area may be granted to carry out scientific observation, monitoring, and site inspection activities, which may involve limited collection of fauna samples, eggs, and other biological materials for scientific purposes. To help maintain the environmental and scientific values of the Area, visitors shall take every precaution against the introduction of alien materials and organisms.

Any long-term monitoring sites shall be appropriately marked on a map and on site. A map showing the boundary of the ASPA shall be displayed at Mirny Station. A copy of the Management Plan shall be displayed at Mirny Station. A copy of the Management Plan shall be freely available at Mirny Station.

Visits to the Area shall be limited to scientific, management and educational purposes.

7(xi) Requirements for reports

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

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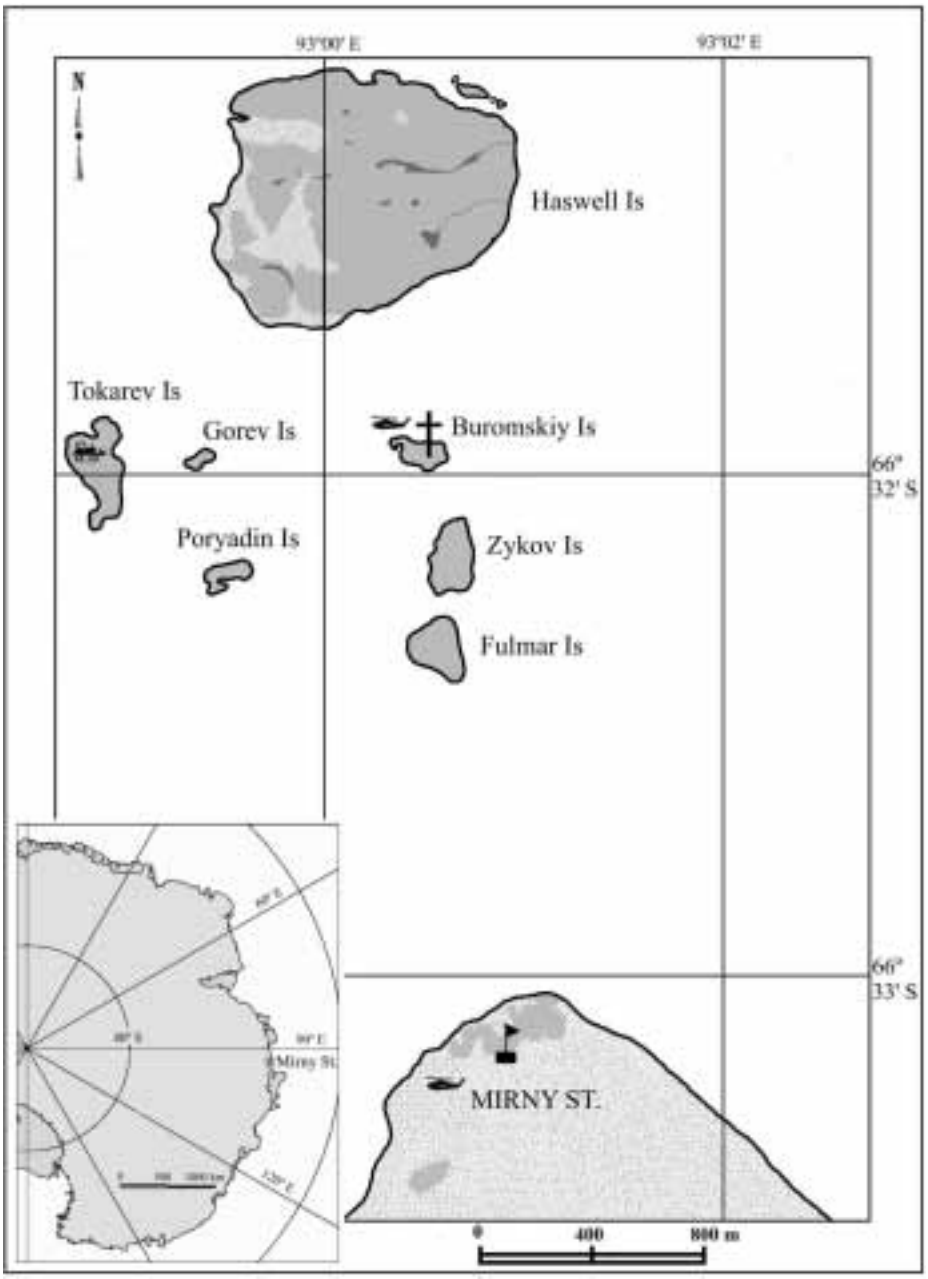
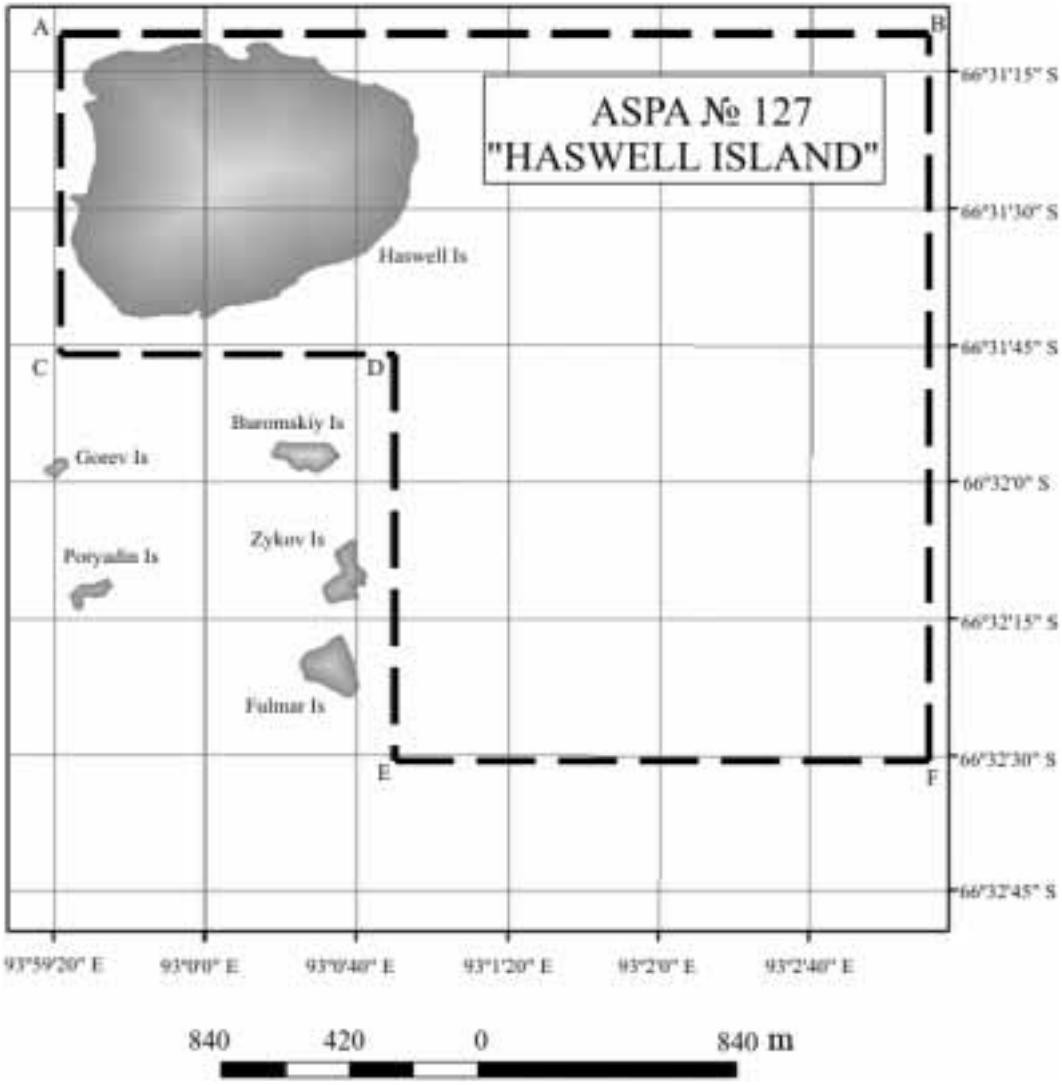
Map 1: Location of the Haswell Islands, Mirny Station, and logistic activity sites.

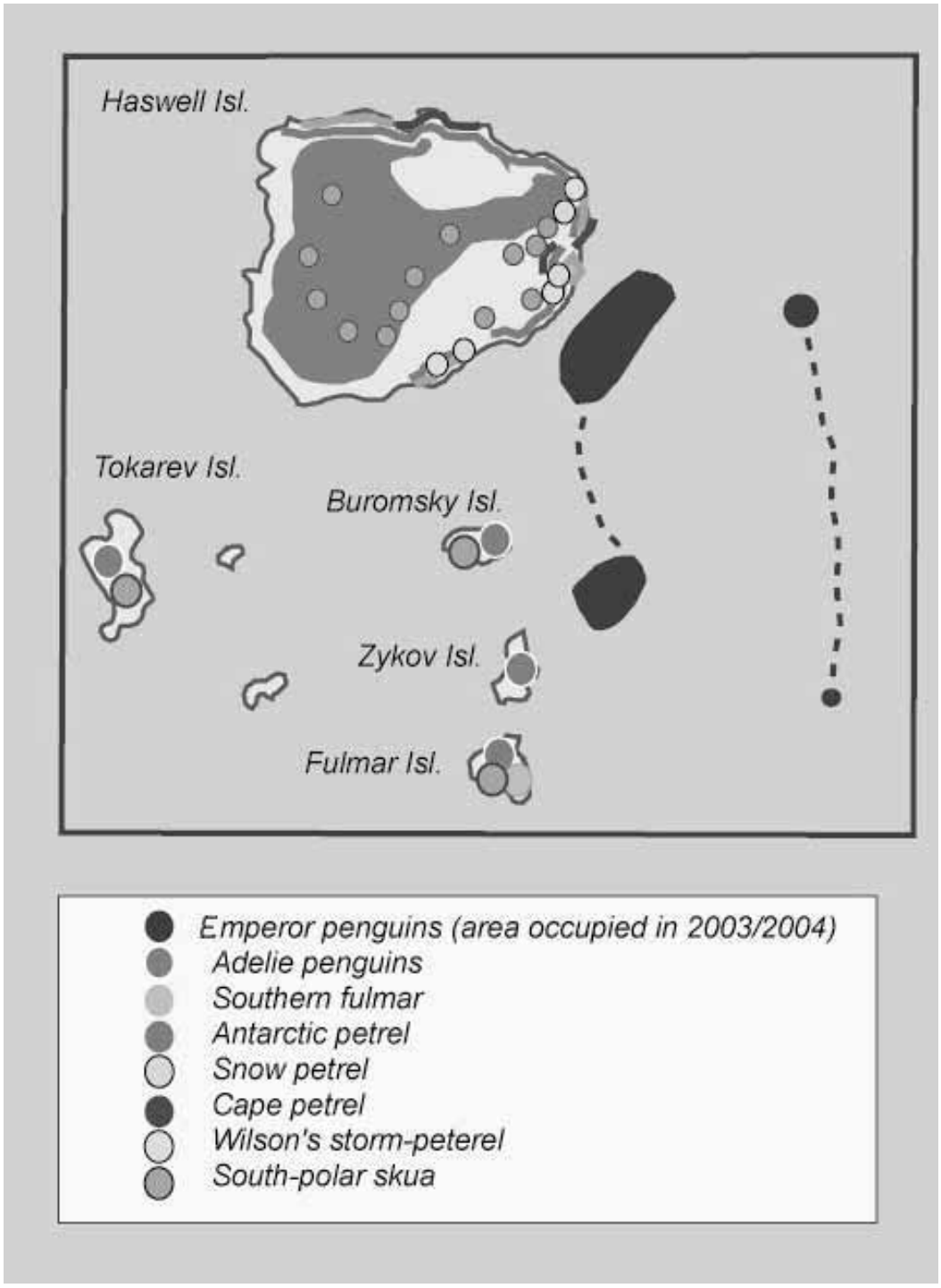


soil, rocks | glacier | lakes | station | cemetry | helicopter pad | vehicle debarkation site

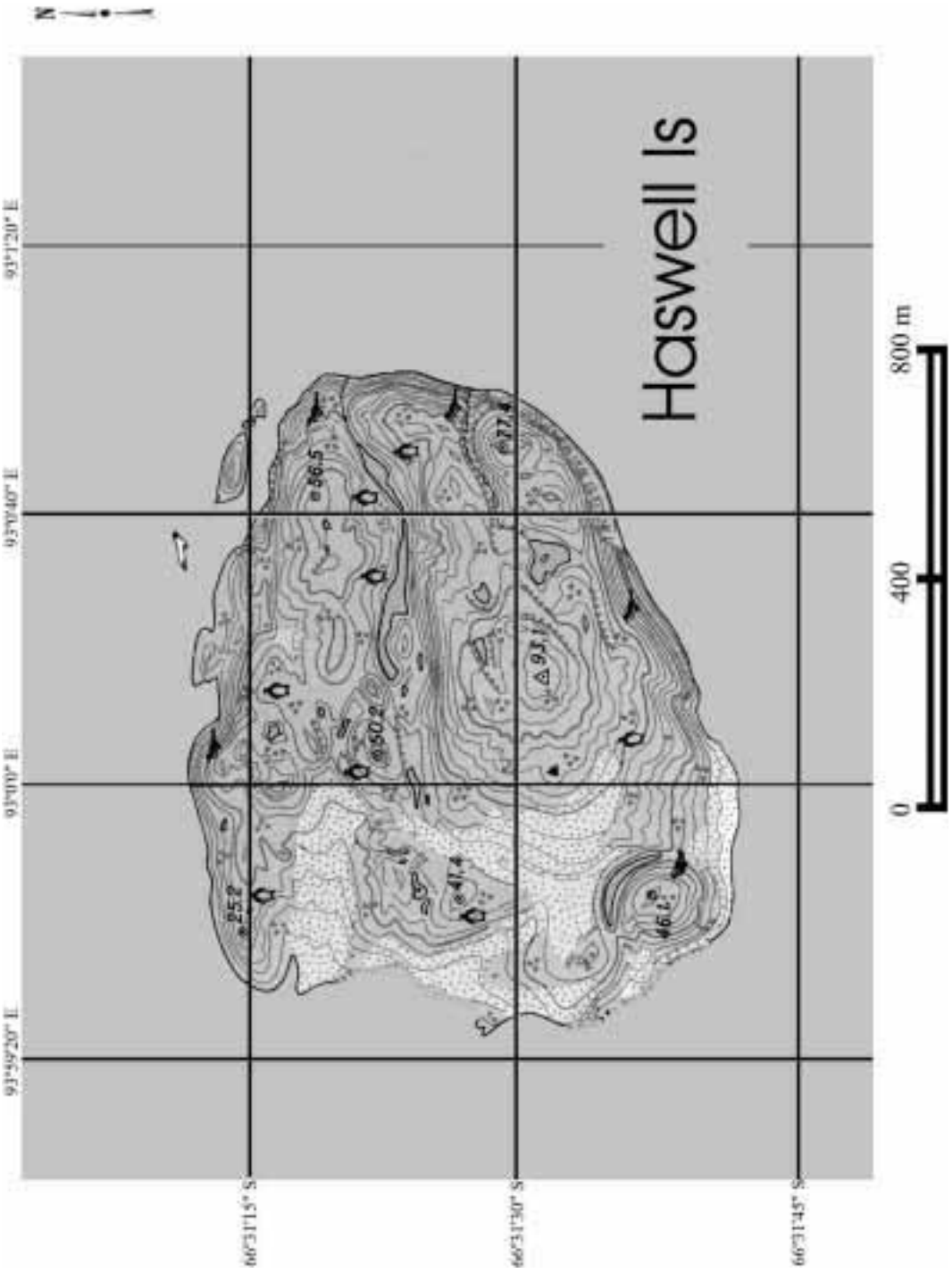
Map 2: Boundaries of Antarctic Specially Protected Area 127, Haswell Island.



Map 3: Location of breeding seabird colonies.



Map 4: Topographic map of Haswell Island.



Management Plan for Antarctic Specially Protected Area No. 131

CANADA GLACIER, LAKE FRYXELL, TAYLOR VALLEY, VICTORIA LAND

1. Description of values to be protected

An area of 1 km^2 to the east side of Canada Glacier was originally designated in Recommendation XIII-8 (1985) as SSSI No. 12 after a proposal by New Zealand on the grounds that it contains some of the richest plant growth (bryophytes and algae) in the southern Victoria Land Dry Valleys. As such, the Area is of exceptional intrinsic ecological value, and is also of scientific value to botanists, zoologists and microbiologists. The Area is designated primarily to protect the site's ecological values. It is also valuable as a reference site for other dry valley ecosystems.

The boundaries of this site have been changed such that the Area now includes biologically rich communities that were previously excluded. The Area comprises sloping ice-free ground with summer ponds and small meltwater streams draining from the Canada Glacier to Lake Fryxell. Most of the plant growth occurs in a flush area close to the glacier in the central part of the Area. The composition and distribution of the plant communities in the Area are correlated closely with the water regime. Thus, water courses and water quality are important to the values of the site. The Area is unusual in that it receives more consistent water flows compared with many other parts of the south Victoria Land Dry Valleys, and is sheltered from strong winds by the nearby 20 m glacier face.

The Area has been well-studied and documented, which adds to its scientific value. However, the plant communities are fragile and vulnerable to disturbance and destruction by trampling and sampling. Damaged areas will be slow to recolonise. Sites damaged at known times in the past have been identified, which are valuable in that they provide one of the few areas in the Dry Valleys where the long-term effects of disturbance, and recovery rates, can be measured.

The Area requires long-term special protection because of its exceptional moss communities for the south Victoria Land Dry Valleys and thus ecological importance; its scientific values; the limited geographical extent of the ecosystem; the vulnerability of the Area to disturbance through trampling, sampling, pollution or alien introductions; and in view of the existing and increasing pressure from scientific, logistic and tourist activities in the region.

2. Aims and objectives

Management at Canada Glacier aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research on the ecosystem and elements of the ecosystem in particular moss communities while ensuring protection from over-sampling;
- allow other scientific research provided it is for compelling reasons which cannot be served elsewhere;
- 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 are to be undertaken to protect the values of the Area:

- Signs illustrating the location and boundaries with clear statements of entry restrictions shall be placed at appropriate locations at the boundaries of the Area to help avoid inadvertent entry.
- Signs showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, in all of the research hut facilities located in the Taylor Valley that are within 20 km of the Area.
- Brightly coloured markers, clearly visible from the air and posing no significant threat to the environment, shall be placed to mark the helicopter landing pad.
- Wind direction indicators should be erected close to the designated helicopter landing site when necessary and removed when no longer required.
- Markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition.
- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- National Antarctic Programmes operating in the region shall consult together with a view to ensuring these steps are carried out.
- Up to date Management Plans, maps and other relevant information shall be made available on National Programme websites.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

- Map A: Canada Glacier, Taylor Valley, location map. Map specifications:
  Projection: Lambert conformal conic;
  Standard parallels: 1st 79° 18' 00" S; 2nd 76° 42' 00"S
  Central Meridian: 162° 30' 00" E Latitude of Origin: 78° 01' 16.2106" S;
  Spheroid: WGS84.
- Inset: McMurdo Dry Valleys and Ross Island region, showing the location of McMurdo Station (US) and Scott Base (NZ), and the location of the other specially protected areas in the Dry Valleys (Barwick Valley, Victoria Land, ASPA No. 123, and Linnaeus Terrace, Asgaard Range, Victoria land, ASPA No. 138).
- Map B: Canada Glacier, topographic map. Map specifications are the same as those for Map A. Contours are derived from the digital elevation model used to generate the orthophotograph in Map D. Precise area of moist ground associated with the flush is subject to variation seasonally and inter-annually.
- Map C: Canada Glacier, topographic map showing vegetation density map. Map specifications are the same as those for Map B. Vegetation density mapped and mummified seals identified.

- Figure 1: Perspective view of the Canada Glacier protected area, combining orthophoto and Landsat images. The perspective is from an elevation of 485 m (1600 ft), 1.1 km out from the Area at a bearing of 95° SE.

6. Description of the Area

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

General description

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

Boundaries

The south boundary of the Area is defined as the shoreline of Lake Fryxell, to the water's edge, extending from where the Canada Glacier meets Lake Fryxell to about 1 km northeast (77°36'49.5"S 163°04'52.5"E). The southeast corner is near the neck of a small peninsula extending into Lake Fryxell. The peninsula, outside of the Area, is marked by a large rock (split) surrounded by a circle of rocks which was a benchmark for the 1985 NZ survey of the original SSSI. A wooden post marking Dry Valley Drilling Project Site 7 (1973) is about 10 m to the NW of this point. A moraine ridge extending from the southeast corner upward in a northerly direction defines the eastern boundary of the Area. A cairn is located on a knoll on this ridge 450m from the southeast corner point (77°36'40.9"S 163°04'23.9"E). The ridge dips sharply before joining the featureless slope of the main Taylor Valley wall: the northeast corner of the Area is in this dip and will be marked by a cairn.

From the northeast cairn, the northern boundary slopes gently upwards and west for 1.7km to Canada Glacier, where a large rock marks the northwest corner of the Area (77°36.434'S E162°59.772'E). The rock is situated on a small knoll at an elevation of 220m, approximately 300m from where the glacier emerges into the Taylor Valley. The western boundary follows the glacier edge for about 1km, down a slope of lateral moraine of fairly even gradient to the lake (77°37'12.2"S; 163°02'98.4"E).

Biology

The central flush area (Maps C and D), containing the richest stands of vegetation, is close to the glacier edge to the north and south of a small, shallow pond. The flush area is gently sloping and very moist with numerous small ponds and rivulets in the summer. The slopes above this area are better drained, but vegetation colonises several small stream channels which extend parallel to the glacier from the upper boundary of the Area down to the flush. Undulating moraines assist accumulation of persistent snow patches on this slope, which may also provide moisture for plant growth. Stream channels, and associated vegetation, become less obvious with distance from the glacier. These slopes and the central flush are drained to the Southeast by Canada Stream, one of three streams which dominate the water input to Lake Fryxell. From the 31/12/03 to the 31/12/04 the average discharge rate from the Canada Glacier Stream (F1) was 11.5 l/s (min = 0 l/s and max = 130.23l/s). The average water temperature over this time was 1.02°C (min = -9.1°C and max = 11.65°C) (*http://www.mcmlter.org/*).

Three moss species have been identified from the flush area: *Bryum subrotundifolium*, and *Pottia heimii* dominate with rare occurrences of *Bryum pseudotriquetrum.* Lichen growth in the Area is inconspicuous, but two epilithic lichens, *Carbonea capsulata* and an unknown species of *Sarcogyne*, and *Lecanora expectans* and *Caloplaca citrina* may be found in a small area near the outflow of the pond near Canada Glacier. Chasmoendolithic lichens occur in many boulders. Over 37 species of freshwater algae have been described at the site, predominantly from the Cyanophyta. The upper part of Canada Stream superficially appears sparse in algal growth. However, abundant encrusting epilithophytes grow on the undersides of stones and boulders. Two algae, *Prasiola calophylla* and *Chamaesiphon subglobosus*, have been observed only in this upper part of the stream. *Prasiola calophylla* growing in dense green ribbons beneath stones in the stream is generally only apparent when stones are overturned. Cyanobacterial mats are extensive in the middle and lower reaches of the stream. Mucilaginous colonies of *Nostoc commune* dominate wetter parts of the central flush, while oscillatoriacean felts cover much of the mineral fines. Epiphytic algae, dominated by *Nostoc,* are common over the surface of *Bryum argenteum* and *Pottia heimii*. The lower stream is similar in floral composition, although it is notable in that the alga *Tribonema elegans* is abundant while absent further upstream: this is the first record of this alga from Antarctica. *Phormidium* and *Gloeocapsa* species are common throughout the stream-course.

Invertebrates from six phyla have been described in the Area: the three main groups are Rotifera, Nematoda and Tardigrada, with Protozoa, Platyhelminthes, and Arthropoda also present.

Past human activity

Evidence of human activities is commonplace within the Area. The main forms of damage evident at sites of vegetation are paths, footprints and removal of core samples and larger clumps from moss turfs. A number of old markers exist in the flush area.

A plastic greenhouse was erected within the Area close to the flush from 1979 to 1983 for research and experimental growth of garden vegetables. The structure was removed at the end of each season except for 1983, when it was destroyed by a winter storm. Remains of the greenhouse found in the Area have been removed. The first New Zealand hut at Canada Glacier was relocated to a second site in 1989, and removed completely in 1995–96. The second site is now designated for essential camping associated with research, marked on Maps B and C. Paths marked by lines of rocks, areas cleared for use as campsites, an old helicopter pad, and several low rock structures associated with the first hut site have now been remediated. A series of at least four shallow pits (~1 m in depth) were dug close to the old hut site. The second hut site comprised two small buildings, several new campsites, and a new helicopter pad, which remains as the current helicopter landing site. The second hut site is the present preferred camping site.

6(ii) Restricted zones within the Area

None.

6(iii) Structures within and near the Area

Paths exist between the designated camp site and the glacier edge, crossing a moist area of plant growth, and between the lake shore and the weir on Canada Stream. An access route between Lake Hoare and Lake Fryxell runs just above the northern boundary.

A rock weir was constructed in the constricted part of Canada Stream in the 1981/1982 season and was fully removed at the end of the season. In 1990 a more substantial weir and 9-inch Parshall flume were installed nearby (Maps Band C). The flume is made of black fibreglass. The weir consists of polyester sandbags filled with alluvium from near the stream channel: areas disturbed

during construction were restored and after one season were not evident. The upstream side of the weir is lined with vinyl-coated nylon. A notch has been built into the weir for relief in case of high flow. Clearance of seasonal snow from the channel has been necessary to prevent water from backing up at the weir. Data logging instrumentation and batteries are stored in a plywood crate located nearby on the north side of the stream. The weir is maintained by the Long Term Ecological Research project.

Signposts and cairns mark the Area boundaries.

The US Fryxell Hut (20m ASL) is located 1.5 km to the east, and Hoare Hut (65m ASL) is located 3km to the west of the Area (Map A).

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

The nearest protected areas to Canada Glacier are Linnaeus Terrace (ASPA No. 138) 47 km west in the Wright Valley, and Barwick Valley, Victoria Land (ASPA No. 123) 50 km to the NW (Inset, Map A).

7. Permit conditions

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

- it is issued only for scientific study of the ecosystem, or for compelling scientific reasons that cannot be served elsewhere, or for essential management purposes consistent with plan objectives such as inspection or review;
- the actions permitted will not jeopardise the ecological or scientific values of the Area;
- access to any zone marked as possessing medium density or higher vegetation (Map C) should be carefully considered and special conditions to access such areas should be attached to the Permit;
- any management activities are in support of the aims of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or an authorized copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- permits shall be issued for a stated period.

7(i) Access to and movement within the Area

Vehicles are prohibited within the Area and access shall be by foot or by helicopter. Helicopter access should be from south of the line marked on the accompanying site maps, and overflight within the Area less than 100 m Above Ground Level (AGL) north of this line is prohibited. Helicopters shall land only at the designated site (163° 02' 53" E, 77° 36' 58" S: Map B) and overflight of the Area should generally be avoided. Exceptions to these flight restrictions, which will only be granted for an exceptional scientific or management purpose, must be specifically authorised by Permit. Use of helicopter smoke grenades within the Area is prohibited unless absolutely necessary for safety, and then these should be retrieved. Visitors, pilots, air crew, or passengers en route elsewhere on helicopters, are prohibited from moving on foot beyond the immediate vicinity of the designated landing and camping site unless specifically authorised by a Permit.

Pedestrians travelling up- or down-valley shall not enter the Area without a Permit. Permitted visitors entering the Area are encouraged to keep to established routes where possible. Visitors should avoid walking on visible vegetation or through stream beds. Care should be exercised

walking in areas of moist ground, where foot traffic can easily damage sensitive soils, plant and algal communities, and degrade water quality: walk around such areas, on ice or rocky ground, and step on larger stones when stream crossing is necessary. Care should also be taken of salt-encrusted vegetation in drier areas, which can be inconspicuous. Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise effects.

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;
- Essential management activities, including monitoring.

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

7(iii) Installation, modification or removal of structures

Any structures erected or scientific equipment installed within the Area are to be specified in a Permit. Scientific equipment shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area. Removal of specific equipment for which the Permit has expired shall be a condition of the Permit. Permanent installations are prohibited.

7(iv) Location of field camps

Nearby permanent camps outside of the Area should be used as a base for work in the Area. Camping at the designated campsite (Maps B and C) may be permitted to meet specific essential scientific or management needs.

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 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 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

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

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

Material may be collected or removed from the Area only in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed unless the impact of removal is likely to be greater than leaving the material in situ: if this is the case the appropriate authority should be notified.

7(viii) Disposal of waste

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

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

- Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, which may involve the collection of small samples for analysis or review, to erect or maintain signposts, or for protective measures.
- Any specific sites of long-term monitoring shall be appropriately marked.
- To help maintain the ecological and scientific values of the plant communities found at the Area visitors shall take special precautions against introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other Antarctic sites, including stations, or from regions outside Antarctica. To minimise the risk of introductions, visitors shall thoroughly clean footwear and any equipment to be used in the area — particularly camping and sampling equipment and markers — before entering the Area.

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.

8. Bibliography

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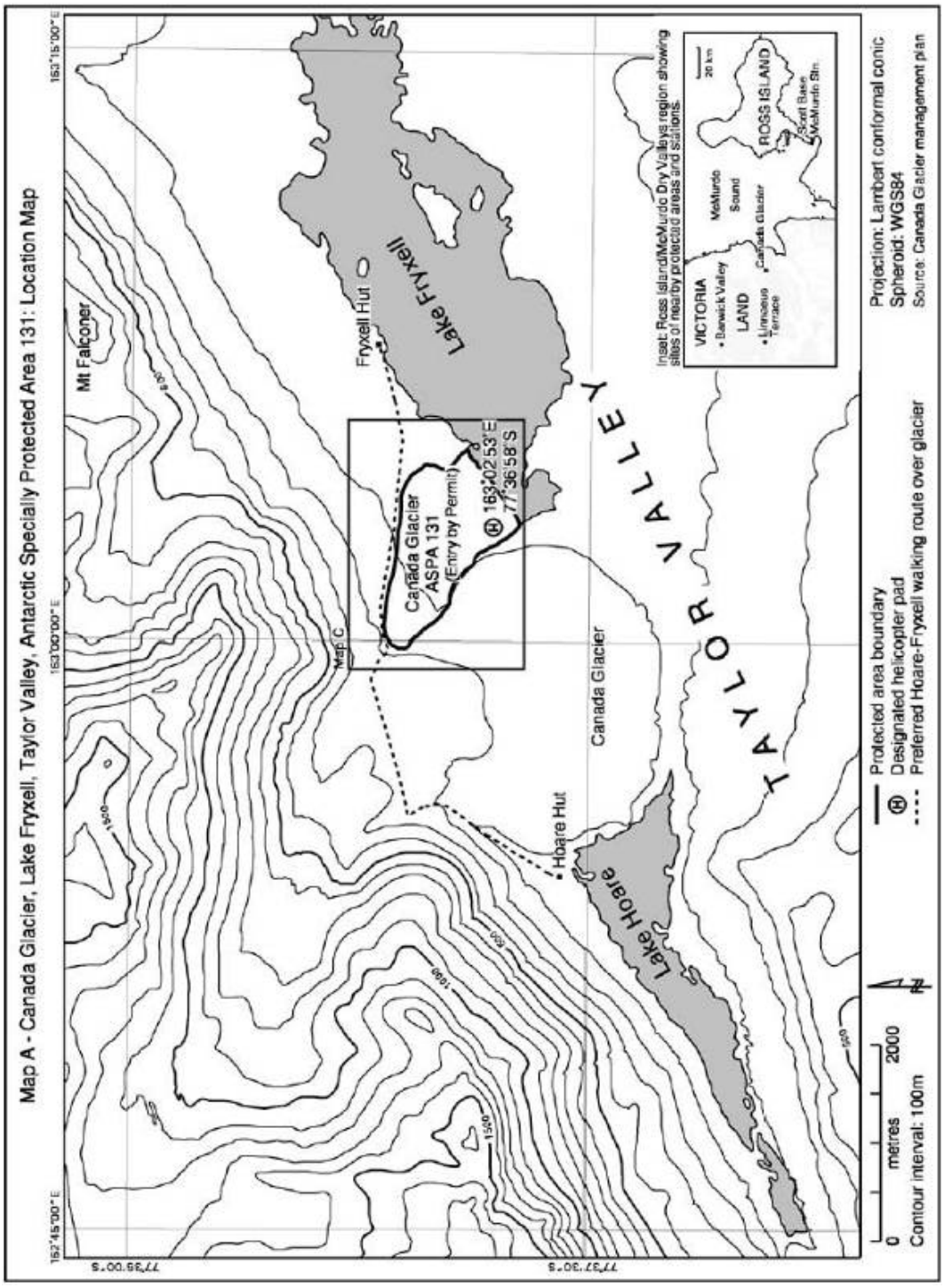
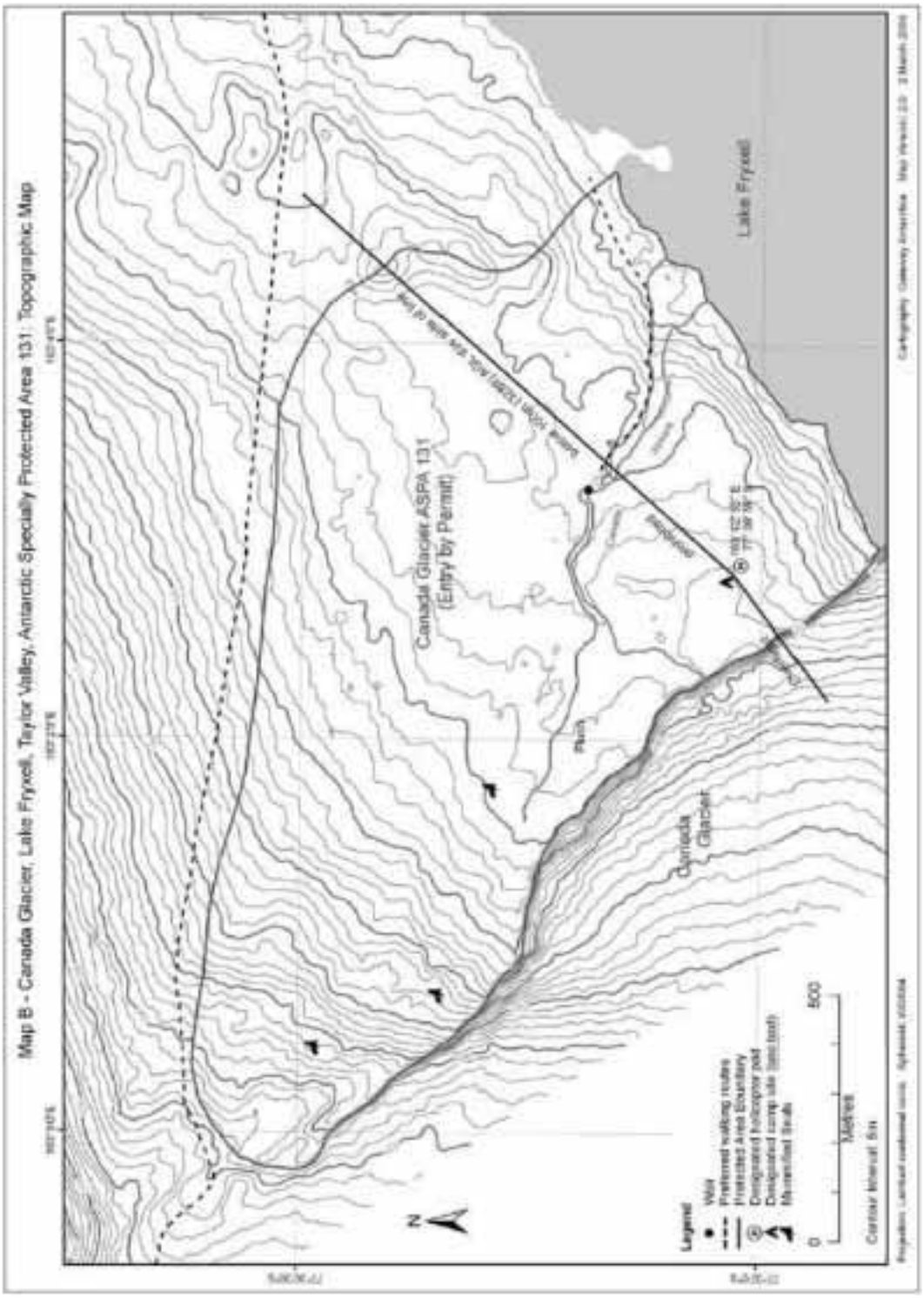
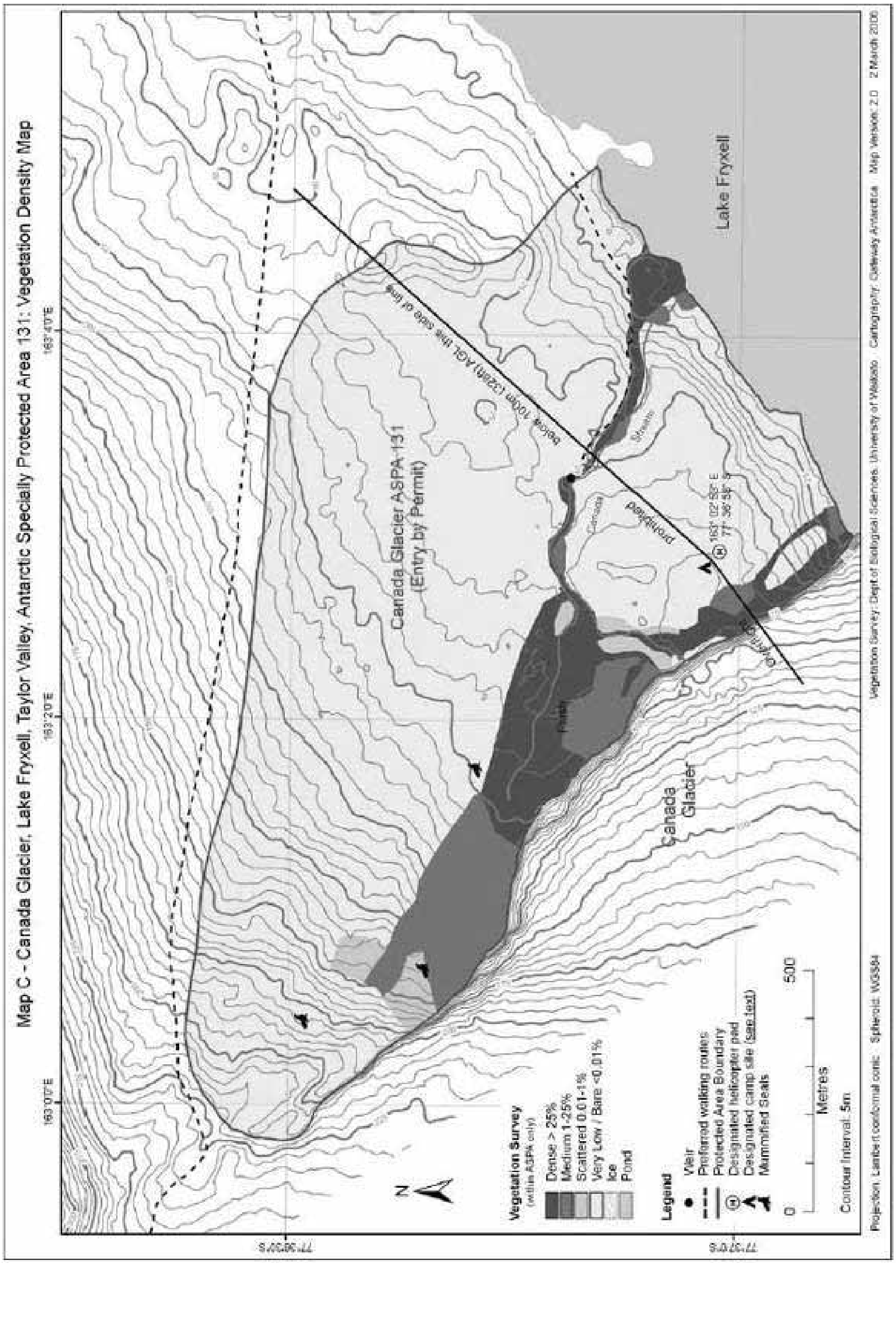

Map A - Canada Glacier, Lake Fryxell, Taylor Valley, Antarctic Specially Protected Area 131: Location Map
163°15'00"E
162°30'00"E
162°45'00"E
77°35'00"S
77°37'30"S
Mt Falconer
Fryxell Hut
Lake Fryxell
Canada Glacier
ASPA 131
(Entry by Permit)
163°02'53"E
77°36'58"S
Map C
Canada Glacier
Hoare Hut
Lake Hoare
TAYLOR VALLEY
Inset: Ross Island/McMurdo Dry Valleys region showing sites of nearby protected areas and stations.
VICTORIA LAND
Berwick Valley
Lincoln Terrace
McMurdo Sound
Canada Glacier
ROSS ISLAND
Scott Base
McMurdo Stn
20 km
Protected area boundary
Designated helicopter pad
Preferred Hoare-Fryxell walking route over glacier
0
metres
2000
Contour interval: 100m
Projection: Lambert conformal conic
Spheroid: WGS84
Source: Canada Glacier management plan


Map B - Canada Glacier, Lake Fryxell, Taylor Valley, Antarctic Specially Protected Area 131: Topographic Map
Canada Glacier ASPA 131
(Entry by Permit)
Lake Fryxell
Canada Glacier
Path
Legend
Meters
500
0
N


Map C - Canada Glacier, Lake Fryxell, Taylor Valley, Antarctic Specially Protected Area 131: Vegetation Density Map
Lake Fryxell
Canada Glacier ASPA 131
(Entry by Permit)
below 100m (328ft) AGL this side of line
prohibited
Canada
Glacier
Vegetation Survey
(within ASPA only)
Dense > 25%
Medium 1-25%
Scattered 0.01-1%
Very Low / Bare <0.01%
Ice
Pond
Legend
Weir
Preferred walking routes
Protected Area Boundary
Designated helicopter pad
Designated camp site (see text)
Mummified Seals
0
500
Metres
Contour Interval: 5m
Projection: Lambert conformal conic   Spheroid: WGS84
Vegetation Survey: Dept of Biological Sciences, University of Waikato   Cartography: Gateway Antarctica   Map Version: 2.0   2 March 2006

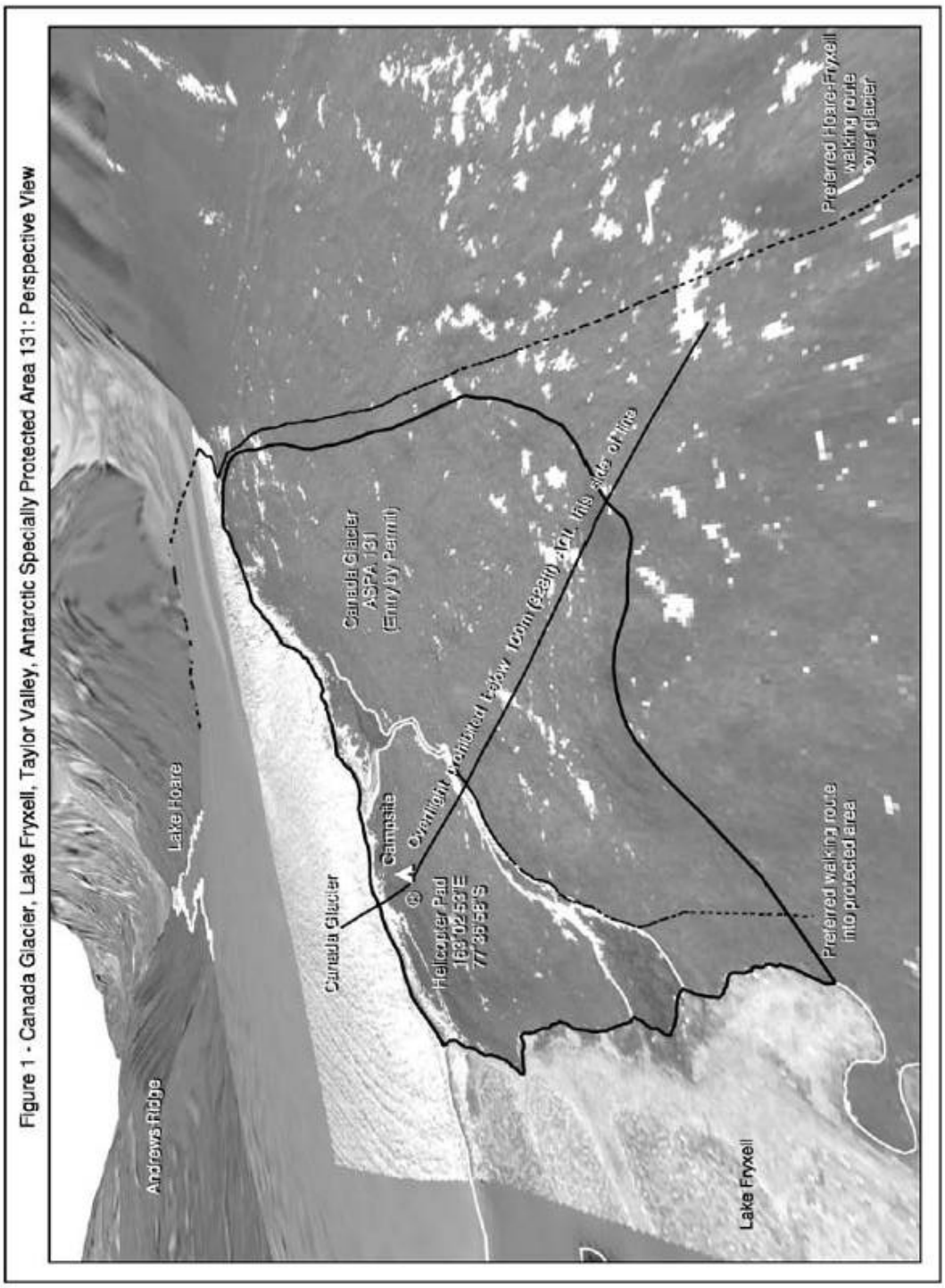


Figure 1 - Canada Glacier, Lake Fryxell, Taylor Valley, Antarctic Specially Protected Area 131: Perspective View
Andrews Ridge
Lake Hoare
Canada Glacier
Canada Glacier
ASPA 131
(Entry by Permit)
Camp site
Overnight prohibited below 100m (330ft) ASL this side of line
Helicopter Pad
163°02.59'E
77°36.58'S
Preferred walking route
into protected area
Preferred Hoare-Fryxell
walking route
over glacier
Lake Fryxell

Management Plan for Antarctic Specially Protected Area No. 134

CIERVA POINT AND OFFSHORE ISLANDS, DANCO COAST, ANTARCTIC PENINSULA

1. Description of values to be protected

This area was originally designated as SSSI No. 15 in ATCM Recommendation XIII-8, after a proposal by Argentina, as an important example of well developed maritime vegetation having breeding colonies of at least five bird species.

During the XXI Antarctic Treaty Consultative Meeting (Christchurch, 1997), the revised Management Plan for the Area was adopted in accordance with the format established by Annex V and Measure 3 (1997). During the XXV Antarctic Treaty Consultative Meeting (Warsaw, 2002), Annex V having entered into force, the *Site of Special Scientific Interest* No. 15 became, by Decision 1 (2002), *Antarctic Specially Protected Area* No. 134.

The original reasons for the designation of the Area are still relevant. This Area has great scientific value due to its unusual biodiversity, which includes numerous species of birds, flora, and invertebrates. The unique topography of the Area together with the abundance and diversity of the vegetation create highly favourable conditions for the formation of numerous microhabitats which, in turn, support the development of biodiversity and give the Area exceptional aesthetic value.

Long-term research programs could be endangered by accidental human interference, destruction of vegetation and soil, pollution of water bodies, and perturbation of birds, especially during reproductive periods.

2. Aims and objectives

Management of ASPA No. 134 aims to:

- Protect the biodiversity of the Area, avoiding major changes in the structure and composition of communities of flora and fauna;
- Prevent unnecessary human disturbance;
- Allow the development of scientific research that cannot be conducted elsewhere, and the continuance of long-term biological studies established in the Area, as well as the development of any other type of scientific research that does not compromise the values for which the Areas is protected;
- Allow the development of studies and monitoring activities to assess the direct and indirect effects of the activities of the neighbouring station (Primavera Base).

3. Management activities

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

- The Primavera Base staff will be specifically instructed as to the conditions of the Management Plan;

- Movement will be limited to areas free of vegetation, avoiding proximity to fauna, except when otherwise required by scientific projects and the corresponding permits of harmful interference have been obtained;
- Collection of samples will be limited to the minimum required for approved scientific research plans;
- Visits shall be made as necessary to ensure that management and maintenance measures are adequate;
- All signs, as well as other structures erected in the Area with scientific or management objectives, will be adequately secured and maintained in proper conditions;
- Pedestrian paths to research sites will be marked to limit movement.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1 shows the general location of ASPA No. 134. Map 2 shows the ASPA in relation to Danco Coast. The shaded area indicates the group of areas that make up ASPA No. 134 (the subtidal marine environment between the continental and insular portions is not included in the ASPA). Map 3 shows the area surrounding Primavera Base in detail, excluded from ASPA No. 134.

6. Description of the Area

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

Cierva Point (lat. 64° 09' 23''S, lon. 60° 57' 17''W[1]) is located on the south coast of Cierva Cove, to the north of Hughes Bay, between the Danco and Palmer Coasts, in the northwestern portion of the Antarctic Peninsula. The site comprises the ice-free area between the southwest coast of Cierva Cove and the northeast coast of Santucci Cove. Also included are Apéndice and José Hernández Islands and the Moss and Penguin Islands, found to the west-southwest of Cierva Point. Although the intertidal zone of each of these areas is included in the Area, the subtidal marine environment is not.

Primavera Base (Argentina) and its associated installations, as well as the beach area utilized for access to the base, are excluded from the Area.

The Area has high species richness of animals and plants, and the abundance of some of these is, in some cases, exceptional.

The cover of mosses, lichens, and grasses is very extensive. The most conspicuous vegetal communities are the associations of dominant lichens, the moss turf dominated by *Polytrichum-Chorisodontium* and the *Deschampsia-Colobanthus* subformation. The moss turves cover areas of more than 100 square metres, with an average depth of about 80 cm. The present flora includes the two Antarctic flowering plant species, 18 moss species, 70 lichen species (two hepatic), as well as 20 species of fungi. The non-marine microalgae, especially on Moss and Penguin Islands, are very abundant with unusual records. Terrestrial arthropods are also very numerous and are occasionally associated with tidal pools in the littoral zone of the Area.

[1] Data corresponding to Primavera Base.

There are twelve species of nesting birds in the Area: Chinstrap Penguin (*Pygoscelis antarctica)*, Gentoo Penguin (*Pygoscelis papua)*, Southern Giant Petrel (*Macronectes giganteus)*, Cape Petrel (*Daption capense)*, Wilson's Storm Petrel (*Oceanites oceanicus)*, Antarctic Shag (*Phalacrocorax. bransfieldensis*), Pale-faced Sheathbill (*Chionis alba)*, Skuas (predominant species *Catharacta maccormickii)*, Kelp Gull (*Larus dominicanus)* and Antarctic Tern *(Sterna vittata)*.

The most numerous colonies correspond to those of the Chinstrap Penguin (*Pygoscelis antarctica)*, Gentoo Penguin (*Pygoscelis papua)*, Wilson's Storm Petrel (*Oceanites oceanicus)*, South Polar skua (*Catharacta maccormickii*) and Kelp Gull (*Larus dominicanus).*

A summary of the estimated number of nesting pairs by species and nesting site is presented in Table 1.

Table 1: Estimated number of nesting pairs by species and Base nesting site.

Species / Nesting Site	CiervaPoint	Apéndice Island	José Hernández Island	Penguin Island	Moss Island
Pygoscelis Antarctica		-	550	1500	-
Pygoscelis papua	600	900	-	-	-
Macronectes giganteus		<10	-	-	35
Daption capense	<10	23	-	<5	30
Pagodroma nivea	<5	-	-	-	-
Oceanites oceanicus	1000	1000	100	100	100
Phalacrocorax bransfieldensis	-	-	21	<10	-
Chionis alba	<5	<5	<5	<5	<5
Catharacta sp.	450	<5	<5	<5	10
Larus dominicanus	160	70	15	<10	120
Sterna vittata	45	15	35	-	15

As well, the Area has great aesthetic value. The great diversity in relief and coastal forms, due to the presence of different geologies and a pronounced system of fractures, in addition to an extensive and varied vegetation cover, provide unusual scenic diversity in the Antarctic environment.

6(ii) Restricted zones within the Area

None.

6(iii) Location of structures within the Area

There are no structures within the Area. Primavera Base (Argentina), located to the northwest of Cierva Point and adjacent to the Area, is only open during the summer. It is composed of eight buildings and a place delimited for helicopter landings.

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

ASPA No. 152, western portion of the Bransfield Strait (Mar de la Flota), in front of Low Island, South Shetland Islands, 90 kilometres northwest of ASPA No. 134; and ASPA No. 153, eastern portion of the Dallmann Bay, in front of the western coast of Brabant Island, Palmer Archipelago, 90 kms west of ASPA No. 134.

7. Permit conditions

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

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

- It is only issued for a scientific purpose, in accordance with the objectives of the Management Plan, that cannot be met elsewhere;
- The actions permitted will not jeopardize the natural ecological system of the Area;
- Any management activities (inspection, maintenance, or revision) are in support of the objectives of the Management Plan;
- The actions permitted are in accordance with this Management Plan;
- The permit, or authorised copy, must be carried by the principal investigator authorized to enter the Area;
- A post-visit report is given to the competent national authority mentioned in the permit.

7(i) Access to and movements within the Area

Access to the Area will be by permit issued by a competent authority, and will only be issued for activities which are in accordance with this Management Plan.

There is only one access for helicopters outside of the Area, in the area adjacent to Primavera Base. Helicopters may only land in the specified area to the east-southeast of the Base. The aircraft route to be used is limited to a north approach and departure. The operation of aircrafts over the Area will be carried out, as a minimum requirement, in compliance with that established in Resolution 2 (2004), "Guidelines for the Operation of Aircraft near Concentrations of Birds". As a general rule, no aircraft should fly over the ASPA at less than 610 metres (2000 feet), except in cases of emergency or aircraft security.

Marine access is allowed from any point of the islands included in the Area. Vehicle traffic of any type is not permitted.

Tourism or any other recreational activity is not permitted. Movements within the Area will be carried out avoiding disturbance to the flora and fauna, especially during the breeding season.

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

- Scientific research activities that cannot be conducted elsewhere and that do not jeopardise the ecosystem of the Area;
- Essential management activities, including monitoring;
- If it is considered necessary for scientific or conservation reasons, access to determined bird nesting sites and mammal colonies may include greater restrictions between the end of October and the beginning of December. This period is considered especially sensitive, because it coincides with peaks in egg-laying for nesting birds in the Area.

7(iii) Installation, modification or removal of structures

No additional structures will be built or equipment installed within the Area, except for essential scientific or management activities with appropriate permits.

Any scientific equipment installed in the Area, as well as any sign of the investigation, should be approved by permit and clearly indicated, showing the country, the name of the principal investigator,

and the year of installation. All the installed materials should pose the minimum risk of pollution to the Area or the minimum risk of causing disturbance to the vegetation or to the fauna.

Signs of investigation should not remain after the permit expires. If a specific project cannot be finished within the allowed time period, an extension should be sought that authorizes the continued presence of any object in the Area.

7(iv) Location of field camps

The Parties that utilize the Area will normally have Primavera Base available for lodging. Only tents shall be installed, with the purpose of housing instrumentation or scientific material, or for employees as a base for observation.

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

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

No uncooked poultry products shall be introduced.

No herbicides or pesticides shall be introduced into the Area. Any other chemical product, which should be introduced with the corresponding permit, shall be removed from the Area upon conclusion of the activity for which the permit was granted. The use and type of chemical products should be documented, as clearly as possible, for the knowledge of other researchers.

Fuel, food, and other materials are not to be stored in the Area, unless required for essential purposes by the activity authorized in the corresponding permit.

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

Any taking or harmful interference, except in accordance with a permit, is prohibited. When an activity involves taking or harmful interference, these should be consistent with the *SCAR Code of Conduct for the use of Animals for Scientific Purposes* in Antarctica as a minimum requirement.

Information on taking or harmful interference will be exchanged through the System of Information Exchange of the Antarctic Treaty, and its record should be incorporated, at the least, into the *Antarctic Master Directory* or, in Argentina, into the *National Antarctic Data Centre*. The researchers that take samples of any kind will show that they are familiar with previous collections to minimize the risk of possible duplication.

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

Any material from the Area may only be collected and removed from the Area with an appropriate permit. Collection of dead biological specimens for scientific purposes should not exceed such a level that the collection degrades the nutritional base of local scavenger species.

7(viii) Disposal of waste

Any non-physiological waste shall be removed from the Area. Residual waters and domestic residual liquids can be discharged into the ocean, in accordance with Article 5 of Annex III of the Madrid Protocol.

Waste resulting from research activities in the Area can be temporarily stored at Primavera Base until it is removed. Said storage should be carried out in compliance with Annex III to the Madrid Protocol, marked as trash, and appropriately closed to avoid accidental losses.

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

Permits may be granted to enter the Area to conduct biological monitoring and inspection activities, which may include the collection of samples of plants and animals for research purposes, the erection and maintenance of signs, or other management measures. All the structures and markings installed in the Area for scientific purposes, including signs, should be approved in the permit and clearly identified by country, indicating the name of the principal investigator and the year of installation. All signs and structures should be removed when, or before, the permit expires. If a specific project cannot be finished within the allowed time period, an extension should be solicited to leave objects in the Area.

7(x) Requirements for reports

The main permit holder, for each permit and once the activity has finished, shall submit a report of the activities conducted in the Area, using the format previously turned in together with the permit. The report should be sent to the permit issuing authority.

Records of permits and post-visit reports relating to the ASPA will be exchanged with the rest of the Consultative Parties as part of the System of Information Exchange according to Art. 10.1 of Annex V.

The permits and reports should be stored and made accessible to any interested Party, SCAR, CCAMLR, COMNAP, so as to provide necessary information of human activities in the Area to ensure adequate management.

Figure 1: General location of Antarctic Specially Protected Area No. 134, Cierva Point and offshore islands, Danco Coast, Antarctic Peninsula.

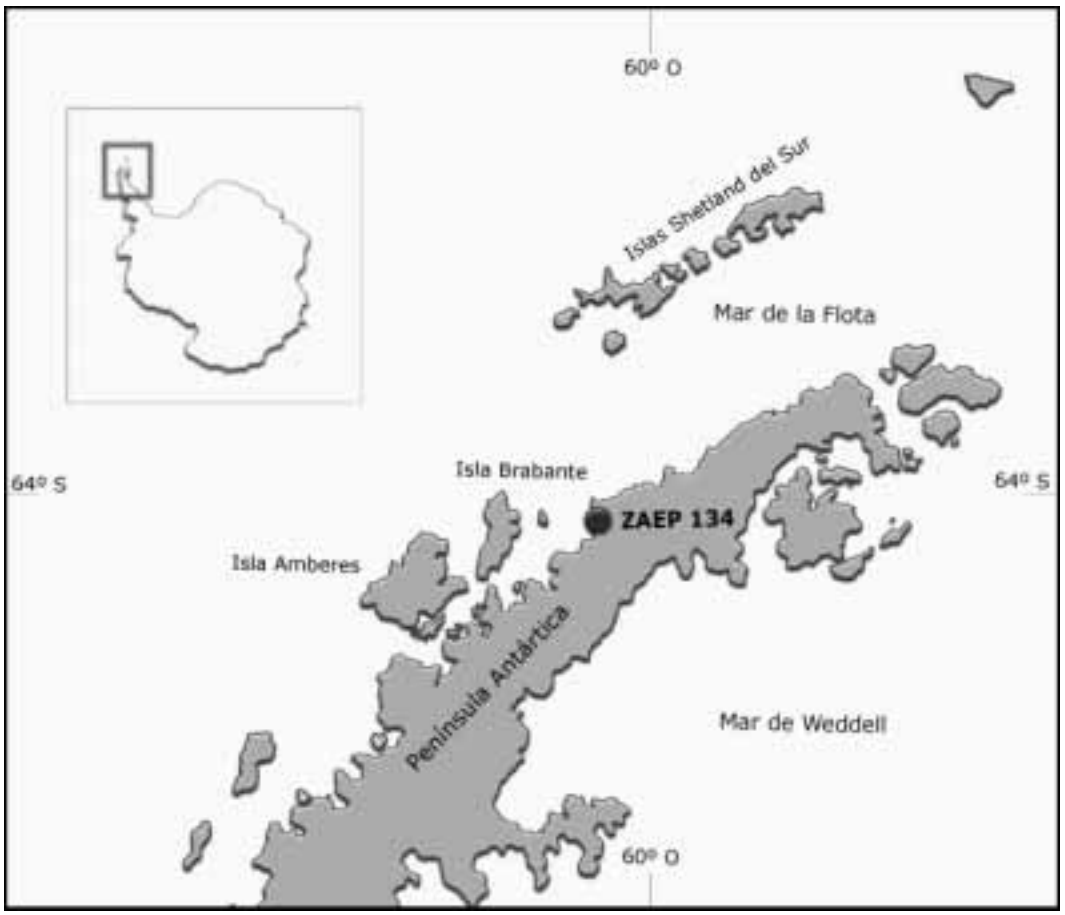


Figure 2: Antarctic Specially Protected Area No. 134, Cierva Point and offshore islands, Danco Coast, Antarctic Peninsula. In shading, the group of areas that make up ASPA 134 (the subtidal marine environment between the continental and insular portions is not included in the ASPA).

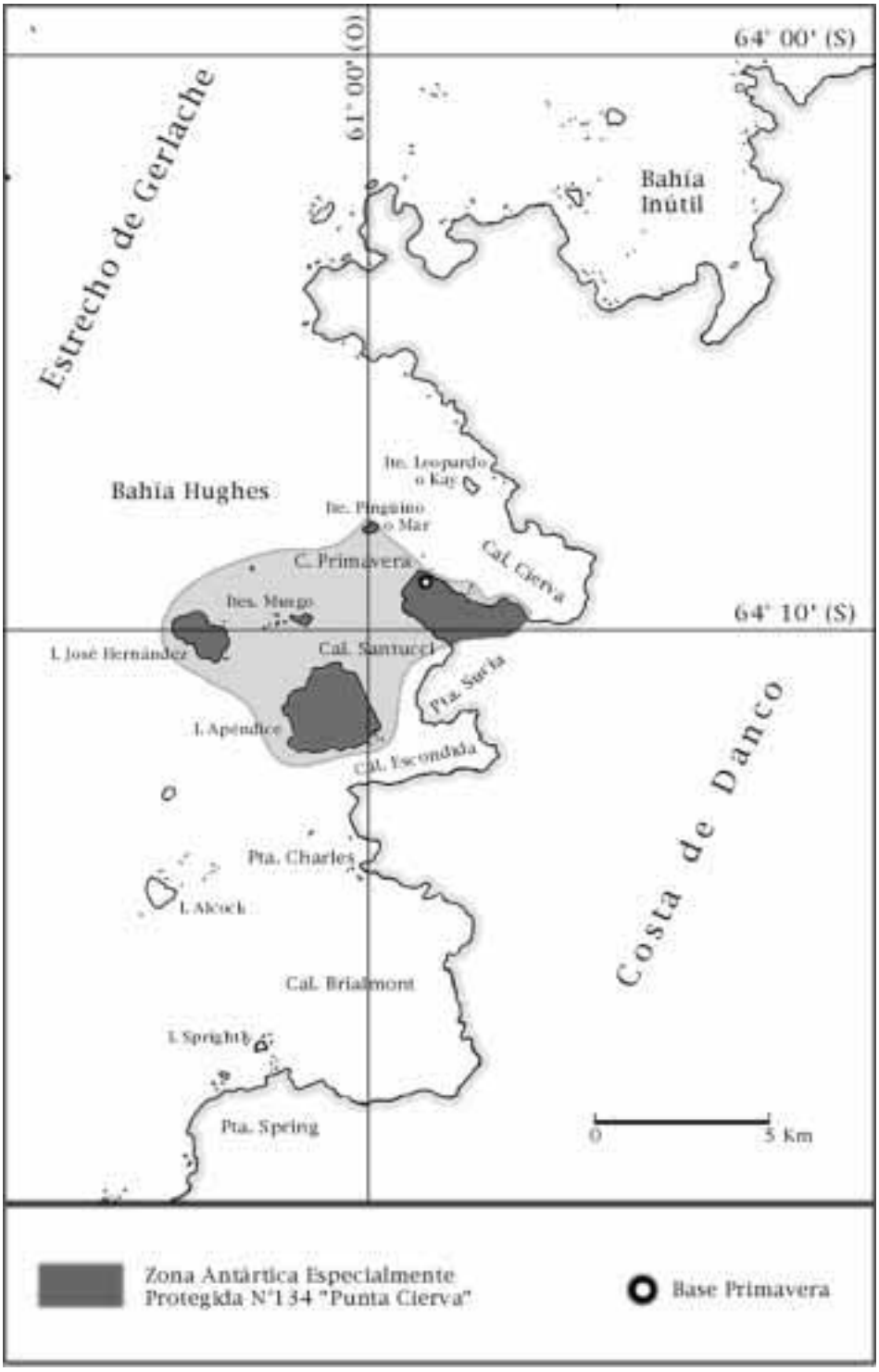
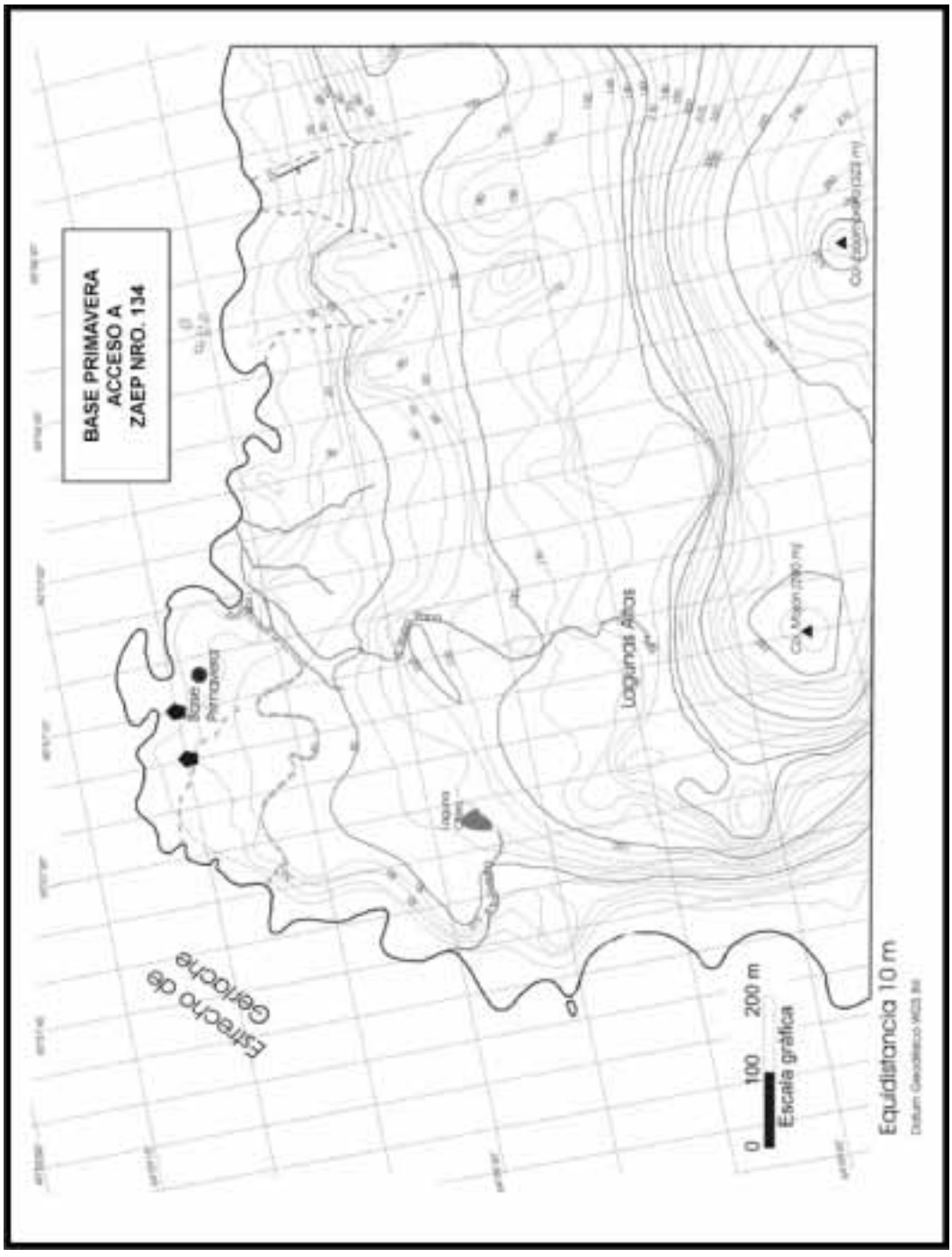


Figure 3: Area of Cierva Point that includes Primavera Base (the grey pointed line above the 40 m contour line indicates the base area, excluded from ASPA No.134).



II. Measures

Management Plan for Antarctic Specially Protected Area No. 136

CLARK PENINSULA, BUDD COAST, WILKES LAND

Introduction

Clark Peninsula was originally designated as a Site of Special Scientific Interest No. 17 under Recommendation XIII-8 (1985) and a revised Management Plan was adopted under Measure 1 (2000). The Area is approximately 9.75 km^2 in area and is adjacent to the Windmill Islands on the Budd Coast, Wilkes Land, East Antarctica (Map A). Scientific research within the Area has focused on plant communities and long term population studies of Adélie penguin colonies. The protection of this flora and fauna within the Area allows for valuable comparison with similar plant communities and penguin colonies closer to Casey Station (approximately 5 kilometres to the south-west) which are subject to greater levels of human disturbance.

1. Description of values to be protected

With the exception of the Antarctic Peninsula, the largely undisturbed terrestrial ecosystem of Clark Peninsula supports one of the most extensive and best developed plant communities on continental Antarctica. The Area has rich associations of macrolichens and bryophytes that occupy very specific ecological niches. Within the relatively complex plant communities, 33 species of bryophytes and macrolichens have been found with 11 cryptogamic associations being identified. This vegetation forms a continuum of ecological variation along environmental gradients of soil moisture, soil chemistry and microclimate. As such, the Area has intrinsic ecological value and scientific importance, particularly in the fields of botany, microbiology, soil science and glacial geomorphology.

Moss and lichen communities in the Area are used as control plots to monitor the environmental impacts of Casey Station. The Area provides baseline and comparative data with which to compare changes in similar plant communities in the immediate surroundings of Casey Station. The cryptogamic plant communities are also being monitored in relation to short-term microclimate fluctuation and long-term climate change in the region since deglaciation 8000-5000 years before present (BP).

Significant and relatively undisturbed breeding populations of Adélie penguins *(Pygoscelis adeliae)* and South Polar skuas *(Catharacta maccormicki)* are present within the Area at Whitney and Blakeney Points. In addition, breeding Wilson's storm petrels *(Oceanites oceanicus)* and Snow petrels *(Pagodroma nivea)* are present in most ice-free areas. The monitoring of the breeding populations of Adélie penguins at Whitney Point since 1959 provides valuable comparative data for assessing and measuring human impacts and disturbance of penguin colonies on Shirley Island which is within the Station Limits of Casey Station. These long-term population data on Adélie penguin numbers are amongst the longest in the Antarctic.

The Area supports exceptional vegetation cover for a continental Antarctic coastal ice-free location, and exhibits a wide range of plant communities. The Area requires protection because of its ecological importance, its significant scientific value and the limited geographical extent of the plant communities. The Area is vulnerable to disturbance from trampling, scientific sampling, pollution and alien introductions, while being sufficiently distant from Casey Station to avoid immediate

impacts and disturbances from activities undertaken there. It is because of the scientific and ecological values, and the usage of the Area for long term monitoring, that it should continue to be protected.

Primary Reason for Designation

Clark Peninsula provides a unique and visible time sequence of the emergence of the area of the Windmill Islands from the sea since the Holocene deglaciation. Prior to the emergence of Whitney Point and Blakeney Point, the central ridge between them consisted of islets that were occupied by Adélie penguins. Soon after the emergence of the two points, the penguins began to occupy them. This historical penguin presence is understood to have lead to the current abundance and density of the plant communities in the Area, the nature of which is not seen anywhere else in the Antarctic. The obvious interaction of these two phenomena provides an exceptional stage for research.

2. Aims and objectives

The aim of this Management Plan is to provide continued protection to the features and values of Clark Peninsula. The objectives of the Plan are to:

- avoid degradation of, or substantial risk to, the values of the Area by minimising human disturbance;
- protect a part of the natural ecosystem as a reference area for the purpose of comparative studies and to assess direct and indirect effects of Casey Station;
- allow scientific research on the ecosystem and elements of the ecosystem, both geological and biological, while ensuring protection from over-sampling and disturbance;
- prevent or minimise the introduction of non-native species into the Area; and
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management activities

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

- signs illustrating the location and boundaries, and clearly stating entry restrictions, shall be placed at appropriate locations at the boundaries of the Area to help avoid inadvertent entry;
- information about the Area, including a statement of the special restrictions that apply and a copy of this Management Plan, shall be displayed prominently at the adjacent abandoned Wilkes Station, the “Wilkes Hilton” (unofficial name) Refuge Hut on Stonehocker Point, “Jack’s Donga” (unofficial name) Refuge Hut and at Casey Station. Copies of this Management plan will also be provided to visiting ships;
- markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required;
- visits shall be made as necessary for management purposes; and
- the Management Plan shall be reviewed at least every five years and revised as required.

4. Period of designation

Designated for an indefinite period.

5. Maps

- Map A: Antarctic Specially Protected Areas, Windmill Islands, East Antarctica
- Map B: Antarctic Specially Protected Area No. 136, Clark Peninsula, Windmill Islands, East Antarctica. *Topography and distribution of birds.*
- Map C: Antarctic Specially Protected Area No. 136, Clark Peninsula, Windmill Islands, East Antarctica. *Distribution of major vegetation types.*
- Map D: Antarctic Specially Protected Area No. 136, Clark Peninsula, Windmill Islands, East Antarctica. *Geology.*

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

Clark Peninsula is an area of rock exposures and permanent ice and snow fields situated on the north side of Newcomb Bay at the east end of Vincennes Bay on Budd Coast, Wilkes Land. The Area covers approxiamtely 9.75 km^2 and is located at latitude 66°15'S and longitude 110°36'E.

The Area comprises all the land on Clark Peninsula within the southern boundary line connecting the east side of Powell Cove at a point which originates at latitude 66°15'16" S, longitude 110°32' E, to trigonometrical station G7 at latitude 66°15'29" S, longitude 110°33'24" E thence to a point to the east-south-east on the Løken Moraines. The eastern boundary is the westernmost limit of the Løken Moraines as far north as a point due east of Blakeney Point, and thence to the coast, returning along the coast to the point of origin. The boundary of the Area will be indicated by prominent markers, and is shown on Maps A, B, C and D.

Topographically, the Clark Peninsula comprises low lying, rounded ice-free rocky outcrops (maximum altitude approximately 40 metres above sea level). The intervening valleys are filled with permanent snow or ice, or glacial moraine and exfoliated debris and contain water catchment areas. The peninsula rises in the east to the Løken Moraines (altitude approximately 130 metres above sea level).

The Windmill Islands offshore from the Area represent one of the easternmost outcrops of a Mesoproterozoic low-pressure granulite facies terrain that extends west to the Bunger Hills and farther west to the Archaean complexes in Princess Elizabeth Land, and eastward to minor exposures in the Dumont d'Urville area and at Commonwealth Bay.

The rocks of the Windmill Islands area comprise a series of migmatitic metapelites and metapsammites interlayered with mafic to ultramafic and felsic sequences with rare calc-silicates, large partial melt bodies (Windmill Island supacrustals), undeformed granite, charnockite, gabbro, pegmatite, aplites and late dolerite dykes. Clark Peninsula distinguishes the northern transition of a metamorphic grade transition which separates the northern part of the Windmill Islands area from the southern part.

Outcrops of metapelitic rock and leucocratic granite gneiss are dominant on Clark Peninsula. The metapelitic rock is generally foliated, migmatized and fine to medium grained. Mineralogy of the metapelitic rock involves biotite-sillimanite and biotite-sillimanite±cordierite. The sillimanite is strongly lineated in the foliation and the cordierite is generally pinnitized. The early granite gneiss is white, medium grained and foliated, it comprises two felsic to intermediate intrusions which

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

Gravels and soils appear to be derived from marine sediments deposited in the Pleistocene with a thin cover of weathered rock. Subfossil penguin colonies are common along the central ridge aligned south-west to north-east on Clark Peninsula, and at both Whitney Point and Blakeney Point. In the vicinity of abandoned penguin colonies, the soils are pebbly and rich in organic matter derived from penguin guano with some silts. Melt streams and pools and small lakes are prevalent in summer. The distribution of lakes on Clark Peninsula is shown at Map B.

Conditions on Clark Peninsula, in comparison with many other continental Antarctic areas, are sufficiently mild to have allowed the formation of relatively stable, complex, well developed, and species-rich vegetation. The ice-free rocks support an extensive cover of lichen, while mosses predominate in lower lying areas. Principal factors responsible for the distribution of vegetation on Clark Peninsula are exposure to wind, availability of water and the location of abandoned penguin colonies.

To the north-east of the Peninsula, well-developed *Umbilicaria decussata*, *Pseudephebe minuscula*, *Usnea sphacelata* communities dominate. Farther from the coast, *U. sphacelata* is dominant and forms extensive carpets over the metamorphic rocks and gravel beds in association with *P. minuscula* and *U. decussata*, together with scattered bryophytes. The bryophytes comprise *Bryum pseudo triquetrum*, *Schistidium antarctici* and *Ceratodon purpureus*. Within these communities, well-developed bryophyte patches dominate in moist, sheltered sites and locally form closed stands comprising a moss turf up to almost 30 cm depth.

In the north-western and western coastal areas where Adélie penguin colonies are present, *Xanthoria mawsonii*, *Candelariella flava* and *Buellia frigida* are more common. On the abandoned penguin colonies in the southern coastal areas, this community type contains a higher proportion of *U. decussata* and *U. sphacelata*.

In the centre of Clark Peninsula the vegetation is dominated by *U. decussata*, *P. minuscula*, *B. soredians* and *B. frigida*, with scattered occurrences of *Pleopsidium chlorophanum*. The vegetation distribution of Clark Peninsula is shown at Map C. The microflora comprises algae, with *Botrydiopsis constricta* and *Chlorella conglomerata* dominating, together with bacteria, yeasts and filamentous fungi.

Adélie penguin (*Pygoscelis adeliae*) colonies are present at two localities in the Area, Whitney Point and Blakeney Point. Approximately 9,000 breeding pairs were present in 2004/05 at Whitney Point, and approximately 4,600 breeding pairs were present at Blakeney Point in 1991. The breeding populations of Adélie penguins at Whitney Point and at Blakeney Point have increased since studies commenced in 1959/60. This is in contrast to nearby Shirley Island (3 km to the southwest and close to Casey Station), where the breeding population of Adélie penguins has remained stable since 1968. Wilson's storm petrels (*Oceanites oceanicus*), South Polar skuas (*Catharacta maccormicki*) and Snow petrels (*Pagodroma nivea*) breed within the Area as shown on Map B.

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

The climate of the Windmill Islands area is frigid-Antarctic. Meteorological data from Casey Station on nearby Bailey Peninsula show mean temperatures for the warmest and coldest months to be 0.3° and -14.9°C, respectively, with extreme temperatures ranging from 9.2° to -41°C. The climate is dry with a mean annual snowfall of 195 mm/year (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. Snowfall is common during the winter, but the extremely strong winds generally scour the exposed areas. Snow gathers in the lee of rock outcrops and in depressions in the substratum and forms deeper drifts farther down the slopes.

6(ii) Special Zones within the Area

There is one special zone within the Area. To allow access from the plateau to the sea for scientific research or management purposes, over-snow vehicle access is permitted within the Transit Zone north east of a line that runs from the ASPA boundary at the Løken Moraines at 110°38’34"E 66°14’47"S and runs north-west to meet the coastline at 110°36’54"E 66°14’31"S. Vehicles must travel only on ice or snow covered ground to avoid disturbance to vegetation and relic penguin colonies. Use of this Transit Zone may be subject to specific permit conditions.

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

The only structure known to exist in the Area is a severely deteriorated wood and canvas hide, known as the “Wannigan” (colloquial name) located on “Lower Snow Slope” (unofficial place name) on the western facing slope of Whitney Point. This hide was constructed in 1959 for behavioural studies of breeding Adélie penguins by R.L. Penney. There are a number of boundary markers along the southern boundary and a number of survey markers within the Area.

The “Wilkes Hilton” refuge hut is located approximately 200 m south of the southern boundary. Approximately 1 km to the southwest is the abandoned Wilkes Station on Stonehocker Point. Another Refuge Hut, “Jack’s Donga” is located approximately 1.5 km north of the northern boundary of the Area.

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

Other protected areas within 50 km include (see Map A):

- Antarctic Specially Protected Area No. 135, north-eastern Bailey Peninsula (66°17’S, 110º33’E): 2.5 km southwest of Clark Peninsula, across Newcomb Bay, adjacent to Casey Station;
- Antarctic Specially Protected Area No. 103, Ardery Island (66°22’S, 110°27’E), and Odbert Island (66°22’S, 110°33’E) Budd Coast: located in Vincennes Bay, 13 km south of the former Wilkes Station; and
- Antarctic Specially Protected Area No. 160, Frazier Islands (66°13’S 110°11’E): approximately 16 km to the NW in Vincennes Bay.

7. Permit conditions

Entry into the Area is prohibited except in accordance with a permit issued by an appropriate National Authority.

A permit to enter the Area may only be issued for scientific research or for essential management purposes, consistent with the objectives and provisions of this Management Plan.

Permits shall be issued for a specified period and the permit or an authorised copy shall be carried within the Area. Additional conditions, consistent with the Management Plan’s objectives and provisions, may be included by the issuing Authority.

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

Access into the Area should be from "Wilkes Hilton" Refuge Hut in the southwest, "Jack's Donga" Refuge Hut in the northeast, or from the over-snow route between Casey Station and "Jack's Donga" by descending the western slope of Løken Moraines in the vicinity east of Stevenson Cove.

Access from Casey to abandoned Wilkes Station is via a well-defined marked cane route outside the southern boundary of the Area. As the Casey-Wilkes route is very close to the boundary, pedestrian and vehicular traffic should take care not to stray northward of it.

Access to the sea ice by oversnow vehicles for scientific purposes or management activities is permitted within the Transit Zone that is north east of a line that runs from the ASPA boundary at the Løken Moraines at 110°38'34"E 66°14'47"S and runs north-west to meet the coastline at 110°36'54"E 66°14'31"S. All vehicles must travel only on ice or snow covered ground to avoid disturbance to vegetation and relic penguin colonies. Vehicles are not allowed within the remainder of the Area (except for emergency situations) and access in all other circumstances should be by foot.

Helicopters are not allowed to land within the Area, except in emergencies or for essential management activities.

Pedestrian traffic in the Area should be kept to the minimum necessary to achieve the objectives of permitted activities. As much as possible, visitors should avoid walking on visible vegetation and in areas of moist ground, where foot traffic can easily damage sensitive soils, plant or algae communities, and degrade water quality.

To avoid disturbance, breeding penguins should not be approached within 30m during the breeding season – October to April – unless essential to the conduct of a permitted research activity.

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

The following may be conducted within the Area:

- scientific research programs consistent with the Management Plan for the Area, and which will not jeopardise the values for which the Area has been designated;
- essential management activities, including monitoring;
- sampling, which should be the minimum required for the approved research program(s).

7(iii) Installation, modification or removal of structures

No structures are to be erected or scientific equipment installed within the Area, except for essential scientific or management activities as authorised in a permit. All scientific equipment installed in the Area must be clearly identified by country, name of principal investigator, year of installation and expected date of completion of the study. Details are to be included in the visit report. All such items should be made of materials that pose minimum risk of contamination of the Area and must be removed at the completion of the study.

7(iv) Location of field camps

Camping is not allowed within the Area. Field parties should camp at either the "Wilkes Hilton" Refuge Hut or at "Jack's Donga" Refuge Hut.

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

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

No poultry material, poultry products, herbicides or pesticides shall be taken into the Area. All chemicals, including radio-nuclides or stable isotopes, shall be removed from the Area at or before the conclusion of the associated activity.

Fuel is not to be stored in the Area unless required for essential purposes connected with a permitted activity. Such fuel storage is to be in containers of 20 litres or less. Permanent depots are not permitted.

All material introduced to the Area shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of inadvertent release into the environment is minimised.

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

Taking of, or harmful interference with native flora and fauna is prohibited, except in accordance with a permit. Where authorised, the activity shall, as a minimum standard, be in accordance with the requirements of Article 3 of of Annex II to the Protocol on Environmental Protection to the Antarctic Treaty, 1991.

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

Material may only be collected or removed from the Area as authorised under 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.* The appropriate Authority must be notified and approval obtained before any material is moved or removed from the Area.

7(viii) Disposal of waste

All wastes generated in the Area, including human faeces and urine, shall be removed from the Area.

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

The following may be necessary to ensure the objectives of the Management Plan are met:

- permits may be granted to enter the Area to undertake 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;
- all sites of long-term monitoring activities shall be appropriately marked and a Global Positioning System (GPS) location obtained for lodgement with the Antarctic Data Directory System through the appropriate National Authority. All GPS data are to be recorded in visit reports and lodged within 3 months of the end of field activities in which the GPS data were captured;
- to help maintain the ecological and scientific values of the plant communities found in the Area, visitors shall take special precautions against introductions. Of particular concern are microbial or vegetation introductions sourced from soils at other Antarctic sites, including Stations, or from regions outside Antarctica. To minimise the risk of introductions, visitors shall thoroughly clean footwear and any equipment, particularly sampling equipment and markers to be used in the Area, before entering the Area.

7(x) Mitigation measures

It is not acceptable to abandon a site without restoring it, as far as is possible, to its original state. Soil pits must be refilled to maintain the integrity of the area. Likewise all markers should be removed at the conclusion of their related activity.

7(xi) Requirements for reports

The principal Permit Holder for each permit is to submit to the appropriate National Authority a report on activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form suggested by SCAR. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Plan of Management.

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

8. Supporting documentation

Some of the data used within this paper and for mapping purposes was obtained from the Australian Antarctic Data Centre (IDN Node AMD/AU), a part of the Australian Antarctic Division (Commonwealth of Australia). The data regarding breeding seabird distributions are from the Australian Antarctic Program's Science Project 1219, titled Monitoring for long-term or cumulative impacts in Southern Ocean seabirds, for the period 1999-2005.

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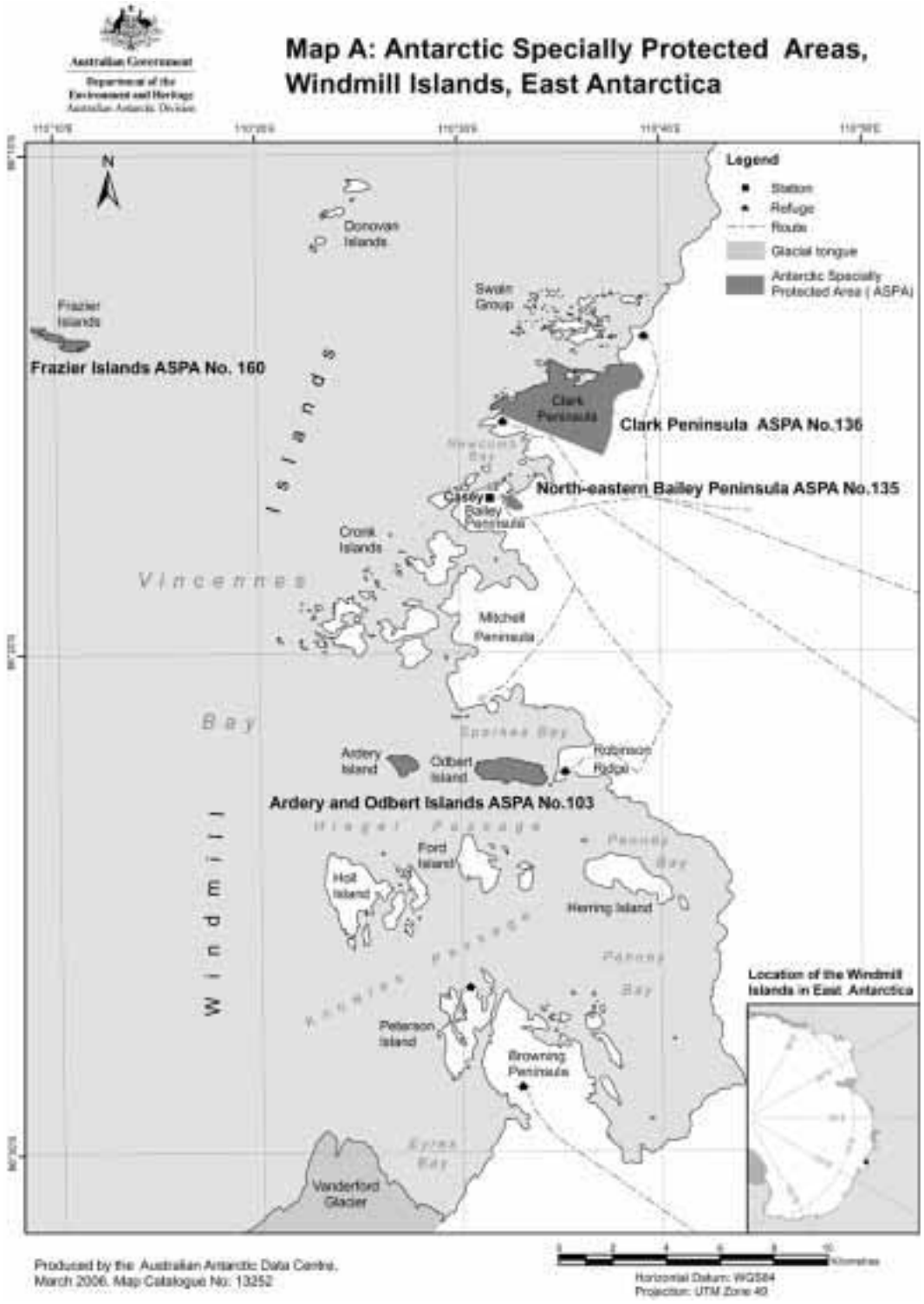
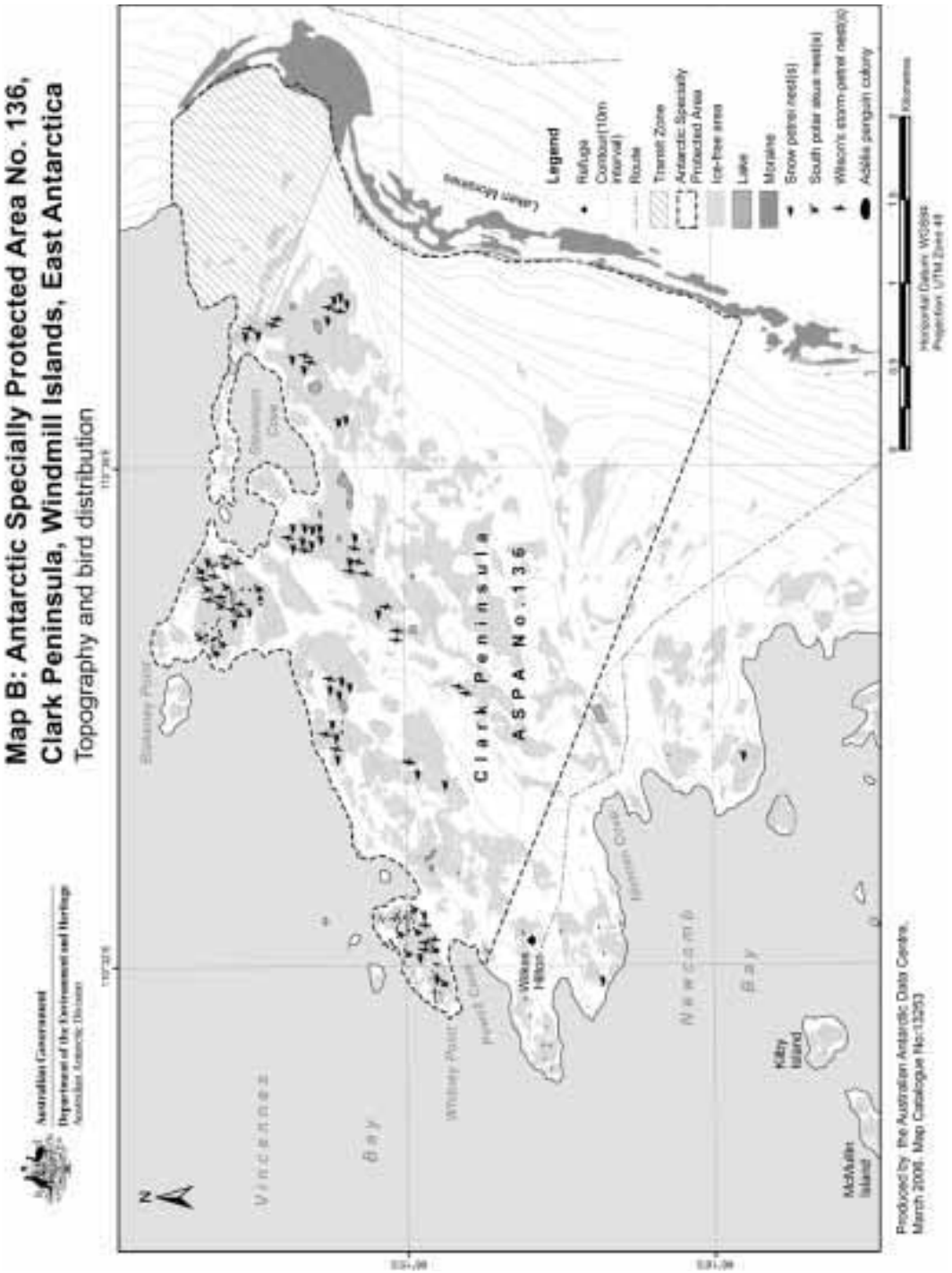
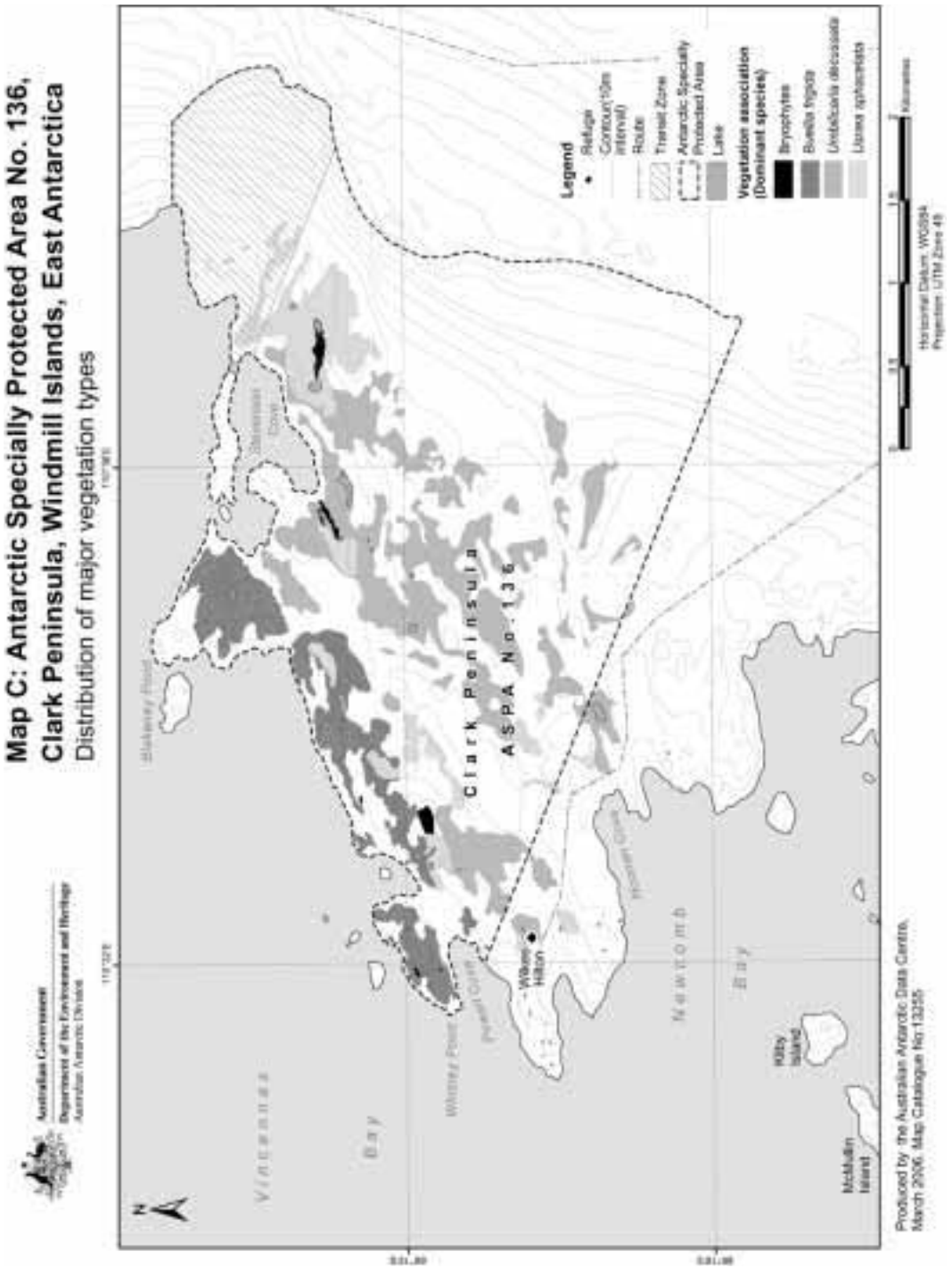
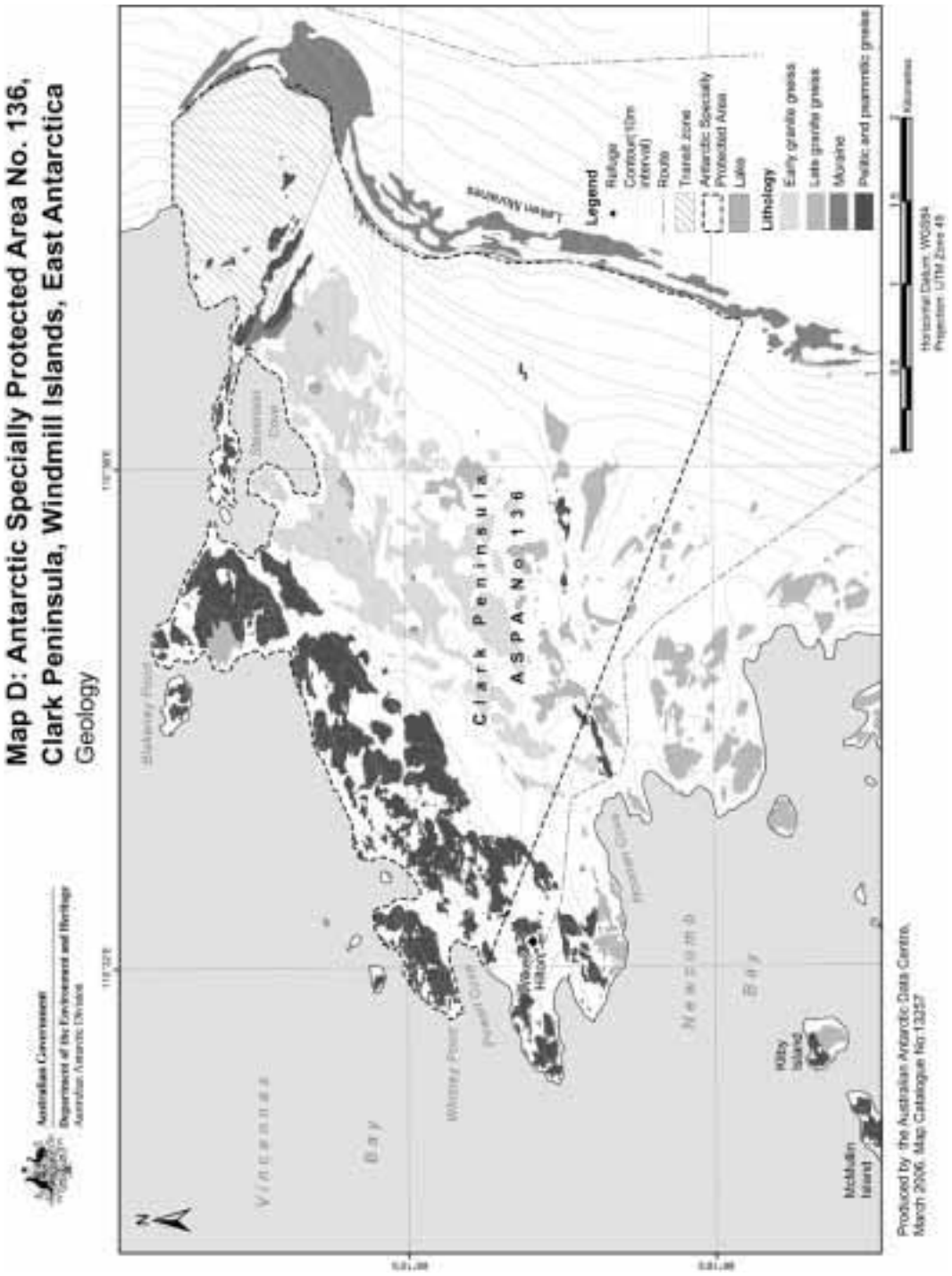

Map A: Antarctic Specially Protected Areas,
Windmill Islands, East Antarctica
Australian Government
Department of the Environment and Heritage
Australian Antarctic Division
Legend
Station
Refuge
Route
Glacial tongue
Antarctic Specially Protected Area (ASPA)
N
Donovan Islands
Swain Group
Frazier Islands
Frazier Islands ASPA No. 160
Clark Peninsula
Clark Peninsula ASPA No.136
North-eastern Bailey Peninsula ASPA No.135
Casey
Bailey Peninsula
Croziet Islands
Vincennes Bay
Mitchell Peninsula
Ardery Island
Odbert Island
Robinson Ridge
Ardery and Odbert Islands ASPA No.103
Windmill Islands
Ford Island
Holl Island
Herring Island
Peterson Island
Browning Peninsula
Vanderford Glacier
Location of the Windmill Islands in East Antarctica
Produced by the Australian Antarctic Data Centre,
March 2006. Map Catalogue No: 13252
Horizontal Datum: WGS84
Projection: UTM Zone 49


Map B: Antarctic Specially Protected Area No. 136,
Clark Peninsula, Windmill Islands, East Antarctica
Topography and bird distribution
Clark Peninsula
ASPA No.136
Vincennes
Bay
Newcomb
Bay
Legend
Rutuga
Contour(10m interval)
Route
Transit Zone
Antarctic Specially Protected Area
Ice-free area
Lake
Moraine
Snow petrel nest(s)
South polar skua nest(s)
Wilson's storm-petrel nest(s)
Adélie penguin colony
Wilkes Hills
Kiby Island
McWhalter Island
Produced by the Australian Antarctic Data Centre,
March 2009. Map Catalogue No:13293


Map C: Antarctic Specially Protected Area No. 136,
Clark Peninsula, Windmill Islands, East Antarctica
Distribution of major vegetation types
Clark Peninsula
ASPA No 136
Vincennes
Bay
Newcomb
Bay
Legend
Refuge
Contour(50m interval)
Route
Transit Zone
Antarctic Specially Protected Area
Lake
Vegetation association (Dominant species)
Bryophytes
Bolella frigida
Umbilicaria decussata
Usnea aphacelata
Produced by the Australian Antarctic Data Centre, March 2006. Map Catalogue No 13255


Map D: Antarctic Specially Protected Area No. 136,
Clark Peninsula, Windmill Islands, East Antarctica
Geology
Australian Government
Department of the Environment and Heritage
Australian Antarctic Division
Clark Peninsula
ASPA No 136
Legend
Refuge
Contour(10m interval)
Route
Transit zone
Antarctic Specially Protected Area
Lake
Lithology
Early granite gneiss
Late granite gneiss
Moraine
Pelitic and psammitic gneiss
Horizontal Datum: WGS84
Projection: UTM Zone 49
Produced by the Australian Antarctic Data Centre,
March 2006. Map Catalogue No 13257

Management Plan for Antarctic Specially Protected Area No. 165

EDMONSON POINT, WOOD BAY, ROSS SEA

1. Description of values to be protected

Edmonson Point (74°20' S, 165°08' E, 5.49 km^2), Wood Bay, Victoria Land, Ross Sea, was proposed as an Antarctic Specially Protected Area (ASPA) by Italy on the grounds that it has outstanding ecological and scientific values which require protection from possible interference that might arise from unregulated access. The Area includes ice-free ground and a small area of adjacent sea at the foot of the eastern slopes of Mount Melbourne (2732 m), which is of limited extent and is the subject of ongoing and long-term scientific research.

The terrestrial and freshwater ecosystem at Edmonson Point is one of the most outstanding in northern Victoria Land. An exceptional diversity of freshwater habitats is present, with numerous streams, lakes, ponds and seepage areas, exhibiting nutrient conditions ranging from eutrophic to oligotrophic. Such a range of freshwater habitats is rare in Victoria Land. Consequently, these habitats support a high diversity of algal and cyanobacterial species, with over 120 species so far recorded, and the stream network is the most extensive and substantial in northern Victoria Land. The volcanic lithology and substrata locally nutrient-enriched by birds, together with a localised abundance of water, provide a habitat for relatively extensive bryophyte development. Plant communities are highly sensitive to changes in the hydrological regime, and environmental gradients produce sharply defined community boundaries. Thus, the range of vegetation is diverse, and includes epilithic lichen communities, some of which are dependent on high nitrogen input from birds, communities associated with late-lying snow patches, and moss-dominated communities that favour continually moist or wet habitats. The site represents one of the best examples of the latter community type in Victoria Land. Invertebrates are unusually abundant and extensively distributed for this part of Antarctica.

The nature and diversity of the terrestrial and freshwater habitats offer outstanding scientific opportunities, especially for studies of biological variation and processes along moisture and nutrient gradients. The site is considered one of the best in Antarctica for studies of algal ecology. These features were among those that led to the selection of Edmonson Point as a key site in the Scientific Committee on Antarctic Research's Biological Investigations of Terrestrial Antarctic Systems (BIOTAS) programme in 1995-96. A coordinated multinational research programme, known as BIOTEX-1, established study sites and made extensive collections of soil, rock, water, snow, guano, bacteria, vegetation (cyanobacterial mats, fungi, algae, lichens, bryophytes) and of terrestrial invertebrates.

The scientific value of Edmonson Point is also considered exceptional for studies on the impact of climate change on terrestrial ecosystems. Its location at approximately the mid-point in a north-south latitudinal gradient extending along Victoria Land is complementary to other sites protected for their important terrestrial ecological values, such as Cape Hallett (ASPA No. 106) and Botany Bay, Cape Geology (ASPA No. 154), which are about 300 km to the north and south respectively. This geographical position is recognised as important in a continent-wide ecological research network (e.g. the Scientific Committee on Antarctic Research 'RiSCC' programme). In addition, the lakes are among the best in northern Victoria Land for studies of biogeochemical processes with short- and long-term variations. Together with the unique properties of the permafrost active layer, which is unusually thick in this location, these features are considered particularly useful as sensitive indicators of ecological change in response to levels of UV radiation and in shifting climate.

A colony of approximately 2000 pairs of Adélie penguins (*Pygoscelis adeliae*) has been a focus of ongoing research since 1994-95 together with a colony of approximately 120 pairs of south polar skuas (*Catharacta maccormicki*). The Edmonson Point Adélie penguin colony is included in the ecosystem monitoring network of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). The site is considered a good example of this species assemblage, which is representative of those found elsewhere. It is unusual, however, for the diverse range of breeding habitat available for south polar skuas, and also because of the unusually high skua to penguin ratio (1:20). The geographical position, the size of the colonies, the terrain and habitat features of the site, the natural protection given by the summer fast ice extension and the distance from Mario Zucchelli Station at Terra Nova Bay (which isolates the colony from research station disturbance but allows for logistic support) make Edmonson Point particularly suitable for the research being undertaken on these birds. The research contributes to the CCAMLR Ecosystem Monitoring Programme (CEMP), focusing on population monitoring, reproductive success, feeding and foraging strategies, migration, and behaviour. This research is important to broader studies of how natural and human-induced variations in the Antarctic ecosystem may affect the breeding success of Adélie penguins, and to understand the potential impact of harvesting of Antarctic krill (*Euphausia superba*).

The near-shore marine environment is a good and representative example of the sea-ice habitat used by breeding Weddell seals to give birth and wean pups early in the summer season. Only one other ASPA in the Ross Sea region has been designated to protect Weddell seals (ASPA No. 137 Northwest White Island, McMurdo Sound), but that site was designated because the small breeding group of seals in that locality is highly unusual; in contrast, inclusion here is as a representative example similar to breeding sites throughout the region.

In addition to the outstanding biological values, a diversity of geomorphic features is present, including a series of ice-cored moraines incorporating marine deposits, raised beaches, patterned ground, a cuspate foreland, and fossil penguin colonies. The cuspate foreland at Edmonson Point is a rare feature in Victoria Land, and is one of the best examples of its kind. It is unusual in that it is not occupied by a breeding colony of penguins, as is the case at Cape Hallett and Cape Adare. The glacial moraines that incorporate marine deposits, including seal bones and shells of the bivalves *Laternula elliptica* and *Adamussium colbecki*, are particularly valuable for dating regional glacier fluctuations. Sedimentary sequences in the north-west of Edmonson Point contain fossils from former penguin colonies. These are useful for dating the persistence of bird breeding at the site, which contributes to reconstructions of Holocene glacial phases and palaeoclimate.

The wide representation and the quality of phenomena at Edmonson Point have attracted interest from a variety of disciplines and research has been carried out at the site for more than 20 years. Over this period, substantial scientific databases have been established, which adds to the value of Edmonson Point for current, on-going and future research. It is important that pressures from human activities in the Area are managed so that the investments made in these long-term data sets are not inadvertently compromised. These factors also make the site of exceptional scientific value for multi-disciplinary studies.

Given the duration and range of past activities, Edmonson Point cannot be considered pristine. Some environmental impacts have been observed, such as occasional damage to soils and moss communities by trampling, dispersal of materials from scientific equipment by wind, and alteration of habitat by construction of facilities. In contrast, the ice-free area at Colline Ippolito (Ippolito Hills) (1.67 km^2) approximately 1.5 km to the north-west, has received relatively little visitation and human disturbance at this site is believed to be minimal. As such, Colline Ippolito is considered particularly valuable as a potential reference area for comparative studies to the main Edmonson Point, and it is important that this potential scientific value is maintained. While the precise effects of scientific research and human presence at both sites are uncertain, because detailed studies on

human impact have not yet been undertaken, contaminants in the local marine ecosystem remain very low and human impacts on the ecosystem as a whole, particularly at Colline Ippolito, are considered to be generally minor.

The biological and scientific values at Edmonson Point and Colline Ippolito are vulnerable to human disturbance. The vegetation, water-saturated soils and freshwater environments are susceptible to damage from trampling, sampling and pollution. Scientific studies could be compromised by disturbance to phenomena or to installed equipment. It is important that human activities are managed so that the risks of impacts on the outstanding values of the Area are minimised.

The total Area of 5.49 km^2 comprises the ice-free area of Edmonson Point (1.79 km^2), the smaller but similar ice-free area at Colline Ippolito (1.12 km^2) approximately 1.5 km to its north which is designated a Restricted Zone, and the adjacent marine environment (2.58 km^2) extending 200 m offshore from Edmonson Point and Colline Ippolito and including Baia Siena (Siena Bay) (Map 1).

2. Aims and objectives

Management at Edmonson Point aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance;
- allow scientific research while ensuring protection from mutual interference and/or over-sampling;
- allow scientific research provided it is for reasons which cannot reasonably be served elsewhere;
- protect sites of long-term scientific studies from disturbance;
- preserve a part of the natural ecosystem as a potential reference area for the purpose of future comparative studies;
- 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 shall be undertaken to protect the values of the Area:

- Copies of this management plan, including maps of the Area, shall be made available at Mario Zucchelli Station at Terra Nova Bay (Italy), Gondwana Station (Germany), and at any other permanent stations established within 100 km of the Area;
- Structures, markers, signs, fences or other equipment erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer necessary;
- Durable wind direction indicators should be erected close to the designated helicopter landing sites whenever it is anticipated there will be a number of landings in a given season;
- Markers, which should be clearly visible from the air and pose no significant risk to the environment, should be placed to mark the designated helicopter landing sites;
- Markers, such as a series of durable sticks, should be placed to mark the preferred inland walking routes between the Adélie penguin colony and the designated helicopter landing sites;

- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate;
- National Antarctic Programmes operating in the region shall consult together with a view to ensuring these steps are carried out.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

- Map 1: Edmonson Point ASPA No. 165, Wood Bay, Victoria Land, Ross Sea. Map specifications: Projection: UTM Zone 58S; Spheroid: WGS84; Ice-free areas and coastline derived from rectified Quickbird satellite image with a ground pixel resolution of 70 cm, acquired 04/01/04 by Programma Nazionale di Ricerche in Antartide (PNRA), Italy. Horizontal accuracy approx ±10 m; elevation information unavailable.

  Inset 1: the location of Wood Bay in Antarctica.

  Inset 2. The location of Map 1 in relation to Wood Bay and Terra Nova Bay. The location of Mario Zucchelli Station (Italy), Gondwana Station (Germany), and the nearest protected areas are shown.
- Map 2: Edmonson Point, ASPA No. 165, Physical / human features and access guidelines. Map derived from digital orthophotograph with ground pixel resolution of 25 cm, from ground GPS surveys and observations, and from Quickbird satellite image (04/01/04).

  Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 72° 40' 00" S; 2nd 75° 20' 00"S; Central Meridian: 165° 07' 00" E; Latitude of Origin: 74° 20' 00" S; Spheroid: WGS84; Vertical datum: Mean Sea Level. Vertical contour interval 10 m. Horizontal accuracy: ±1 m; vertical accuracy expected to be better than ±1 m.
- Map 3: Restricted Zone, Colline Ippolito: Edmonson Point ASPA No. 165. Map derived from Quickbird satellite image (04/01/04). Map specifications as for Map 2, except for horizontal accuracy which is approx ±10 m, and elevation information is not available. Sea level is approximated from coastline evident in satellite image.
- Map 4: Edmonson Point ASPA No. 165, topography, wildlife and vegetation. Map specifications as for Map 2, except for contour interval which is 2 m.

Map data and preparation: PNRA, Dipartimento di Scienze Ambientali (Università di Siena), Environmental Research & Assessment (Cambridge), Gateway Antarctica (Christchurch).

6. Description of the Area

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

General description

Edmonson Point (74°20' S, 165°08' E) is a coastal ice-free area of 1.79 km^2 situated at Wood Bay, 50 km north of Terra Nova Bay, and 13 km east of the summit and at the foot of Mount Melbourne (2732 m), Victoria Land. The Area comprises a total of 5.49 km^2, including the entire ice-free

ground of Edmonson Point (1.79 km^2), the separate ice-free area of Colline Ippolito (Ippolito Hills) (1.12 km^2) approximately 1.5 km north-west of Edmonson Point, and the nearshore marine environment and intervening sea of Baia Siena (Siena Bay) between these ice-free areas (2.58 km^2), which lie east and at the foot of the permanent ice sheet extending from Mount Melbourne (Map 1). Part of the glacier from Mount Melbourne separates the two ice-free areas on land. A broad pebbly beach extends the length of the coastline of Edmonson Point, above which cliffs rise up to 128 m towards the south of the Area. The topography of the Area is rugged, with several hills of volcanic origin of up to 134 m in height, and ice-free slopes rising to around 300 m adjacent to the ice sheet, although accurate elevation information in these areas is not currently available. Undulating ice-cored moraines, boulder fields and rock outcrops are separated by small ash plains and shallow valleys. The Area is dissected by numerous valleys and melt streams, with several small lakes, and seepage areas being common features throughout the Area. In the central region of Edmonson Point are several wide shallow basins, at about 25 m elevation, covered by fine scoria and coarse sand, mixed with extensive carpets of vegetation and areas of patterned ground. The northern coast of Edmonson Point is a cuspate foreland comprising several raised beaches.

The environmental character of Colline Ippolito is similar to that of Edmonson Point. This area has a narrow boulder beach backed by a ridge running parallel to the coast. Small meltwater streams run through shallow gullies and across flats into two lakes behind the coastal ridge in the north. Ridges and cones rise to about 200 m before merging with the snow fields and glaciers of Mount Melbourne in the south.

Boundaries

The margin of the permanent ice sheet extending from Mount Melbourne is defined as the boundary in the west, north and south of the Area (Maps 1-3). The eastern boundary is marine, which in the southern half of the Area follows the coastline 200 m offshore from the southern to northern extremities of the ice-free area of Edmonson Point. From the northern extremity of Edmonson Point, the eastern boundary extends NW across Baia Siena for a distance of 2 km to a position 200 m due east from the coast of the northern extremity of Colline Ippolito. Baia Siena is thus enclosed within the Area. Boundary markers have not been installed because the ice sheet margin and the coast are obvious boundary references.

Climate

No extended meteorological records are available for Edmonson Point, although annual data for McMurdo Station, Scott Base and Cape Hallett suggest the average mean temperature in the Edmonson Point vicinity would be around -16º C, and the mean annual snow accumulation about 20-50 cm, equivalent to 10-20 cm of water (Bargagli *et al.,* 1997). Short-term data are available for December 1995 – January 1996, collected during the BIOTEX 1 expedition. During this period temperatures ranged from -7º C to 10º C, with 0º C exceeded every day. Relative humidity was low (15-40% day, 50-80% night), precipitation occasional as light snow and wind speeds mostly low. From late January weather conditions deteriorated, with frequent subzero daytime temperatures, snow-fall and high winds. Data available for summer seasons in 1998-99 and 1999-00 from a weather station installed near the penguin colony suggest prevailing summer winds at Edmonson Point come from the east, southeast and south. Daily average wind speeds were generally in the range of 3-6 knots, with daily maximums usually being of 6-10 knots, occasionally reaching up to 25-35 knots. Daily average air temperatures ranged from around -15°C in October, -6°C in November, -2.5°C in December to -1°C in January, decreasing to -3.5°C again in February (Olmastroni, pers. comm., 2000). The highest daily maximum in the two summer periods was recorded as 2.6°C on 25 December 1998. The average air temperature recorded over both summers was approximately -4°C, while the average wind speed was 4.5 knots. Average daily relative humidity generally ranged between 40-60%.

Geology and soils

The geology at Edmonson Point is derived from Cenozoic eruptive activity of Mount Melbourne (Melbourne Volcanic Province), part of the McMurdo Volcanic Group (Kyle, 1990), combined with glacial deposits from the marine-based ice sheet that covered much of the Victoria Land coastline during the last glacial maximum (7500 to 25000 years B.P.) (Baroni and Orombelli, 1994). The volcanic complex at Edmonson Point is composed of a large subaerial tuff ring, scoria cones, lava flows, and subaquatic megapillow lava sequences (Wörner and Viereck, 1990). The rocks are mainly of basaltic and/or trachytic composition, and include various additional volcanic products, such as accumulations of tuffs, pumices and debris deposits (Simeoni *et al.,* 1989; Bargagli *et al.,* 1997). The ground surface is composed mainly of dry, coarse-textured volcanic materials with a low proportion of silt and clay (Bargagli *et al.,* 1997). These exposed surfaces, as well as beneath the surfaces of stones and boulders, are often coated with white encrustations or efflorescences of soluble salts. Most of the ground is dark-coloured, with brownish or yellowish patches of scoria and tuffite. Unstable scree is common on hill slopes, which are dry and mostly unvegetated. Valley and basin floors are covered by fine scoria and coarse sand (Bargagli *et al.,* 1999).

Geomorphology

A series of marine deposits are visible on the cuspate foreland at the northern extremity of Edmonson Point. The gently sloping raised beaches of the foreland are composed of differing ratios of sands, pebbles and boulders distributed over lava flows (Simeoni *et al.,* 1989). Numerous small crater-like pits, many containing melt-water or ice, can be observed just above the high tide mark in this locality; these are thought to have been formed by extreme tides and the melting of coastal ice accumulations. South of the cuspate foreland, volcanic bedrock exposures are common over much of the ground extending up to about 800 m inland from the coast, most evident in the prominent hills of about 120 m in height in the central northern part of Edmonson Point. A series of late-Pleistocene moraines and related tills lie on the western side of these exposures, with bands of Holocene ice-cored moraine, talus and debris slopes adjacent to the glacier ice which extends from Mount Melbourne (Baroni and Orombelli, 1994).

Streams and lakes

There are six lakes on Edmonson Point, ranging in length up to 350 m, and in area from approximately 1600 m^2 up to 15,000 m^2 (Map 2). Two further lakes occur behind the coastal ridge at Colline Ippolito, the largest of which is approximately 12,500 m^2 (Map 3). In addition, on Edmonson Point there are approximately 22 smaller ponds of diameters of less than 30 m (Broady, 1987). The larger ponds are permanently ice-covered, with peripheral moats forming during the summer. Detailed physico-chemical characteristics and limnology of the lakes of Edmonson Point are reported in Guilizzoni *et al*. (1991). There are numerous streams throughout the Area, some of which are supplied with meltwater from the adjacent ice sheet, while others are fed by lakes and general ice / snow melt. Several stream beds have flood terraces of fine soil covered by pumice-like pebbles of 5-10 mm diameter. Many of the streams and pools are transient, drying up shortly after the late snow patches in their catchments disappear.

Plant biology

Compared to several other sites in central Victoria Land, Edmonson Point does not have a particularly diverse flora, and there are only a few extensive closed stands of vegetation. Six moss species, one liverwort, and at least 30 lichen species have been recorded within the Area (Broady, 1987; Lewis Smith, 1996, 1999; Lewis Smith pers. comm., 2004; Castello, 2004). Cavacini (pers. comm., 2003) noted that recent analyses have identified at least 120 alga and cyanobacteria species present at

Edmonson Point. These are present in a range of forms including algal mats on soil and as epiphytes on mosses, and in a range of habitats such as in lakes, streams and snow, and on moist ornithogenic and raw mineral soils. At the onset of summer, snow melt reveals small stands of algae and moss on valley floors, although much of these lie buried by up to 5 cm of wind-blown and melt-washed fine mineral particles. This community is capable of rapid growth during December, when moisture is available and soil temperatures are relatively high, bringing shoot apices up to a centimetre above the surface as the surface accumulation of sand is washed or blown away. Increased water flow or strong winds can quickly bury these stands, although sufficient light for growth can penetrate 1-2 cm below the surface (Bargagli *et al.,* 1999).The principal moss communities occur on more stable substrata which are not subjected to burial by sand, for example in sheltered depressions or along the margins of ponds and meltwater streams, and seepage areas below late snow beds where moisture is available for several weeks. Some of these are among the most extensive stands found in continental Antarctica, being of up to 3000 m^2, most notably the stand of *Bryum subrotundifolium* (= *B. argenteum*) several hundred metres west of the main Adélie colony (Map 4). Other, less extensive, notable stands occur near the lake adjacent to the Adélie colony (Map 4), and smaller localized stands of *Ceratodon purpureus* (with relatively thick deposits of dead organic material) being found in a valley in the north of Edmonson Point and in the upper area of the principal stream in the northern ice-free area. Greenfield *et. al*. (1985) suggested that, apart from Cape Hallett, no area in the Ross Sea has a comparable abundance of plants, although in 1996 a similarly extensive area colonised almost exclusively by *Bryum subrotundifolium* (= *B. argenteum*) was discovered on Beaufort Island (ASPA No. 105), approximately 280 km to the south of Edmonson Point.

The moss-dominated communities comprise up to seven bryophyte species, several algae and cyanobacteria and, at the drier end of the moisture gradient, several lichens encrusting moribund moss (Lewis Smith, 1999; Bargagli *et al.,* 1999). There are mixed communities or zones of *Bryum subrotundifolium* (= *B. argenteum*), *B. pseudotriquetrum* and *Ceratodon purpureus*. In some wetter sites the liverwort *Cephaloziella varians* occurs amongst *C. purpureus*. Dry, very open, often lichen-encrusted moss communities usually contain *Hennediella heimii*, and often occur in hollows which hold small late snow patches. *Sarconeurum glaciale* occurs in a stable scree above the large lake in the south of the Area (Lewis Smith, 1996). The upper portions of moss colonies are often coated with white encrustations of soluble salts (Bargagli *et al.,* 1999).

The lichen communities are relatively diverse, with 24 species identified and at least six crustose species so far unidentified, although few are abundant (Castello, 2004; Lewis Smith, pers. comm. 2004). Epilithic lichens are generally sparse and not widespread, being mainly crustose and microfoliose species restricted to rocks used as skua perches and occasionally on stable boulders in scree, moist gullies and temporary seepage areas. Macrolichens are scarce, with *Umbilicaria aprina* and *Usnea sphacelata* found in a few places. The former species is more abundant on the gently sloping intermittently inundated outwash channels of Colline Ippolito, together with *Physcia* spp. and associated with small cushions of *Bryum subrotundifolium* (= *B. argenteum*) (Given, 1985, 1989), *B. pseudotriquetrum* and *Ceratodon purpureus* (Lewis Smith, pers comm. 2004). *Buellia frigida* is the most widespread crustose lichen on the hard lavas, but a distinct community of nitrophilous species occurs on rocks used as skua perches (*Caloplaca, Candelariella, Rhizoplaca, Xanthoria*). In gravelly depressions below late snow beds, moss turves are often colonised by encrusting cyanobacteria and ornithocoprophilic lichens (*Candelaria, Candelariella, Lecanora, Xanthoria*) and, where there is no bird influence, by the white *Leproloma cacuminum* (Lewis Smith, 1996).

Early work on the algal flora at Edmonson Point identified 17 species as Cyanophyta, 10 as Chrysophyta and 15 as Chlorophyta (Broady, 1987). More recent analyses (Cavacini, pers. comm., 2003) have identified 120 alga and cyanobacteria species, which is considerably more than the numbers of species of Cyanophyta (28), Chlorophyta (27), Bacillariophyta (25) and Xanthophyta

(5) recorded previously (Cavacini, 1997, 2001; Fumanti *et al.,* 1993, 1994a, 1994b; Alfinito *et al.,* 1998). Broady (1987) observed few areas of algal vegetation on ground surfaces; the most extensive were oscillatoriacean mats in moist depressions in areas of beach sand, which may have been temporary melt ponds prior to when the survey was undertaken. Similar mats were found adjacent to an area of moss with a *Gloeocapsa* sp. as an abundant associate. *Prasiococcus calcarius* was observed in the vicinity of the Adélie penguin colony, both as a small area of rich green crusts on soil and growing on an area of moribund moss cushions. Other epiphytic algae include Oscillatoriaceae, *Nostoc* sp., unicellular chlorophytes including *Pseudococcomyxa simplex*, and the desmid *Actinotaenium cucurbita*. Substantial stream algae were observed with waters containing oscillatoriacean mats over the stream beds, wefts of green filaments attached to the surface of stones (mainly *Binuclearia tectorum* and *Prasiola* spp.), small ribbons of *Prasiola calophylla* on the undersurfaces of stones, and dark brown epilithic crusts of cyanophytes (dominated by *Chamaesiphon subglobosus* and *Nostoc* sp.) coating boulders. Ponds present in beach sand contained *Chlamydomonas* sp. and cf. *Ulothrix* sp., while ponds fertilized by penguin and skua guano contained *Chlamydomonas* sp. and black benthic oscillatoriacean mats. Other ponds also contained rich benthic growths of Oscillatoriaceae, frequently associated with *Nostoc sphaericum*. Other abundant algae were *Aphanothece castagnei*, *Binuclearia tectorum*, *Chamaesiphon subglobosus*, *Chroococcus minutus*, *C. turgiduş Luticola muticopsis*, *Pinnularia cymatopleura*, *Prasiola crispa* (particularly associated with penguin colonies and other nitrogen-enriched habitats), *Stauroneis anceps*, various unicellular chlorophytes, and – in the highest conductivity pond in beach sand – cf. *Ulothrix* sp.

Algae and cyanobacteria are locally abundant in moist soils, and filaments and foliose mats of *Phormidium* spp. (dominant on patches of wet ground and in shallow lake bottoms), aggregates of *Nostoc commune* and a population of diatoms have been identified (Wynn-Williams, 1996; Lewis Smith pers. comm., 2004). The fungal species *Arthrobotrys ferox* has been isolated from moss species *Bryum pseudotriquetrum* (= *B. algens*) and *Ceratodon purpureus*. *A. ferox* produces an adhesive secretion which has been observed to capture springtails of the species *Gressittacantha terranova* (about 1.2 mm in length) (Onofri and Tosi, 1992).

Invertebrates

There is a high diversity of soil nematodes in the moist soils at Edmonson Point when compared to other areas described in Victoria Land. Nematodes found at Edmonson Point include *Eudorylaimus antarcticus, Monhysteridae* sp., *Panagrolaimus* sp., *Plectus antarcticus, P. frigophilus*, and *Scottnema lyndsayea* (Frati, 1997; Wall pers. comm., 2000). The latter species, previously only known from the McMurdo Dry Valleys, was found at Edmonson Point in 1995-96 (Frati, 1997). Less abundant are the springtails, most commonly *Gressittacantha terranova*, which was found under rocks and on soil and mosses in a number of moist microhabitats (Frati, 1997). Red mites (likely to be either *Stereotydeus* sp. or *Nanorchestes*, although species not identified) are common in aggregations beneath stones in moist habitats, and Collembola, rotifers, tardigrades and a variety of protozoans are also found (Frati *et al.,* 1996; Lewis Smith, 1996; Wall pers. comm., 2000; Convey pers. comm., 2003).

Breeding birds

Adélie penguins (*Pygoscelis adeliae*) breed in two groups near the coast in the central and easternmost part of Edmonson Point, occupying an area of about 9000 m^2 (Map 4). The number of breeding pairs recorded between 1981-2005 is summarised in Table 1, the average number in this period being 1808. In 1994-95 the majority of birds were recorded to arrive around 30-31 October, while the majority of the season's chicks had fledged by 12 February, with fledging complete by 21 February (Franchi *et al.,* 1997). An abandoned nesting site, occupied approximately 2600-3000 years ago, lies about 1 km to the northwest of the current colony, on bedrock adjacent to the cuspate foreland (Baroni and Orombelli, 1994).

Table 1. Adélie penguins (breeding pairs) at Edmonson Point 1981-2005 (data Woehler, 1993; Olmastroni, 2005, *pers. comm.*).

Year	No. of breeding pairs
1981	1300
1984	1802
1987	2491
1989	1792
1991	1316
1994	1960
1995	1935
1996	1824
1997	1961
1999	2005
2001	1988
2003	2588
2005	2091

A breeding colony of south polar skuas (*Catharacta maccormicki*) within the Area is one of the most numerous in Victoria Land, with over 120 pairs, of which 36 pairs occupy Colline Ippolito (CCAMLR, 1999; Pezzo *et al*., 2001; Volpi, 2005. Pers. comm.). Furthermore the Area includes two "club sites", nearby large freshwater ponds, used throughout the breeding seasons by groups of non-breeders ranging between 50 and 70 individuals (Pezzo 2001; Volpi 2005 pers. comm.). Flocks of snow petrels (*Pagodroma nivea*) have been observed flying over the Area, and Wilson's storm petrels (*Oceanites oceanicus*) have been sighted regularly. Neither of these latter two species is known to breed within the Area.

Breeding mammals

At Edmonson Point numerous (>50) Weddell seals (*Leptonychotes weddellii*) regularly breed in the near shore marine environment (on fast ice) within the Area. Females use this area to give birth and raise pups on the fast ice along the coastline of the whole Area. Later in the summer Weddell seals frequently haul out on beaches within the Area.

Scientific research

CCAMLR Ecosystem Monitoring Programme (CEMP) Studies

1. The presence at Edmonson Point of breeding penguin colonies and the absence of krill fisheries within their foraging range make this a critical site for comparative studies and inclusion with other CEMP sites in the ecosystem monitoring network established to meet the objectives of CCAMLR. The purpose of protected area designation is to allow planned research and monitoring to proceed, while avoiding or reducing, to the greatest extent possible, other activities which could interfere with or affect the results of the research and monitoring programme or alter the natural features of the site.

2. The Adélie penguin is a species of particular interest for CEMP routine monitoring and directed research at this site. For this purpose the Adélie Penguin Monitoring Program, a joint research project between Italian and Australian biologists, has been ongoing at Edmonson Point since 1994-95. An Automated Penguin Monitoring System (APMS) along with on-site observations by researchers, forms the basis of a study of at least 500-600 nests within the northern sector of the colony as part of the CEMP (CCAMLR, 1999; Olmastroni *et al*., 2000). Fences have been installed to direct penguins over a bridge which registers their weight, identity and crossing direction as they move between the sea and their breeding colony.

3. Parameters routinely monitored include trends in population size (A3), demography (A4), duration of foraging trips (A5), breeding success (A6), chick fledging weight (A7), chick diet (A8) and breeding chronology (A9).

4. The studies on Adélie penguins also involve population monitoring, experiments with satellite transmitters and temperature-depth recorders to investigate foraging location and duration. Combined with stomach flushing to record the diet of monitored penguins, this programme is developing comprehensive observations of the Adélie penguin feeding ecology (Olmastroni, 2002). Diet data (Olmastroni *et al*., 2004) confirmed the results of studies from krill distribution in the Ross Sea (Azzali and Kalinowski, 2000; Azzali *et al.,* 2000) and indicate that this colony is located at a transition point in the availability of *E. superba* between northern and more southerly colonies where this species is absent or rare in the diet of penguins (Emison, 1968; Ainley, 2002). These studies also highlighted the importance of fish to the diet of the Adélie penguin, which represented up to 50% of stomach contents in some years.

Local sea ice and weather data contribute to the understanding of possible factors affecting the breeding biology of this species (Olmastroni *et al*., 2004). Moreover behavioural studies are also part of the research (Pilastro *et al.,* 2001).

Research on the south polar skua colony focuses on breeding biology (Pezzo *et al*., 2001), population dynamics, biometry, reproductive biology and migratory patterns. Since 1998/99 more than 300 south polar skuas have been banded by metal and coloured rings, which facilitate field research that requires the recognition of individual birds and will allow for identification of birds migrating from the Area.

Other scientific activities

Studies of terrestrial ecology at Edmonson Point were initiated in the 1980s, although this type of research and other forms of science increased in the 1990s, in particular by Italian scientists. Edmonson Point was the location of BIOTEX 1, the first SCAR Biological Investigation of Antarctic Terrestrial Ecosystems (BIOTAS) research expedition, during December 1995 and January 1996. Ten researchers from three countries participated in a variety of scientific projects which included: taxonomic, ecological, physiological and biogeographical studies on cyanobacteria, algae, bryophytes, lichens (including chasmolithic and endolithic communities), nematodes, springtails and mites; studies of soil and freshwater biogeochemistry; microbial metabolic activity and colonisation studies; and investigations into the photosynthetic responses to ambient and controlled conditions of mosses, lichens and plant pigments that may act as photoprotectants (Bargagli, 1999). While the BIOTAS programme has now formally concluded, it is expected that further studies of this type will be on-going at Edmonson Point.

Human activities / impacts

Edmonson Point was probably first visited on 6 February 1900 when Carsten Borchgrevink landed just north of Mount Melbourne on "a promontory almost free of snow .... about 100 acres in extent" and climbed about 200 m up the slopes (Borchgrevink, 1901: 261). The Wood Bay region was rarely mentioned during the following 70 years, and presumably was visited only infrequently. Activity in the area increased in the 1980s, first with visits by the GANOVEX expeditions (Germany). Botanical research was undertaken in December 1984 (Given, 1985; Greenfield *et. al*., 1985; Broady, 1987) and in January 1989, at which time the first proposals for special protection of the site were made (Given, 2003. Pers. comm.). Italy established a station in close proximity at Terra Nova Bay in 1986-87 and increased research interest in the site followed.

The modern era of human activity at Edmonson Point has been largely confined to science. The impacts of these activities have not been described, but are believed to be minor and limited to items such as campsites, footprints, markers of various kinds, human wastes, scientific sampling, handling of limited numbers of birds (e.g. installation of devices to track birds, stomach lavage, biometric measurements, etc), and potentially some impacts associated with helicopter access and installation and operation of camp and research facilities at the penguin colony and on the northern cuspate foreland. At least one fuel spill of around 500 ml, and other smaller spills, were reported in 1996 as a result of refuelling operations at the generator and fuel store located at the penguin colony (see disturbed sites marked on Map 4). In addition, seaborne litter is occasionally washed onto beaches within the Area. The Restricted Zone at Colline Ippolito has received less human activity than Edmonson Point and impacts in this area are expected to be negligible.

6(ii) Restricted and managed zones within the Area

Restricted Zone

The ice-free area of Colline Ippolito (1.12 km^2) approximately 1.5 km north-west of Edmonson Point is designated as a Restricted Zone in order to preserve part of the Area as a reference site for future comparative studies, while the remainder of the terrestrial Area (which is similar in biology, features and character) is more generally available for research programmes and sample collection. The northern, western and southern boundaries of the Restricted Zone are defined as the margins of the permanent ice extending from Mount Melbourne, and are coincident with the boundary of the Area (Maps 1 and 3). The eastern boundary of the Restricted Zone is the mean low water level along the coastline of this ice-free area.

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

6(iii) Structures within and near the Area

CEMP Site: A fibreglass cabin for field observation, containing instrumentation and APMS panel, and two Nunsen huts for 4 people were installed by PNRA in 1994/95 to support CEMP research. These structures are located on a rocky knoll at an elevation of 16 m, 80 m from the coast and 40 m south of the northern sub-colony of penguins (Maps 2 and 4). At the beginning of each field season a generator and a number of fuel drums are temporarily stored about 20 m from the camp and removed at the end of each season. Adjacent to the northern penguin sub-colony, fences of metal net (30-50 cm) have been installed to direct penguins over the APMS weigh bridge.

Other activities: Approximately 50 plastic cloches were installed at 10 locations throughout the Area in 1995-96 as part of BIOTEX-1 (Maps 2 and 4). A number of additional cloches were installed the previous year at four locations (Wynn-Williams, 1996). It is not precisely known how many of

these cloches remain within the area. Temporary camp facilities were installed at the location of the designated camp site for the duration of the BIOTEX-1 programme, which have now been removed.

The nearest permanent stations are Mario Zucchelli Station at Terra Nova Bay (Italy) and Gondwana Station (Germany), which lie approximately 50 km and 45 km south respectively.

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

The nearest protected areas to Edmonson Point are the summit of Mount Melbourne (ASPA No. 118), which lies 13 km to the west, and a marine area at Terra Nova Bay (ASPA No. 161), which lies approximately 52 km to the south (Map 1, Inset 2).

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 research on the Area, or for compelling scientific reasons that cannot be served elsewhere; or
- it is issued for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- access to the Restricted Zone is allowed only for compelling scientific reasons or management purposes (such as inspection or review) that cannot be served elsewhere within the Area;
- the actions permitted will not jeopardise the ecological or scientific values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the Permit, or an authorised copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- Permits shall be issued for a stated period.
- The appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

7(i) Access to and movement within the Area

Access to the Area shall be by small boat, on foot or by helicopter. Movement over land within the Area shall be on foot or by helicopter. Access to the Area by vehicle is restricted according to the conditions described below.

Small boat access

The Edmonson Point part of the Area may be entered at any point where pinnipeds or seabird colonies are not present on or near the beach. Access for purposes other than CEMP research should avoid disturbing pinnipeds and seabirds (Map 1 and 2). There are no special restrictions on landings from the sea, although when accessing the main ice-free area of Edmonson Point visitors shall land at the northern cuspate foreland and avoid landing at breeding bird colonies (Map 2).

Restricted conditions of vehicle access

Use of vehicles within the Area is prohibited, except at the southern boundary of the Area where they may be used on sea ice to gain access to the shore, from where visitors shall proceed on foot. Thus, vehicle use shall avoid interference with animal feeding routes and the Adélie penguin colony. When using vehicles on sea ice, care should be exercised to avoid Weddell seals which may be present: speed should be kept low and seals shall not be approached by vehicle closer than 50 m. Access over land by vehicles is allowed to the boundary of the Area. Vehicle traffic shall be kept to the minimum necessary for the conduct of permitted activities.

Aircraft access and overflight

All restrictions on aircraft access and overflight stipulated in this plan shall apply during the period 15 October–20 February inclusive. Aircraft may operate and land within the Area according to strict observance of the following conditions:

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

Minimum overflight heights within the Area according to aircraft type.

Aircraft type	Number of Engines	Minimum height above ground	
		Feet	Metres
Helicopter	1	*2461*	750
Helicopter	2	*3281*	1000
Fixed-wing	1 or 2	*1476*	450
Fixed-wing	4	*3281*	1000

(ii) Helicopter landing is normally allowed at only three designated sites (Maps 1-4). The landing sites with their coordinates are described as follows:

> (A) shall be used for most purposes, located on the northern cuspate foreland of EdmonsonPoint (Map 2) (74°19’24"S, 165°07’12"E);
>
> (B) is allowed in support of the Adélie Penguin Monitoring Programme when necessary for transport of heavy equipment / supplies (Map 2) (74°19’43"S, 165°07’57"E); and
>
> (C) is allowed for access to the Restricted Zone, located at the northern ice-free area (CollineIppolito, Map 3) (74°18’50"S, 165°04’29"E).

(iii) In exceptional circumstances, helicopter access may be specifically authorised elsewhere withinthe Area for the purpose of supporting science or management according to conditions imposed by the Permit on access location(s) and timing. Landing of helicopters at sites of mammals and seabird sites and significant vegetation shall be avoided at all times (Maps 2-4).

(iv) The designated aircraft approach route is from the west of the Area, from over the lower eastern ice slopes of Mount Melbourne (Maps 1-3). Aircraft shall approach the main designated landing site (A) on the cuspate foreland from the north-west over or near Baia Siena (Siena Bay). When appropriate, access to landing site (B) should follow the same route and proceed a further 700 m SE. The departure route is identical in reverse.

(v) When appropriate, access to landing site (C) should be from the lower eastern ice slopes of Mount Melbourne and proceed directly to the landing site from the south over the land or where this is not feasible over Baia Siena (Siena Bay), avoiding skuas nesting to the north of the landing site;

(vi) 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.

Foot access and movement within the Area

Movement on land within the Area shall be on foot. Visitors should move carefully so as to minimise disturbance to the breeding birds, soil, geomorphological features and vegetated surfaces, and should walk on rocky terrain or ridges if practical to avoid damage to sensitive plants and the often waterlogged soils. Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects. Pedestrians that are not undertaking research or management related to the penguins shall not enter the colonies and should maintain a separation distance from the breeding birds of at least 15 m at all times. Care should be exercised to ensure monitoring equipment, fences and other scientific installations are not disturbed.

Pedestrians moving between the helicopter landing sites (A) or (B) to the Adélie colony shall follow the preferred walking routes marked on Maps 2 and 4 or follow a route along the beach.

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

- The research programme associated with the CCAMLR CEMP
- Scientific research that will not jeopardise the ecosystem of the Area;
- Essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a Permit. All 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 to the Area. Removal of specific equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures are prohibited.

7(iv) Location of field camps

Semi-permanent camps and temporary camping is permitted within the Area at the primary designated site on the cuspate foreland of Edmonson Point (Map 2). Camping at the CEMP Research camp (Maps 2 & 4) is permitted only for purposes of the Adélie Penguin Monitoring Programme. When necessary within the Restricted Zone for purposes specified in the Permit, temporary camping is permitted at the designated site (C) (74°18’51"S, 165°04’16"E) approximately 100 m west of helicopter landing site (Map 3).

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. In view of the presence of breeding bird colonies at Edmonson 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 is not to be stored in the Area, unless authorised by Permit for specific scientific or management purposes. Fuel spill clean-up equipment should be made available for use at locations where fuel is being regularly handled. Anything introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of any introduction into the environment is minimised. If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ. The appropriate authority should be notified of anything released or not removed that was not included in the authorised Permit.

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

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

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

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

7(viii) Disposal of waste

All wastes, except human wastes, shall be removed from the Area. Human wastes shall either be removed from the Area, or incinerated using purpose-designed technologies such as a propane-burning toilet, or in the case of liquid human wastes may be disposed of into the sea.

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

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

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

3. To help maintain the ecological and scientific values of Edmonson Point special precautions shall be taken against introductions. Of concern are microbial, invertebrate or plant introductions from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be thoroughly cleaned. 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.

7(x) Requirements for reports

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

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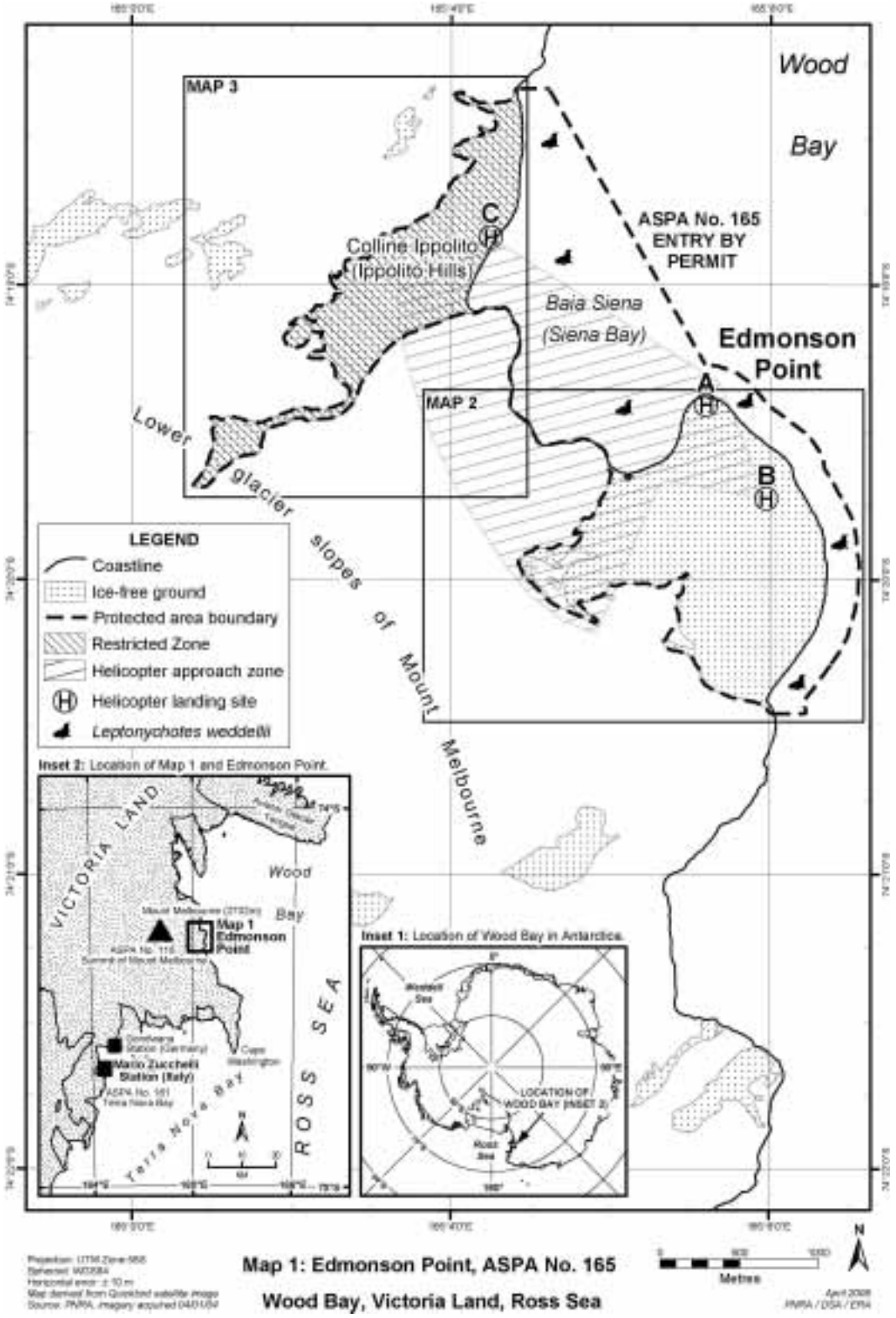
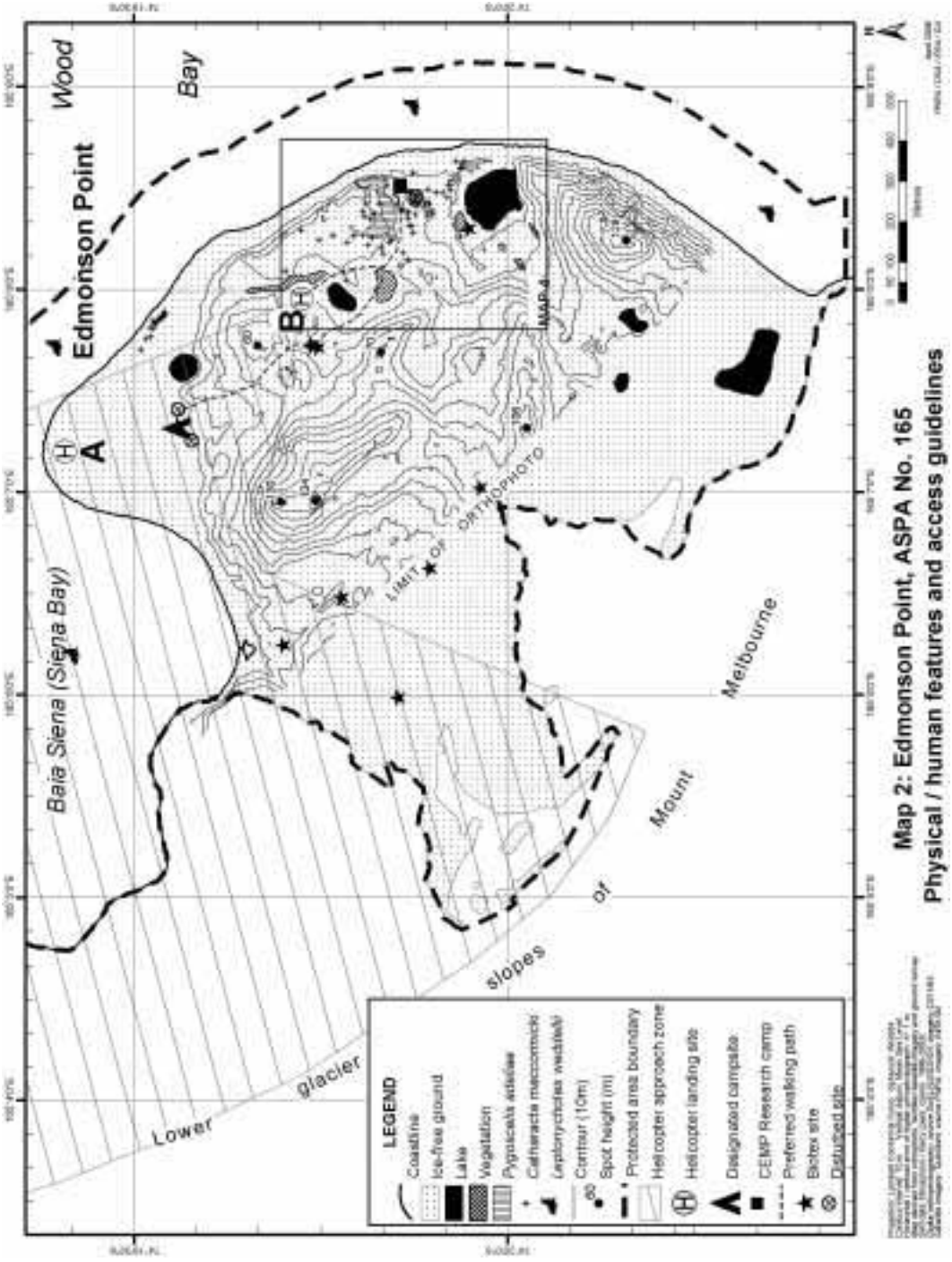
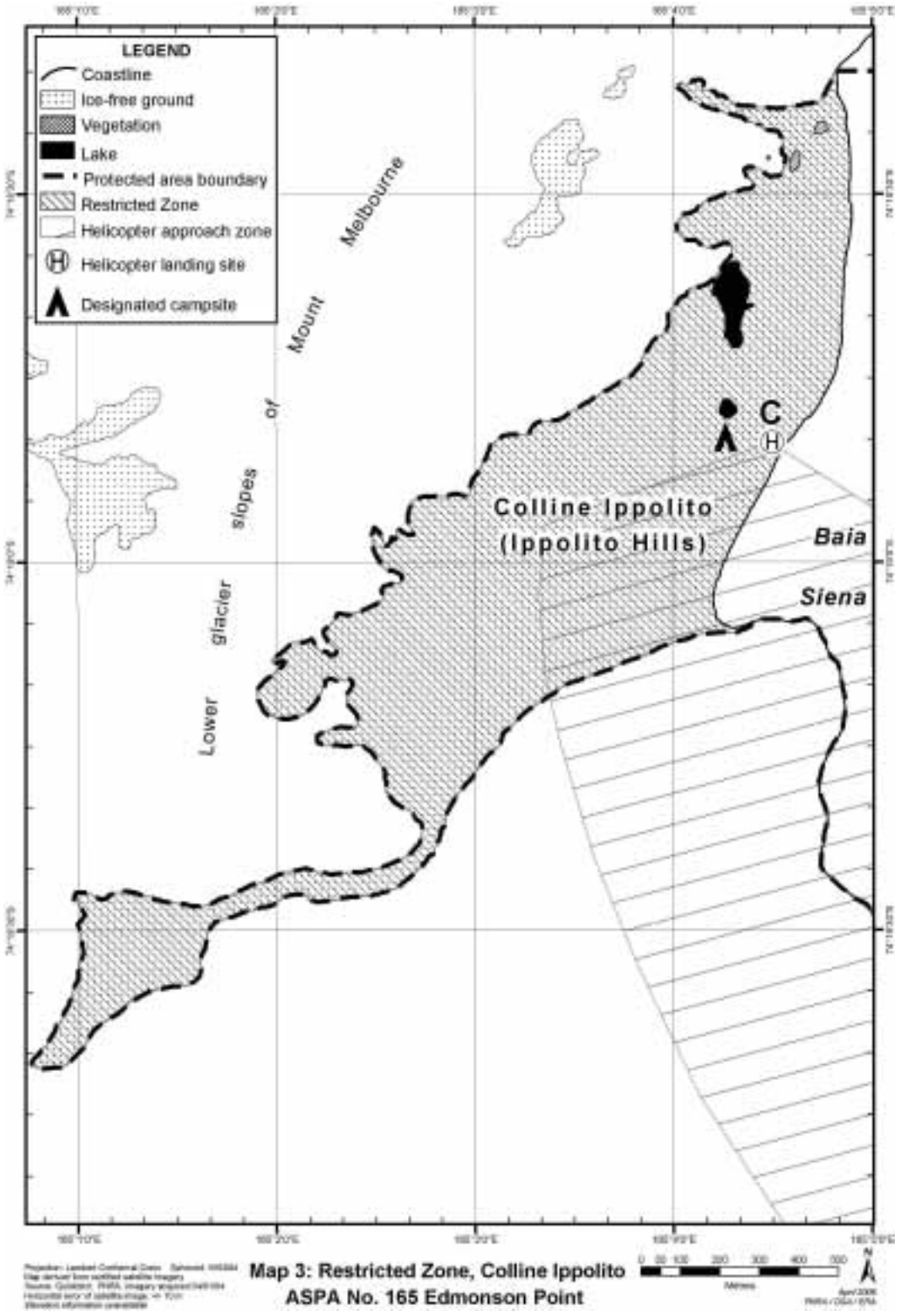
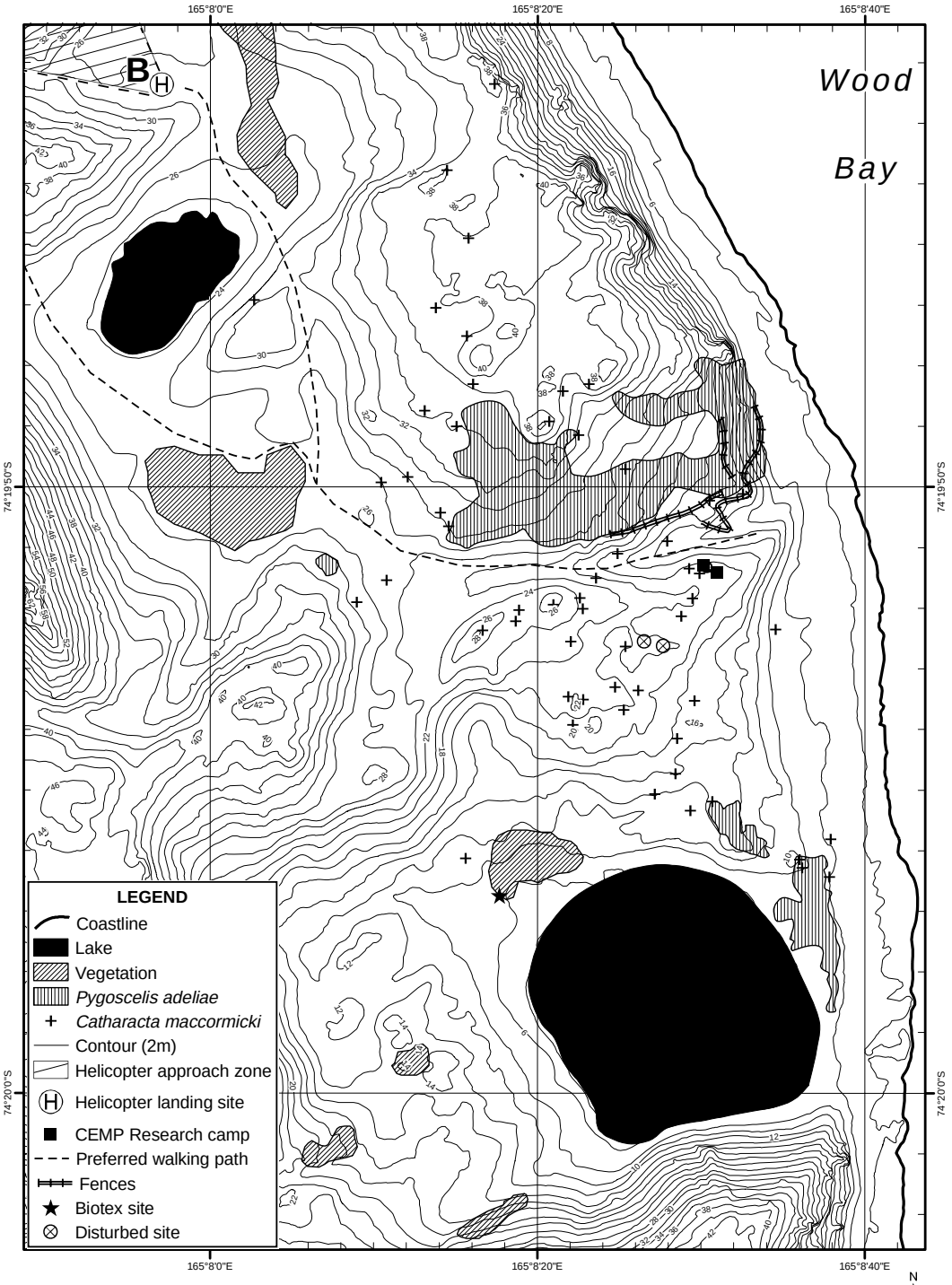

Wood
Bay
MAP 3
MAP 2
ASPA No. 165
ENTRY BY
PERMIT
Colline Ippolito
(Ippolito Hills)
Baia Siena
(Siena Bay)
Edmonson
Point
A
B
C
Lower
glacier
slopes
of
Mount
Melbourne
LEGEND
Coastline
Ice-free ground
Protected area boundary
Restricted Zone
Helicopter approach zone
Helicopter landing site
Leptonychotes weddelli
Inset 2: Location of Map 1 and Edmonson Point.
VICTORIA LAND
Wood
Bay
Map 1
Edmonson
Point
Mario Zucchelli
Station (Italy)
ROSS SEA
Terra Nova Bay
Inset 1: Location of Wood Bay in Antarctica.
LOCATION OF
WOOD BAY (INSET 2)
Metres
Map 1: Edmonson Point, ASPA No. 165
Wood Bay, Victoria Land, Ross Sea


Wood Bay
Edmonson Point
A
B
MAP 4
LIMIT OF ORTHOPHOTO
Baia Siena (Siena Bay)
Melbourne
Mount
slopes
of
Lower
glacier
LEGEND
Coastline
Ice-free ground
Lake
Vegetation
Pygoscelis adeliae
Catharacta maccormicki
Leptonychotes weddelli
Contour (10m)
Spot height (m)
Protected area boundary
Helicopter approach zone
Helicopter landing site
Designated campsite
CEMP Research camp
Preferred walking path
Biotex site
Disturbed site
Map 2: Edmonson Point, ASPA No. 165
Physical / human features and access guidelines



Map 3: Restricted Zone, Colline Ippolito
ASPA No. 165 Edmonson Point



Projection: Lambert Conformal Conic Spheroid: WGS84
Contour interval: 2m Vertical datum: Mean Sea Level
Horizontal / vertical error of digital orthophotograph: +/- 1 m
Map derived from orthophoto and ground survey
Bird data Olmastroni / Kerry (pers. comm. 1996-2003);
Digital orthophotography source: DoSLI/USGS; imagery 23/11/93

Map 4: Edmonson Point, ASPA No. 165
Topography, wildlife & vegetation

April 2006
PNRA / DSA / ERA / GA

Management Plan for Antarctic Specially Protected Area No. 166

PORT-MARTIN, TERRE-ADÉLIE

1. Description of values to be protected

Originally, the historical site of Port-Martin was designated as Historical Monument N° 46, proposed by France, in Recommendation XIII-16 (Brussels, 1985).

Brief historical summary

The building of a base in Terre-Adélie was programmed as Expedition TA21's main task. This expedition left Brest (France) in November 1948 and reached the pack ice on February 11, 1949. Due to unfavorable ice conditions, it was unable to come ashore.

A new expedition, named TA3, succeeded on January 18, 1950 and on January 20, the final site was selected for the construction of the new base. The site took the name of Port-Martin as a tribute to J.-A. Martin, a member of the expedition who died on board. A team of 11 men, under the leadership of André-Franck Liotard, raised the main building – a pre-cut wood frame, with oblique relieving posts – and then built several annexes to house mainly scientific activities (magnetism, geodesy, ionospheric sounding, atmospheric optics, biology, etc.) as well as meteorology. Radio transmission antennae and wind machine towers were raised in the open spaces in between these buildings, along with an emergency shelter.

On January 6, 1951, the 17 members of the T4 relief crew, under the leadership of Michel Barré, came ashore. They enlarged the main building while continuing and developing scientific activities.

Relief team T5, under the command of René Garcia, reached Port-Martin on January 14, 1952, while a reduced crew, led by Mario Marret (4 men in total), were building a secondary base on Petrel Island (Pointe Géologie Archipelago).

During the night of January 23 to 24, 1952, the main building at the Port-Martin base was destroyed by fire. The supply boat, which was still nearby, was able to evacuate the men, three of which joining the original four that were dropped off at Pointe Géologie where they joined Mario Marret's team. During that wintering season, the seven men of this rebuilt team carried out a raid on Port-Martin to recover various supplies – including the two Weasels – which had been left there.

Since then, only limited visits of at most a few hours were made to this base which is presumed to have been left as it was.

Building group

Today, what remains in Port-Martin are the ancillary buildings, including the shelter, a weather shelter and the coal and supply sheds. With snow covering the remains of the main station year-round, it is difficult to say precisely what was left after the fire. An archeological mission needs to be sent there to inventory what remains of the buildings and the furniture they contained. But the ancillary buildings, witnesses to the organization of a spatial base in Antarctica in the beginning of the 1950s, by themselves justify special protection.

In fact, Port-Martin is the perfect illustration of a base in Antarctica in the immediate post-war period, and its creation corresponds to the project of an International Geophysics Year. Yet, while it kept dog-sled transport from the Heroic Era, it borrowed Weasels (caterpillar tractors) from the

Mechanization Era. Its goals, however, were resolutely part of the Scientific Era since, in spite of its brief actual operation, some progress in the study of earth sciences, weather and ionosphere are associated with it. As such, the site has a historical and cultural importance.

The short duration of its operation left a "snapshot" of this history. No change – except for some superficial pillage – has altered its original implantations.

Furthermore, for future archeology, the site represents an optimal site to design methods and techniques adapted to extreme archeological investigation conditions. The site is partially covered in a snow that needs to be considered, conceptually, as a specific type of sediment. From the Port-Martin deposit, archeologists should be able to promote new concepts as well as a methodology adapted to it. These could be used for future archeological study of other sites in Antarctica.

Therefore, Port-Martin must be considered not only as a historical bridge site, but also as an original archeological field, the exploitation and evaluation of which will require the design of specific, exemplary techniques, a new, privileged area for international cooperation in the spirit of the Treaty.

2. Goals and objectives

The goal of this management plan is to ensure the protection of the area and of its characteristics in order to preserve its proven and potential values. Its main objectives can be spelled out as follows:

- Avoid the degradation of the area's values as well as potential risks to them, by
- Preserving the site's integrity, including though strict access regulation until specialists formulate appropriate investigation methods for its development and its opening to the greatest number, and
- Designing a conservation plan *a minima* for the surface artifacts (antenna and wind machine towers, shelter, weather and tower shelter, etc.)

3. Management activities

- A program of *in situ* conservation and maintenance of superstructures, including the shelter;
- A study program characterized by constant monitoring of artifacts' and structures' condition as well as of the factors which affect them;
  - through a study of weather data recorded during decades by an *in situ* automatic American station,
  - through automatic sensors transmitting relevant data on the various levels of snow stratigraphy
- An on-site and off-site conservation program for artifacts, including a surface objects inventory through :
  - cartography and recording of the disposal of historical artifacts around the shack,
  - recording other relevant historical data,
  - preparing a SIG
- National Antarctic program directors operating in the area or those interested in the area will carry out consultations to ensure application of these provisions.

4. Designation duration

The area shall remain an Antarctica's Specially Protected Area (ASPA) for an undetermined period.

5. Document, maps and reference photography

Annex A: Port-Martin – *Plan des environs de la base (originellement) au 1/300 par Paul Perroud, in* Vallette Y. et J. Dubois, *Terre-Adélie 1950-1952, Expéditions Polaires Françaises, Résultats techniques N° G.III, 53,* Paris 1955.

Annex B: *Carte Expéditions Polaires Françaises – Expéditions antarctiques 1948 – 1953: « Terre-Adélie – Port-Martin »,* 1/20 000.

Annex C: *Plan levé de 1950 à 1952 par les Expéditions antarctiques françaises* – 1/5000.

6. Definition of the Area

The area is centered on a point (geographic coordinates: 66°49'S/141°23'E) which corresponds to the marker known as the "Astrolabe pillar" located on the left hand side of the "refuge shelter" (see map in Annex A). The exact geographic points delineating the polygon, as described below and presented on the map in Annex A, may be added to the description of the area as soon as it has been surveyed by an ad hoc expedition.

6(i) Limits of the proposed Area

These limits are defined by the polygon drawn on the plan (annex A, scale 1/300). New maps will need to drawn in priority in order to tag the polygon's angles to the GPS differential.

In order to delineate the designated area, the polygon's angles lie on the outside boundary of the remains, going beyond them by approximately 6 metres. The remains are as follows:

- to the north: the pole of the ionospheric sensor's Trombone antenna, the wind machine tower NNW angle, the workshop's NNW angle, the workshop's ESE angle;
- to the west: the workshop's WSW angle, the supply shed's W angle, the wind machine tower's south angle;
- to the south: the wind machine tower's south angle, the meteorological tower's SSW angle, the pluviometer location (cote 20,60);
- to the east: the pluviometer (cote 20,60), the weather shelter's E angle, the pole of the ionospheric sensor's Trombone antenna.

Furthermore, the area includes a 200 m-wide band running parallel to the coast line as represent on the IGN 1/20 000 map (Annex B) and from Sphinx Mountain to Bold Mountain (Annex C) on the 1/5000 map (Drawn by the French Polar Expeditions in 1950/1952). Coastal presence of several landing points and, underwater, of a known shipwreck.

6(ii) Reserved access area inside the Area

The area that falls within the limits defined above and which includes the marine band shall be declared a reserved access area. All buildings and furnishing artifacts within the area are presumed to be of historical origin. The reserved access duration shall be limited to the end of the inventory work and expert evaluation of the land, onsite items of value and the archeological field.

6(iii) In-area buildings

All buildings inside the area are considered to be of historical origin.

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

There are no other protected areas within direct proximity of the area offered for classification.

7. Permit criteria

Access to the reserved area is forbidden without a permit delivered by a competent national authority.

Such permits may come with general and specific conditions.

The general conditions determining permit issuance include, in order of priority:

- activities relating to experts' tasks (topographers and archeologists and related sciences specialists) specifically entrusted with necessary surveys and studies for a better site knowledge and improvement of the historical site management plan;
- preservation, consolidation, conservation and maintenance operations of surface structures;
- installation and maintenance of automatic stations that may be set up there and future repairs thereto;
- finally, all management activities aimed at reaching the plan's objectives.

At first, tourism-related activities and educational and leisure activities shall be limited until completion of the phases of archeological study and high structure's possible reinforcement operations (safety measures and historical monuments preservation). The duration of this limited access period shall be left up to the discretion of the competent national authority.

A granted permit shall be valid for duration not to exceed the time required for execution of the tasks for which it was issue.

7(i) Access to the Area and travels within

For people with a permit, access points or areas shall be through land sighting point(s) defined according to several scenarios (including staff and/or equipment landing, most common weather conditions in the area, etc.). The limits of these approach points shall be defined following the best advice provided by sailors, pilots and conservation consultative bodies (archeologists and heritage protection specialists).

They shall also be based on the hypothesis that as long as archeological works have not been carried out, any substantial increase of the number of visitors would be deleterious to those values to be protected.

Aircraft landings shall take place outside the area on points which, should they be in very close proximity, should be chosen after consulting pilots and heritage conservation specialists. These people's opinion shall be based, in particular, on the fact that landing too close to site buildings

- could be dangerous for equipment and crews (lifting surface artifacts),
- would disrupt space distribution of surface artifacts,
- would risk damaging existing structures by spraying surface items and ice particles.

Therefore, landings and approaches shall take place on landing and approach sites designated in agreement between pilots and heritage agents. Their definition through examination of ground conditions is part of the heritage site management plan.

Land vehicles are not allowed inside the area except for light vehicles that may be required for scientific and/or archeological artifacts conservation work. In such case, these vehicles' gross weight shall not exceed 1.2 tons and they will need to be fitted with low-pressure tires, preferably adapted to snow and névé, or with tracks made of rubber or similar flexible materials.

7(ii) Authorized activities within the Area

Among activities authorized within the area are heritage and archeological identification visits, visits for restoration, preservation and/or protection purposes, including installation, service and maintenance of automated surveying and/or remote transmission equipment.

Permit holders must make sure that their visit will not disrupt any program underway.

7(iii) Building installation, modification or removal

Any surface anthropogenic (man-made) remnant and *a fortiori* any underground item is assumed to form part of the historical heritage.

No remains and no item belonging to historical structures may be removed from the site, except for restoration and/or preservation purposes, and in such cases, only after issuance of an explicit authorization by the relevant authority.

No structure or scientific equipment may be set up in the area except for essential scientific reasons or for management activities authorized by the relevant authority.

7(iv) Camp location

Authorized visitors shall define a camp area according to local conditions and the requirements of their work. For each campaign, ground boundary of the various camp modules shall be indicated on a small-scale map (1/2000 for instance). These maps shall be turned into the relevant issuing authority after each campaign.

7(v) Restrictions on materials and organisms authorized inside the Area

- in compliance with the provisions of Annex II to the Madrid Protocol, live animals or plants, poultry products and by-products, including powdered eggs, may not be imported inside the area.
- chemical products are forbidden in the area, except those introduced for authorized scientific activities under the conditions spelled out in a permit. Any chemical must be taken out of the area at the end or prior to the end of the activities for which permits were issued.
- depositing fuels, foodstuff or any other material is forbidden except when needed for those activities for which permits were issued. All introduced substances shall be removed as soon as they are no longer required. Permanent storage is forbidden.

7(vi) Collection or removal of items or materials inside the area not brought by the permit holder

Collection or removal of materials or items that were not brought inside the area by the permit holder is forbidden.

However, materials may be picked up or removed from the area for the sole purposes of restoration, preservation or heritage protection, or for scientific reasons in compliance with the objectives of the

management plan, under a separate permit issued specifically for this purpose by the relevant authority.

7(vii) Waste elimination

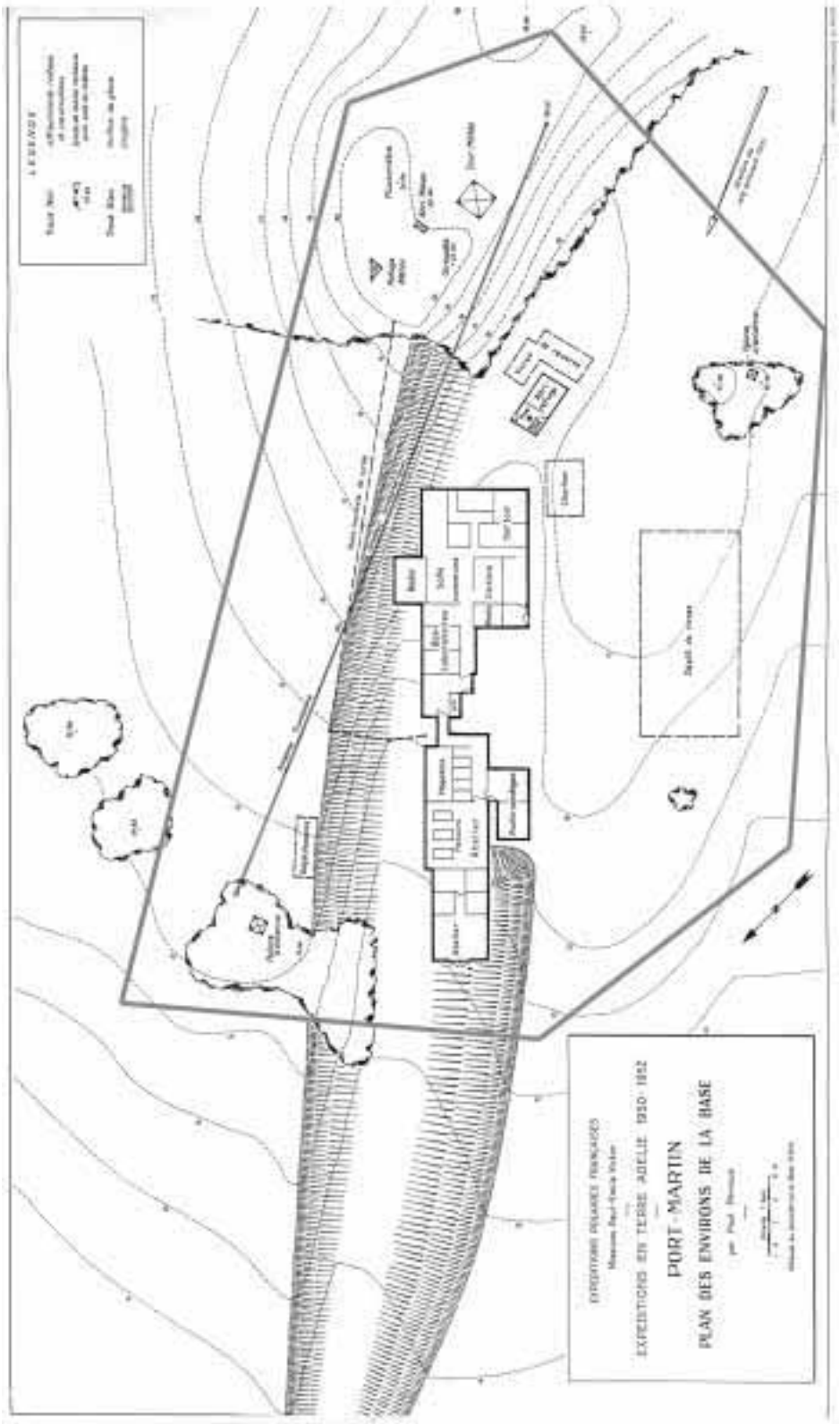
All waste materials produced by working parties or visitors will need to be removed from the area.

7(viii) Measures needed to meet the management plan's goals and objectives

Area visits shall be strictly limited to scientific and management activities.

7(ix) Visit reports

The Parties shall ensure that the main holder of each permit issued present to the relevant authority a report on activities carried out in the area. The Parties must keep in their archives a copy of these activities, and in the annual information exchange, they must provide a summary description of the activities carried out by people under their jurisdiction, with enough details to allow for a review of the management plan efficiency. In as much as possible, the Parties shall place the originals or the copies of these reports in archives accessible to the public in order to keep a usage log to be used in the management plan review and the area scientific use organization. Their posting on a dedicated website may be considered.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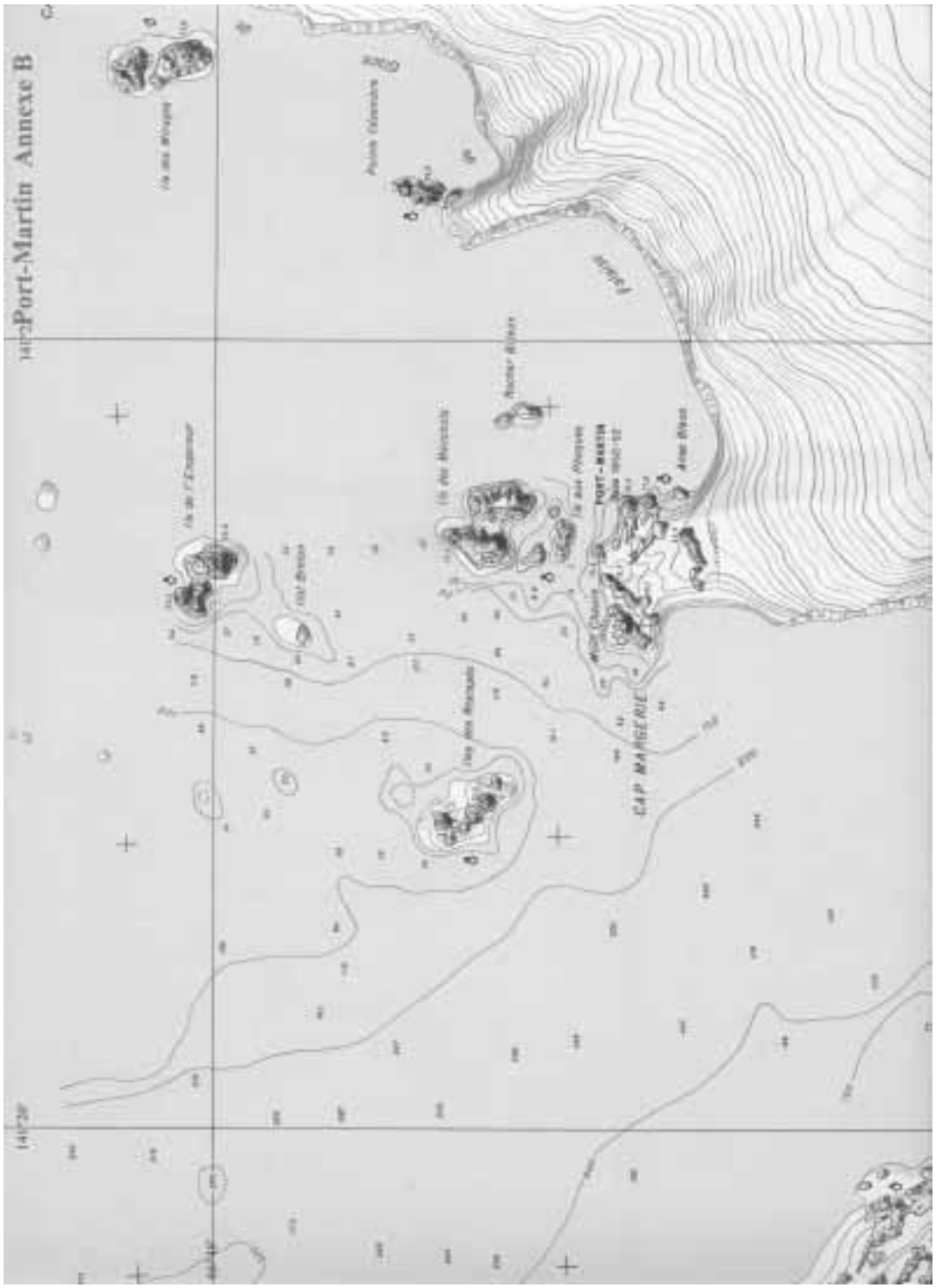
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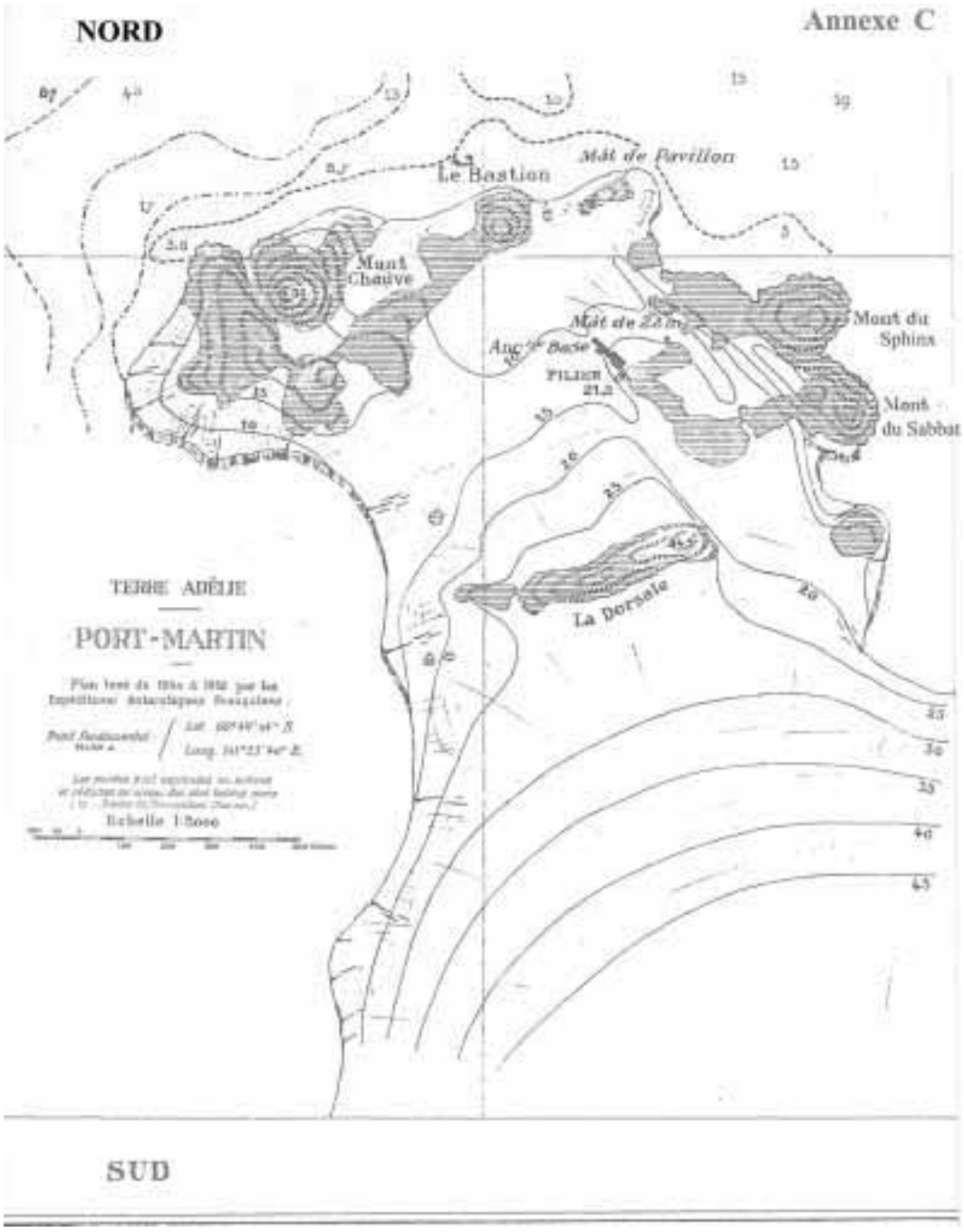
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II. Measures

Management Plan for Antarctic Specially Protected Area No. 167

HAWKER ISLAND, VESTFOLD HILLS, INGRID CHRISTENSEN COAST, PRINCESS ELIZABETH LAND, EAST ANTARCTICA

1. Description of values to be protected

Hawker Island, lying some 300 m off the Antarctic mainland, is located 7 km south-west from the Australian Davis station in the Vestfold Hills on the Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica at 68°35'S, 77°50'E (Map A). The island supports a breeding colony of southern giant petrels (*Macronectes giganteus*) which is the southernmost colony of the species on continental Antarctica. The island also supports a colony of Adélie penguins and a limited number of flying birds.

The southern giant petrel colony was discovered in December 1963; at that time there were 40-50 nests present, "some with eggs". Seventeen population counts were undertaken between 1963 and 1999 (see Figure 1). A maximum of 90 nests with eggs was recorded in 1970/71. The recorded number of nests with eggs had decreased to 10 in 1983, but the two most recent surveys, conducted in 1987 and 1999, recorded 21 and 25 respectively.

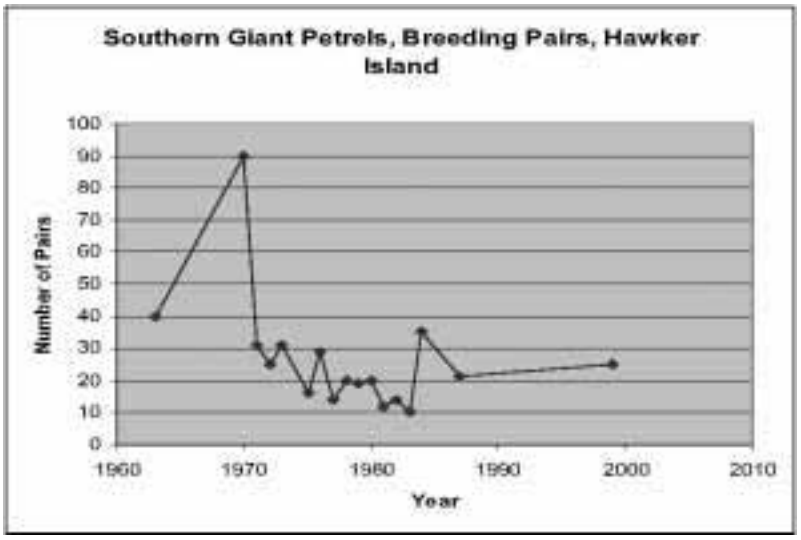

Figure 1: Population records for southern giant petrels (breeding pairs) at Hawker Island

Hawker Island is one of only four known breeding locations for southern giant petrels on the coast of continental Antarctica. The other locations have all been designated as Antarctic Specially Protected Areas (ASPAs): ASPA No. 102, Rookery Islands, Holme Bay, Mac Robertson Land (67º36'S, 62º53'E) – near Mawson Station; ASPA No. 160, Frazier Islands, Wilkes Land (66°13'S 110°11'E) – near Casey station; and ASPA No. 120, Pointe-Géologie, Terre Adélie (66º40'S, 140º01'E) – near Dumont d'Urville. Southern giant petrels on the Antarctic continent comprise less than 1% of the global breeding population. The current population for continental Antarctica is estimated at approximately 290 pairs, comprised of 25 pairs on Hawker Island, 3 pairs on Giganteus Island (part of the Rookery Islands group), 248 pairs on the Frazier Islands and 16 pairs at Pointe-Géologie.

Southern giant petrels also breed on islands in the southern Indian and Atlantic Oceans and in the Antarctic Peninsula.

As indicated above, the breeding population of southern giant petrels at Hawker Island decreased following its discovery in the early 1960s by personnel from nearby Davis Station. Human disturbance has been implicated in the observed decreases at all four southern giant petrel breeding sites on continental Antarctica. The disturbance to colonies near the Australian stations arose primarily through early efforts (1950s-1970s) to band adults and chicks at the nest. The population decrease at PointeGéologie has been attributed to station construction at Dumont d'Urville Station.

Southern giant petrels breeding in East Antarctica are particularly sensitive to disturbance at the nest. Restrictions in activities permitted at breeding sites, including a prohibition of banding, were introduced in the mid-1980s. While the population at Hawker Island has not recovered to the same extent as that on the Frazier Islands, it is showing signs of long-term recovery.

Reductions in breeding populations of southern giant petrels at other locations in the Antarctic and subantarctic have been attributed to activities associated with research stations. The bycatch of southern giant petrels in longline fisheries operating in the Southern Ocean is also likely to have contributed to observed population decreases. Decreases in breeding populations of southern giant petrels have also been observed at sites where human disturbance has been minimal, such as Heard Island.

The global breeding population of southern giant petrels is estimated at around 31,300 pairs, and is inferred to be declining at a rate of 20-50% over the past three generations. A total of 30 populations contain 500 or fewer breeding pairs, and at 15 of these sites there are 50 or fewer breeding pairs. It is believed that the global decrease in population is primarily due to fatal interactions with longline fisheries, although the species is also sensitive to other forms of human-induced disturbance such as scientific research and visitor activities, ship movements and overflights. The species is listed as Vulnerable under IUCN criteria and has conservation status under a number of international agreements (see Table 1).

Table 1: The conservation status of southern giant petrels by various authorities using IUCN criteria.

Authority	Conservation Status under IUCN criteria
IUCN Red List 2004	Vulnerable
Garnett, S.T. and Crowley, G. M. (2000) *The Action Plan for Australian Birds*	Vulnerable (global population)Endangered (Australian population only)
Agreement on the Conservation of Albatrosses and Petrels (ACAP)	Annex I
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)	Unfavourable conservation status listed in Appendix II.

The overall decrease in the Hawker Island population of southern giant petrels since its discovery is consistent with global trends and suggests that continued and formalised protection of the colony is warranted. Long-term protection and monitoring of the colony at Hawker Island will contribute to the development of appropriate regional and global conservation strategies for the species and will provide information for comparisons with populations elsewhere.

The designation of Hawker Island as an Antarctic Specially Protected Area completes a suite of protected areas that safeguard all known southern giant petrel breeding locations in East Antarctica.

2. Aims and objectives

Management of Hawker Island aims to:

- minimise human disturbance to assist stabilisation and recovery of the breeding colony of southern giant petrels;
- protect the value of Hawker Island as a reference area for future comparative studies with other breeding populations of southern giant petrels; and
- minimise the possibility of the introduction of alien plants, animals and microbes to Hawker Island.

3. Management activities

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

- one research visit should be conducted to census the southern giant petrels and other seabird populations in each five year period to enable monitoring of breeding populations. The visiting group should be restricted to the lowest number required to safely conduct the activity, and should include an ornithologist who is associated with an approved national program or who has previous field experience with southern giant petrels;
- information on the location of Hawker Island ASPA (stating the restrictions that apply) shall be produced and prominently displayed at Davis station and copies of this Management Plan shall be available at the station. Informative material and the Management Plan shall be provided to ships visiting the vicinity;
- clothing (particularly all footwear) and field equipment shall be appropriately cleaned before entering the Area; and
- the Management Plan shall be reviewed at least every five years and updated/modified as required.

4. Period of designation

Designation is for an indefinite period.

5. Maps

- Map A: Vestfold Hills, showing the location of Hawker Island and protected areas within the region. Map specifications: Projection: UTM Zone 49 Horizontal Datum: WGS84
- Map B: Hawker Island, Antarctic Specially Protected Area showing distribution of seabird nesting sites. Map Specifications: Projection: UTM Zone 49 Horizontal Datum: WGS84

6. Description of the Area

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

Hawker Island is located at 68°35'S, 77°50'E, approximately 300 m offshore from the Vestfold Hills. The Vestfold Hills is a roughly triangular ice-free area of approximately 512 km^2, of bedrock, glacial debris, lakes and ponds. The Vestfold Hills are bound by the ice plateau to the east, the Sørsdal Glacier to the south, and Prydz Bay to the west. The Vestfold Hills contain low hills (maximum height 158 m at Boulder Hill) and valleys, and are penetrated deeply by fjords and lakes. Numerous islands fringe the coast of the Vestfold Hills, and Hawker Island lies in the south-west, between Mule Island and Mule Peninsula.

Hawker Island is an irregularly shaped island of low elevation (maximum elevation of nearly 40 m), with two parallel ranges of hills running in a north south direction terminating in two small southern peninsulas. A third peninsula lies directly west and terminates with a 40 m hill with steep cliffs to the sea on the western and southerly aspects. A number of small fresh-water lakes lie between the ranges of hills on the northern part of the island, with a number of small lakes lying on the flatter terrain on the eastern sector of the island. At its maximum extent the island is 2 km north to south and 1.7 km east to west.

The Hawker Island ASPA comprises the entire terrestrial area of Hawker Island, with the seaward boundary at the low water mark (Map B). The total area of the Hawker Island ASPA is approximately 1.9 km^2. There are no boundary markers.

Human history

The first recorded sighting of the Vestfold Hills was by Douglas Mawson on the BANZARE voyage of the *'Discovery'* on the 9 February, 1931. Four years later, on 20 February 1935, Captain Klarius Mikkelsen of the Lars Christensen Company tanker *'Thorshavn'*, sighted and landed in the area. He named many features, and the area, the Vestfold Hills after his home province in Norway. The Vestfold Hills were again visited by Mikkelsen in early 1937, while undertaking an aerial survey of the coast.

In January 1939 the American explorer, Lincoln Ellsworth, and his Australian adviser, Sir Hubert Wilkins were the next recorded visitors to the area in the motor ship *'Wyatt Earp'*, Ellsworth flew some 400 km inland. In early 1947 the *'USS Currituck'* visited the Ingrid Christensen Coast as part of Operation Highjump. Photographic flights were to survey the coastline.

The first Australian National Antarctic Research Expeditions (ANARE) to the area was led by Dr Phillip Law on *'Kista Dan'* and reached the Vestfold Hills on 1 March, 1954. During January 1956, members of the Soviet Antarctic Expedition landed on the Ingrid Christensen Coast, in preparation for the IGY moving on to establish Mirny Station 595 km to the east. Australia established Davis station in the Vestfold Hills in 1957. Hawker Island was named for A.C. Hawker, radio supervisor at Davis station in 1957.

Climate

Meteorological data for the Area are confined almost entirely to observations at Davis station, 7 km northwest of Hawker Island. The Vestfold Hills area has a polar maritime climate that is cold, dry and windy. Summer days are typically sunny, with a midday temperature from -1°C to +2.9°C and a summer maximum of +5°C, but temperatures are below 0°C for most of the year falling to as low as -40.7°C in winter. The maximum temperature recorded at Davis station from 1957 to 2001 was +13°C. Long periods of relatively calm, fine conditions occur throughout the year. Winds are generally

light. The yearly average is around 20 km/h. Violent winds and blizzards can commence with little warning, and gusts of over 200 km/h have been recorded. Snowfall averages 78 mm/yr, with the greater proportion of annual accumulation resulting from wind blown drift. Apart from several permanent ice banks, the Vestfold Hills are virtually snow free in summer and lightly covered in winter. The record illustrates the seasonal climate expected for high latitudes, but on average Davis station is warmer than other Antarctic stations at similar latitudes. This has been attributed to the "rocky oasis" which results from the lower albedo of rock surfaces compared to ice, hence more solar energy is absorbed and re-radiated.

Geology

The Vestfold Hills consist of Archaean gneiss, upon which thin and often fossiliferous Pliocene and Quaternary sediments occupy depressions. The oldest known Cenozoic strata in the Vestfold Hills are the mid-Pliocene Sørsdal Formation, which contains a diverse marine fossil flora and fauna. Other younger Cenozoic strata attest to repeated glaciation, and several marine transgressions and regressions. The three major lithologies forming the Vestfold Hills are (in order of age) Chelnock Paragneiss, Mossel Gneiss and Crooked Lake Gneiss. This is repeated in units from east-north-east to west-south-west. Intruded into these, are groups of mafic dykes in a rough north-south orientation. The dykes are a major feature of the Vestfold Hills. Hawker Island comprises an extension of the Crooked Lake Gneiss of the northern portion of Mule Peninsula above Laternula Inlet. In common with the Archaean gneisses in the Vestfold Hills, the Hawker Island Crooked Lake Gneiss is cut by very distinctive, middle to early Proterozoic dolerite dykes.

Southern giant petrels

The Hawker Island southern giant petrel colony is situated on level ground about 20 m above sea-level. Rocks and boulders break the relief but provide little shelter. The same area has been used for nesting since the first records were made in 1963/64. The eastern side of the breeding area forms a slight ridge with the ground dropping away below, providing a good area for take-off into the prevailing north-easterly winds. Nests are built from pebbles and are relatively widely dispersed, about 5-10 m apart. Records of the number of nests with eggs are shown in Figure 1.

The breeding season for southern giant petrels on Hawker Island commences with laying during the second half of October. Following an incubation period of about 60 days, hatching starts in the second half of December. Hatching continues over a period of three to four weeks until mid-January and, with a fledging period of 3½-4 months. Young birds leave the colony from late March to early May.

Seventeen counts, or, on average, one visit every two years occurred between 1956 and 1999 (see Figure 1). In the mid 1980s, a management strategy was implemented for all three southern giant petrels breeding localities in the vicinity of the Australian stations, to minimise human disturbance. The strategy involved the Australian Antarctic Division restricting census visits to one in every three to five year period and implementing tight administrative controls over all other visits. This three to five year interval was considered an appropriate compromise between the risk of disturbing the birds through census work and the need to obtain meaningful population data. The strategy is believed to have contributed to the stabilisation and recovery observed in one of the three populations in Eastern Antarctica during the late 1980s onwards.

Other birds

Adélie penguins breed along the Vestfold Hills coastline and on at least 17 offshore islands, including Hawker Island. The total number of Adélie penguins in the Vestfold Hills has been estimated at 130,000 pairs. The Hawker Island colony is located in the vicinity of a small hill midway on the western side of the island and has been estimated at 2500 to 7500 pairs. There is evidence that the

colony or some of the breeding groups within the colony have moved location periodically. The deserted areas are marked by deep deposits of guano, frozen eggs and the dehydrated carcasses of chicks. The first Adélie penguins usually appear in the area by the middle of October with eggs being laid about four weeks later. The interval between laying of the first and second egg is 2½ to 4½ days, and the incubation period is in the range of 32 to 35 days. The last moulted adults depart Hawker Island by the end of March.

A small colony of Cape petrels has been recorded on Hawker Island on the southern tip of the south western peninsula. Cape petrels are absent from the area in winter. Cape petrels return to nesting sites during October with egg laying late in November to early December and fledging in late February and early March.

Snow petrels (*Pagodroma nivea*) breed on most islands and several mainland sites in the Vestfold Hills but there are no records of them breeding on Hawker Island. Antarctic fulmars (*Fulmarus glacialoides*), Antarctic petrels (*Thalassoica antarctica*) and Emperor penguins (*Aptenodytes forsteri*) are infrequent visitors to the Vestfold Hills in the summer months. South polar skuas (*Catharacta maccormicki*) nest on nearby Marine Plain and occasionally around the waters edge.

Seals

Weddell seals *(Leptonychotes weddellii*) breed in the Vestfold Hills and on the south-east part of Hawker Island. The seals start to appear inshore in late September and early October, and pupping occurs from mid-October until late November. Throughout summer, moulting Weddell seals continue to frequent firm sea-ice and haul out onto land. Most of the local population remains in the Vestfold Hills throughout the summer. Non-breeding groups of southern elephant seals (*Mirounga leonina*) haul out during the summer months in the vicinity of the south-western peninsula on Hawker Island. Crabeater seals (*Lobodon carcinophagus*) and Leopard seals (*Hydrurga leptonyx*) appear occasionally at the Vestfold Hills on sea-ice and beaches.

Vegetation

The flora of the Vestfold Hills comprises at least 82 species of terrestrial algae, six moss species and at least 23 lichen species. The lichens and mosses are distributed chiefly in the eastern or inland sector and their distribution patterns reflect the availability of drift snow, time since exposure of the substrate from the ice plateau and time since the last glaciation, elevation and proximity to saline waters. Very few occurrences of lichens or mosses have been noted towards the salt-affected coastal margin including Hawker Island where the low terrain is densely covered with extensive sand and moraine deposits.

Terrestrial algae are widespread and are major primary producers in the Vestfold Hills. Sublithic (or hypolithic) algae has been reported from Hawker Island, developing on the undersurfaces of translucent quartz stones that are partially buried in soil. The dominant algae, Cyanobacteria, particularly oscillatoriacean species, *Chroococidiopsis sp*., and *Aphanothece sp.* occur with the greatest frequency together with the Chlorophyta species, *cf. Desmococcus sp.A* and *Prasiococcus calcarius*. The endaphic alga *Prasiola crispa*, occurs as green crumpled sheet-like strands at melt flushes, usually associated with the diatom *Navicula muticopsis* and oscillatoriacean algae. The ornithocophilous lichen *Candelariella flava* has been reported from Hawker Island, associated with sea bird nesting sites.

Invertebrates

An extensive survey of terrestrial tardigrades has been undertaken in the Vestfold Hills in 1981 from which four genera and four species of tardigrade were recovered. Although no tardigrades

were recovered from the Hawker Island sample site it has been suggested that, as two species of tardigrade, *Hypsibius allisonii* and *Macrobiotus fuciger?* were recovered from Walkabout Rocks, they may be found in other coastal areas of similar ecology, associated with *Prasiola crispa*. The mite, *Tydeus erebus* is associated with breeding sites of Adélie penguins on the island.

6(ii) Special zones within the Area

There are no special zones within the Area.

6(iii) Location of structures within the Area

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

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

The following Protected Areas are located near Hawker Island:

- Marine Plain, Antarctic Specially Protected Area No. 143 (68°36'S, 78°07'E).

7. Permit conditions

Visits to Hawker Island ASPA are prohibited except in accordance with a Permit issued by an appropriate National Authority. National Antarctic Programs operating in the region shall consult with each other to ensure that the frequency of visits does not exceed that permitted in the Management Plan. Permits to enter the Area may be issued during the non-breeding period for southern giant petrels, specifically from 1 May to 30 September, for compelling scientific research that cannot be undertaken elsewhere, or for essential management purposes consistent with the objectives and provisions of the Management Plan. Permits are only to be issued for research that will not jeopardise the ecological or scientific values of the Area, or interfere with existing scientific studies.

Only one Permit is to be issued for the purpose of conducting a seabird census in each 5 year period. The Permit issuing authority is to refer to the provisions under section 3 of this management plan when issuing Permits. Censuses are to be conducted from beyond the limits of the southern giant petrel colonies, wherever practicable. In most cases there are vantage points from where the nesting birds may be counted. The maximum time to be spent on Hawker Island is 12 hours in total; however, the census may involve several visits to the islands. Only persons named in the Permit may be ashore within the Area at any time. Others, such as boat operators, should remain at the nominated landing sites.

Permits should include a condition that the Permit or a copy shall be carried at all times when within the Area. Additional conditions, consistent with the objectives and provisions of the Management Plan, may be included by the issuing authority. The principal Permit Holder for each Permit issued is required to submit to the Permit issuing authority a visit report detailing all activities undertaken within the Area, and including all census data obtained during the visit.

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

- Vehicle use is prohibited within the Area;
- Access to Hawker Island may be by watercraft or vehicle depending upon seasonal conditions. Watercraft landings or parking of vehicles must be made at one of the two small bays at the southern end of the island. Boats used to visit the islands must be left at the shoreline. Movement within the Area is by foot only. Only personnel who are required to carry out scientific/management work in the Area are to leave the landing/parking site;

- The minimum (closest) approach distances set out in Table 2 are to be maintained when approaching any wildlife on, or in the vicinity of Hawker Island, unless a closer approach distance is authorised in a Permit. These distances are a guide and should an activity disturb wildlife, a greater distance is to be maintained;
- Persons permitted to approach southern giant petrels to obtain census data or biological data, should maintain the greatest practical separation distance and should in no case approach closer than 20 m;
- To reduce disturbance to wildlife, noise levels including verbal communication is to be kept to a minimum. The use of motor-driven tools and any other activity likely to generate noise and thereby cause disturbance to nesting birds is prohibited within the Area during the breeding period for southern giant petrels (1 October to 30 April); and
- Landing of aircraft in the Area is prohibited at any time.

Table 2: Minimum distances to maintain when approaching wildlife at Hawker Island.

Species	Distances (m)		
	People on foot / ski	**Quad/ Skidoo**	**Hagglunds**
Giant petrels	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		

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

The following activities may be conducted within the Area from 1 May to 30 September as authorised in a Permit:

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

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

No permanent structures are to be erected in the Area.

7(iv) Location of field camps

Camping is prohibited in the Area except in an emergency.

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

- Fuel is not to be deposited in the Area. Boat refuelling is permitted at shoreline landing sites. A small amount of fuel may be taken into the Area for an emergency stove.

- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No herbicides or pesticides are to be brought into the Area.
- Any chemical which may be introduced for compelling scientific purposes as authorised in a Permit shall be removed from the Area, at or before the conclusion of the activity for which the Permit was granted. The use of radio-nuclides or stable isotopes is prohibited.
- No animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions; all equipment and clothing should be thoroughly cleaned before entering the Area.

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

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

Disturbance of southern giant petrels should be avoided at all times.

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

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

Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material *in situ*. If such material is found the appropriate National Authority must be notified.

7(viii) Disposal of waste

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

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

One census of southern giant petrels should be conducted in each 5 year period. Censuses of other species may be undertaken during this visit provided no additional disturbance is caused to the southern giant petrels.

The length of time spent at Hawker Island to conduct a bird census should be minimised. A survey should be able to be completed in less than a 12 hours.

GPS data shall be obtained for specific sites of long-term monitoring for lodgement with the Antarctic Master Directory through the appropriate National Authority.

7(x) Requirement for reports

Parties should ensure that the principal Permit Holder for each Permit submits to the appropriate National Authority a report on activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form 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 this 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 Plan of Management and in organising the scientific use of the Area.

A copy of the report should be forwarded to the National Party responsible for development of the Management Plan to assist in management of the Area, and monitoring of bird populations. Additionally visit reports should provide detailed information on census data, locations of any new colonies or nests not previously recorded, a brief summary of research findings and copies of photographs taken of the Area.

8. Supporting documentation

Some or all of the data used within this paper was obtained from the Australian Antarctic Data Centre (IDN Node AMD/AU), a part of the Australian Antarctic Division (Commonwealth of Australia).

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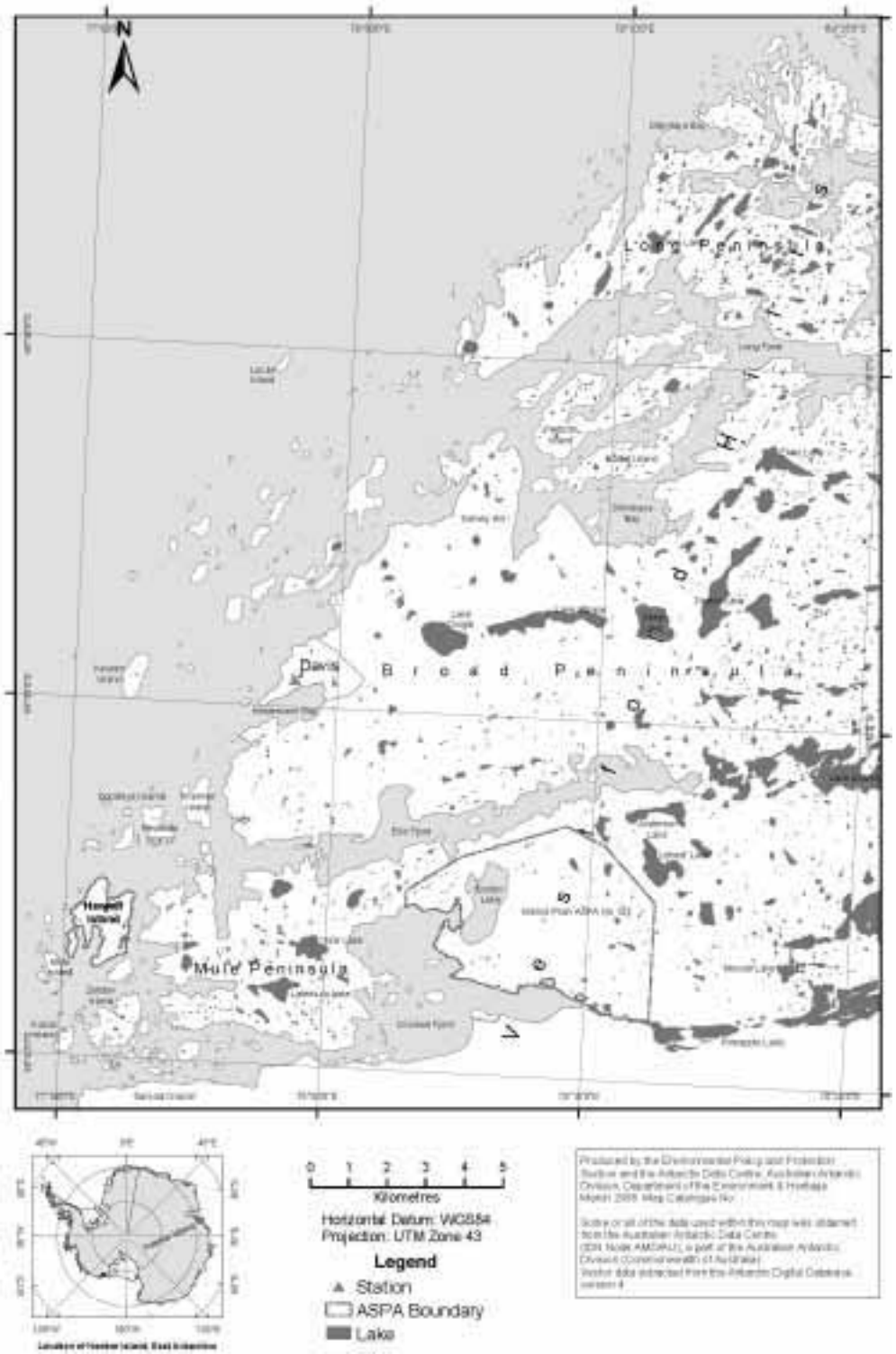
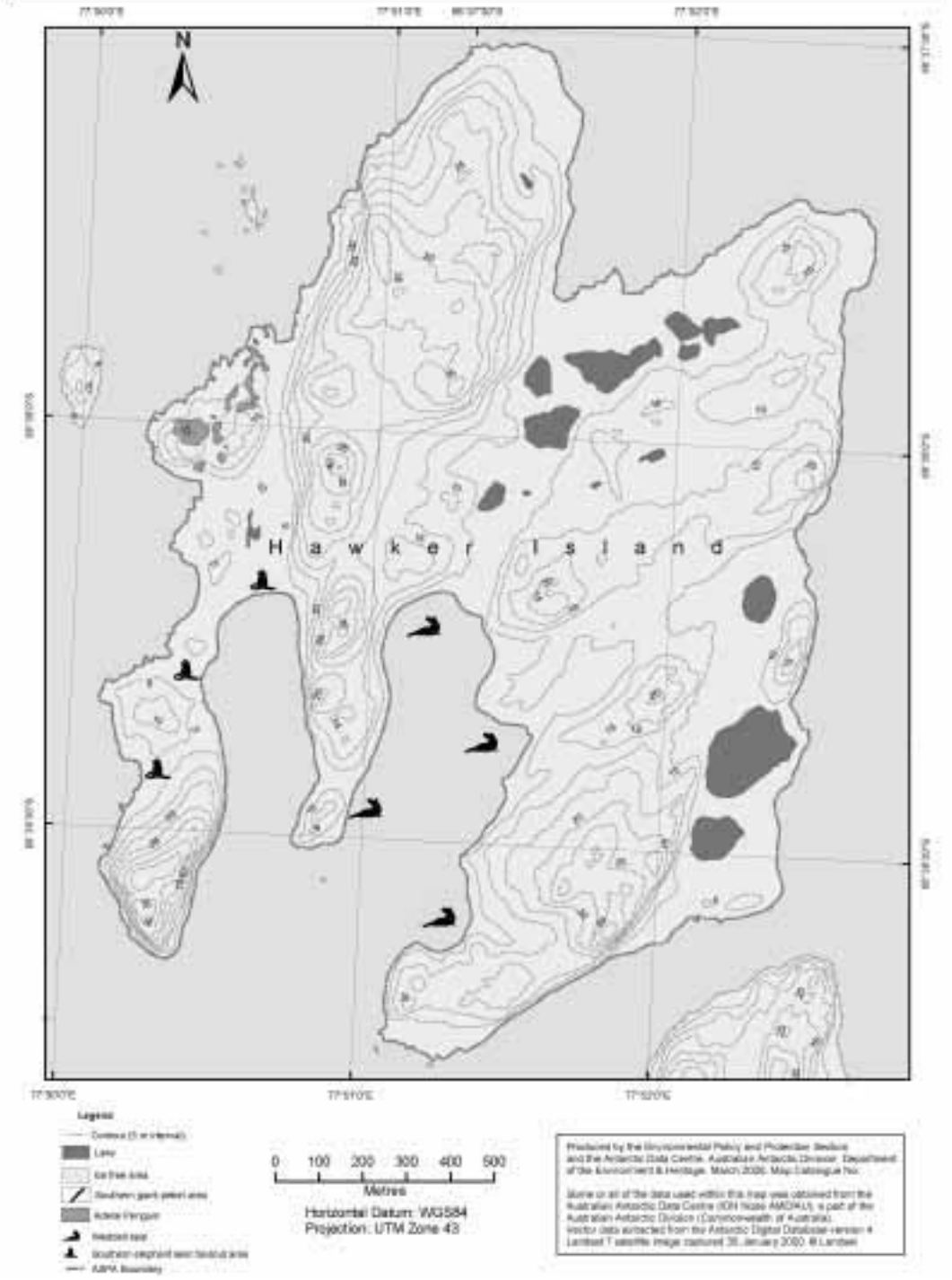
Map A: Hawker Island Antarctic Specially Protected Area No. 167, Vestfold Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica



Map B: Hawker Island Antarctic Specially Protected Area No. 167, Vestfold Hills, Ingrid Christensen Coast, Princess Elizabeth Land, East Antarctica
Biota, Topography and Physical Features



Measure 2 (2006)

Antarctic Specially Managed Area: Designation and Management Plan: Admiralty Bay, King George Island

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 Recommendation X-5 (1979), which designated the western shore of Admiralty Bay as Site of Special Scientific Interest ("SSSI") No. 8, and Decision 1 (2002), which renamed and renumbered the area as Antarctic Specially Protected Area ("ASPA") No. 128;

Recalling Measure 3 (2003), which revised and updated the "List of Historic Sites and Monuments" in which Historic Site and Monument ("HSM") No. 51 is listed;

Recalling the 20th Antarctic Treaty Consultative Meeting, held in Utrecht in 1996, where the Consultative Parties agreed to comply with a Management Plan for Admiralty Bay, King George Island, on a voluntary basis until such time as Annex V to the Protocol on Environmental Protection became effective, when it would become an ASMA after an evaluation of the experience gained and, if necessary, a revision of the Management Plan;

Noting that the Committee for Environmental Protection has advised that Admiralty Bay, King George Island, be designated as an ASMA and has endorsed the Management Plan annexed to this Measure;

Recognising that Admiralty Bay, King George Island, is an area where activities are being conducted, in which it is desirable to plan and co-ordinate activities, avoid possible conflicts, improve co-operation between Parties and avoid possible environmental impacts;

Desiring to designate Admiralty Bay, King George Island, as an ASMA, within which ASPA No. 128 and HSM No. 51 are located, and to approve a Management Plan for the Area, without any modification to the Management Plan for ASPA No. 128, which is annexed to Measure 1 (2000);

Noting that Admiralty Bay, King George Island, contains marine areas and that the Commission for the Conservation of Antarctic Marine Living Resources approved the draft Management Plan for this Area at its 24th meeting;

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

That:

1. Admiralty Bay, King George Island, be designated as Antarctic Specially Managed Area No. 1;

2. the Management Plan for Antarctic Specially Managed Area No. 1: Admiralty Bay, King George Island, contained in the Annex to this Measure, be approved.

Management Plan for Antarctic Specially Managed Area No.1

ADMIRALTY BAY, KING GEORGE ISLAND

Introduction

Admiralty Bay is an area of outstanding environmental, historical, scientific, and aesthetic values. It was first visited by sealers and whalers in the 19th and early 20th centuries, and relics from these periods still remain. The area is characterized by magnificent glaciated mountainous landscape, varied geological features, rich sea-bird and mammal breeding grounds, diverse marine ecosystems, and terrestrial plant habitats. Scientific research in Admiralty Bay in post IGY times has been performed in a more permanent way for some three decades now. The studies on penguins have been undertaken continuously in the area for 28 years, and is the longest ever done in Antarctica. Admiralty Bay also has one of the longest historical series of meteorological data collected for the Antarctic Peninsula, one of the areas of the planet most sensitive to climate change.

Admiralty Bay has become a site of increasingly diverse human activities, which are continuously growing and becoming more complex. Over the last 30 years, more stations were settled and have grown in area, and visitors increased in numbers per year, from a few hundred to over 3,000. Better planning and co-ordination of existing and future activities will help to avoid or to reduce the risk of mutual interference and minimize environmental impacts, thus providing an effective mechanism for the conservation of the valuable features that characterize the area.

Five parties: Poland, Brazil, United States, Peru and Ecuador have active research programmes in the area. Poland and Brazil operate two all-year round stations (Poland: Henryk Arctowski Station at Thomas Point; and Brazil: Comandante Ferraz Antarctic Station at Keller Peninsula). Peru and United States operate two summer stations (Peru: Machu Picchu at Crepin Point; USA: Copacabana at Llano Point). Ecuador has a refuge at Hennequin Point. There are several small removable and permanent installations elsewhere.

The Area includes one ASPA (ASPA No. 128 Western Shore of Admiralty Bay – former SSSI No. 8) and one Historic Monument (No. 51: a grave) at Arctowski Station.

In addition to numerous scientists, supporting personnel and research expeditions, Admiralty Bay is visited by an increasing number of tourists, the latter mainly as organized tourist ship expeditions and private yachts.

A Management Plan for designating Admiralty Bay and its surroundings (herein called the Area) as an Antarctic Specially Managed Area (ASMA), under Annex V of the Protocol to the Antarctic Treaty on Environmental Protection (herein called Protocol), was jointly proposed by Brazil and Poland, in coordination with Ecuador and Peru and voluntarily adopted by the ATCPs at ATCM XX (Utrecht, 1996). This document is a revision of the former Management Plan, as required at ATCM XX.

1. Description of values

Aesthetic values

Admiralty Bay has basic physiographic and aesthetic values as one of the most typical examples of bay/fjord settings in the South Shetland Islands. The ice-free areas within Admiralty Bay are formed by recent and raised pebble-cobble beaches, recent and sub-recent moraines, mountainous peninsulas, rocky islets, spurs and nunataks. The terrain is heavily shaped by glacial, nival and coastal marine processes. These, together with the geological features of the area, add to the great scenic beauty of the landscape.

Environmental values

The area of Admiralty Bay is representative of the terrestrial, limnic, coastal, near-shore, pelagic, and fjord-bottom ecosystem of King George Island.

Flora is mostly represented by mosses, lichen and fungi formations. Twenty four species of birds and six species of pinnipeds have been registered for the Area, but only thirteen species of birds and three species of pinnipeds actually breed within the Area.

The marine ecosystem of the bay largely reflects the general environmental conditions prevailing in the South Shetland Islands. However, there is a unique site, Napier Rock, at the entrance of the bay, where a rich and highly diverse benthic invertebrate fauna is found. Fish are represented by fifteen species of Nototheniidae.

Scientific values

Diverse and continuous scientific activities have been undertaken in the Area for almost 30 years supported by the Polish Henryk Arctowski Station, by the Brazilian Comandante Ferraz Station and by the US Antarctic Program at ASPA No. 128 Western Shore of Admiralty Bay. Research activities at the Peruvian Machu Picchu Station (at Crepin Point) and at the Ecuadorian refuge (at Hennequin Point) have occurred intermittently during the summer.

Many features of Admiralty Bay are of considerable scientific interest. The main themes of field and laboratory research at the Polish and Brazilian stations have been marine and terrestrial biology, including physiology and adaptation of Antarctic fish and krill; taxonomy and ecology of the benthic fauna; vascular plants; mosses and lichens; terrestrial and marine ecology; migration and dispersion of birds. A long-term research project on the biology and dynamics of bird populations (mainly Pygoscelid penguins) has been carried out by the US Antarctic Program since 1976. This study is of relevance for the CCAMLR Ecosystem Monitoring Programme (CEMP). Other studies include geology and palaeontology, glaciology and palaeoclimatology of the King George Island ice cap; and glacio-marine sedimentation in Admiralty Bay. A year-round seismic and Earth-magnetism observatory, established at Arctowski Station in 1978, is the only station of its kind in the South Shetland Islands. Studies on atmospheric chemistry, geomagnetism, the ionosphere and astrophysics have been conducted at Ferraz Station since 1984. A meteorological station has been operational at Arctowski since 1977 and at Ferraz Station since 1984 to provide basic data and to support logistic operations. Research on upper atmosphere winds is being developed at Machu Picchu Station using MST radar.

Both Arctowski and Ferraz stations have hosted many foreign scientists (Argentineans, Belgians, Chileans, Germans, former Soviets and Russians, Netherlands, New Zealanders, Americans, Uruguayans and others). There is a strong tradition of co-operation between Polish and Brazilian scientists in matters related to Admiralty Bay and the South Shetland Islands as a whole.

A comprehensive study of the state of the environment in the Area is under way at Ferraz Station, comprising the analysis of a series of biotic and abiotic parameters. Results will serve as a baseline for future monitoring of activities and for implementation of a strategy for environmental management of the ASMA.

Historic values

Sheltered deep harbours and accessible beaches ensured an early start to activities in Admiralty Bay. The bay offered protection for ships in the area during the sealing and whaling periods in the 19th and early 20th centuries, and ruins of installations related to the latter period still exist. Whale bones cover the beaches and are part of the landscape, remaining as heritage of this period.

The Area was visited by the second French Antarctic Expedition *Pourquoi Pas?*, under Dr J.B. Charcot (1908-10), and by D. Ferguson (1913-14), a geologist who took part in a British whaling expedition. Reports on minerals and rocks collected during these expeditions, published between 1910 and 1921, are among the first earth-science publications on Admiralty Bay and the South Shetland Islands as a whole. The famous British Discovery voyages of 1934 and 1937 collected more rocks, as well as plants and animals from the Area. Results published from 1948 to 1964 constituted a substantial contribution to knowledge of the geology of Admiralty Bay. Argentina established a refuge hut at Keller Peninsula in 1948 (since dismantled) and the work of Argentinean geologists in Admiralty Bay in 1953 concentrated on fossil plants of the Tertiary age.

During the International Geophysical Year (1957-58), the UK Base "G", on Keller Peninsula, Admiralty Bay (opened in 1947 and closed in 1961), later dismantled, was the center of meteorological observations and glaciological and geological research.

Establishment of the Polish Arctowski Station in 1977 at Thomas Point, of the Brazilian Ferraz Station at Keller Peninsula in 1984, and of the Peruvian Machu Picchu Station at Crepin Point in 1989 has provided a sound basis for permanent research in Biological, Earth and Atmospheric sciences, which continues up to now. Ornithological research by US biologists began in 1976, with the establishment of Copacabana Station (unofficially called Pietr J. Lenie) covering the entire western side of Admiralty Bay, from Italian Valley (in Ezcurra Inlet) to Patelnia Point. Since 1985, ornithological research has also been occasionally undertaken at Keller Peninsula, by Brazilian biologists.

Educational and touristic values

Sites of ecological interest and scientific installations in the Area are frequently visited by tourists and participants in non-governmental expeditions, who have thus an opportunity to become familiar with Antarctic environment and activities.

2. Aims and objectives

Taking into account that the Area is already the focus of multiple and continuous activities which tend to become even more intense and diverse in the near future, the present Management Plan is designed to provide mechanisms for:

- Safeguarding the long-term scientific research in the Area while maintaining stewardship of the environment;
- Protecting important physiographic features, and the outstanding biological, ecological, historical and aesthetic values of the Area;

- Improving the understanding of natural processes at work in the Area which in turn will help to protect the environment from unnecessary disturbance;
- Managing potential or actual conflicts of interest between different activities, including science, logistics and tourism;
- Avoiding or minimizing the risk of mutual interference and cumulative impacts on the terrestrial and marine environments; and
- Improving the level of mutual assistance and co-operation among Parties operating in the Area.

3. Management activities

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

- Parties that have active research programmes within the Area should establish an international Admiralty Bay Management Group, which will hold regular meetings (at a convenient time) to:
  - review the functioning and implementation of the Management Plan;
  - facilitate communication between those working in or visiting the Area;
  - monitor the Area to investigate possible sources of environment impact including cumulative impacts;
  - promote the dissemination of information on this Management Plan to all parties operating in the Area, and all other visitors to the Area;
  - maintain a record of activities in the Area;
  - provide the name and address of their co-ordinator.
- Parties that have active research programmes within the Area should consult amongst themselves with a view to:
  - designating a person to coordinate the implementation of the Management Plan in the Area (ASMA Coordinator). Designation will be for a 5 year period on a rotational basis;
  - developing contingency plans for each station, as well as for the whole Area, for oil spills and any other accident with possible significant impact on the environment, including attendance in an emergency;
  - establishing a waste management plan for the Area.
- National Programmes operating within the Area, as well as all other visitors, should undertake activities in accordance with the environmental Code of Conduct contained in this Management Plan.
- Wherever feasible, markers delimiting boundaries of already existing protected areas and other zones of ecological or scientific interest identified in this Management Plan and warnings for visitors about their nature should be provided, and removed when no longer necessary.
- National Programmes that have active research programmes in the Area should make arrangements with other parties that have installations and/or structures now abandoned to consider their value. Conservation plans should be formulated if any of the installations are assessed to be of historical value. If not, plans should be formulated for their removal in

accordance with the provisions of Annex III on Waste Disposal and Waste Management to the Protocol on Environmental Protection.

- National Programmes operating in the Area should ensure that all personnel in their programmes visiting the Area have been briefed on the requirements of the Management Plan and, in particular, on the Environmental Code of Conduct that applies within the Area.
- Tour operators visiting the Area should ensure that their staff, crew and passengers are briefed on, and are aware of the requirements of this Management Plan and supporting documentation.
- Copies of this management plan and supporting documentation, such as maps and appendices, should be kept in appropriate stations and research hut facilities and be made available to all persons in the Area.

4. Period of designation

Designated for an indefinite period.

5. Description of the Area

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

General description

ASMA No. 1: Admiralty Bay, King George Island (62º 01'21"S – 62º14'09"S/58º 15'05"W–58º41'02"W) comprises the terrestrial and marine areas immediately within the glacial drainage basin of this bay (Fig. 2). In addition, it includes ASPA No. 128 Western Shore of Admiralty Bay, part of which is outside the drainage basin area.

The Area is bounded by a line extending from its southern margin at Telefon Point to The Tower, and then toward Jardine Peak intersecting the ice divide of the Warszawa ice-field, thence following this divide to the west of Ezucurra Inlet, north-eastward to enclose Mackellar and Martel inlets, and then southward through Ternyck Needle to Cape Syrezol on the eastern shore of, Admiralty Bay. The waters of Admiralty Bay and a small part of Bransfield Strait north of a straight line between Cape Syrezol and Telefon Point are also included in the ASMA. There are no fixed survey points available at the Area boundaries, but markers indicating the ASMA will be fixed at appropriate arrival points on land.

The revised total area of ASMA No. 1 is 360 km², of which 194 km² are ice covered, including 138 km² of Admiralty Bay Waters and an adjoining 7 km² of the Bransfield Strait (Admiralty Chart N° 6258, 1968, London; Polish Chart Admiralty Bay, King George Island, 1:50,000, Battke, S, Warszawa, 1990; SSSI No. 8: Western Shore of Admiralty Bay, King George Island, 1:12 500, ed. Department of Antarctic Biology, Polish Academy of Sciences, Pudelko R., 2002; Brazilian Chart No. 25121, Baía do Almirantado, 1:40,000, 1984, Rio de Janeiro; Braun *et al.* 2001a and b; Arigony-Neto, 2001).

Approximately 90% of the land area within the proposed ASMA is ice-covered, the ice-free areas represent about 37 km².

Earth Science features

The glacial drainage basin is formed mainly by the main ice cap of King George Island which flows from north, east and west towards the trough of Admiralty Bay. At the head of the bay, the ice cap

spills into three inlets: Ezcurra, Mackellar and Martel inlets. Heavily crevassed outlet glaciers descend towards the sea becoming tidewater glaciers. Along the west coast, in the area of ASPA No. 128, some glaciers descending from Warszawa Peninsula (ice cap) terminate on land; others form tidewater ice cliffs. The eastern coast of the bay, from Cape Syrezol to Hennequin Point, is bordered mainly by ice-cliffs of tidewater glaciers descending from Krakow Ice Field, and by rocky spurs and narrow beaches. In the whole area of Admiralty Bay intensive deglaciation is well documented.

Geomorphology of the area is dominated by glacial erosional and depositional landforms, pebble to cobble covered beaches and raised marine terraces. Igneous and sedimentary rocks outcropping around Admiralty Bay record a complex Cenozoic evolution of a volcanic island arc intercalated with terrestrial and glacial deposits.

Climate

The climate of the Area is typical of maritime Antarctica. Based on data of more than 20 years obtained at the Polish Arctowski Station and at the Brazilian Comandante Ferraz Station, the local microclimate is characterized by an average annual temperature of around -l.8ºC and an average annual wind speed in the order of 6.5 m s^{-1}. Annual average precipitation is 508.5 mm, humidity is 82% and pressure is 991 hPa. The waters of Admiralty Bay have an average annual temperature range of -1.8° to +4°C, being well mixed by tides and strongly influenced by currents from the west of Bransfield Strait.

Flora

In the adjoining ice-free areas of Admiralty Bay, the distribution of plant communities is closely related to geoforms and to the presence of birds and soil. Wherever edaphic conditions are favorable, mosses form strands which also contain lichen and fungi formations. The lichenized mycobiota is restricted to the rock fragments and rock outcrops, sometimes associated with bird colonies. The coastal areas are the most densely covered, being represented mostly by moss carpet formations. Near the Brazilian Station two of these areas occur, both of which are almost 300 m long. As elevations start up, showing rocky outcrops, crustose lichens and mosses which grow directly on rock predominate. The species are listed at Appendix A.

Birds

Within the Area, 13 species of birds breed. Three sympatrica1ly breeding Pygoscelid penguins make up 91% of the number and up to 95% of the biomass of the breeding community. Other seabirds breeding in the Area are: southern giant petrel*;* blue-eyed shag*;* brown skua; south polar skua; Wilson's storm petrel*;* black-bellied storm petrel, cape petrel, kelp gull*,* Antarctic tern and American sheathbill. The areas of ASPA No. 128 Western Shore of Admiralty Bay, Cape Vauréal, Chabrier Island and surroundings, are the most important bird breeding locations in Admiralty Bay. Around Vaureal Cape, nests of all species mentioned above are found, including all of the Area's blue-eyed shags and 50% of its giant petrels. The species are listed at Appendix B.

Mammals

Six species of pinnipeds occur in the Area (Appendix B). The most frequent mammal during winter is the crabeater seal. During summer, elephant seals and fur seals are the most frequent and abundant. Fur seals, once relatively rare, have increased in number in recent years. Elephant seals and Weddell seals breed in the area. Leopard seals are found throughout the year in varying numbers. Ross seals rarely occur in the Area. The humpback whale is the most frequent cetacean during summer.

Marine ecosystem

Macroalgae, predominantly Phaeophyta and Rhodophyta, characterize the shallow water bottom community down to 50-60 m depth. With the exception of *Nacella concinna*, epifauna is practically absent in the intertidal zone. The vagile benthos is abundant with a high variety and density of Amphipoda. Below 4-5 m, substrata are typically sandy and dominated by Isopoda, particularly the genus *Serolis*. With the increasing depth, vagile species such as *Sterechinus, Neobuccinum* and *Parborlasia* dominate. In deeper waters, on a muddy and more stable substrata, sessile forms include sponges, anemones, the bivalve *Laternula elliptica* and tunicates, besides high-density concentrations of echinoderms such as *Amphioplus acutus, Ophionotus victoriae* and *Odontaster validus.* Scavenger invertebrates include *Labidiaster annulatus, Gliptonotus antarcticus, Parborlasia corrugatus* and *Neobuccinum eatoni*. The species found in the area are largely the same as those observed on similar substrata at other sites in the region, indicating homogeneity in the benthic fauna of the Antarctic Peninsula and related areas. Fish are represented by fifteen Nototheniidae, mainly *Notothenia neglecta, N. gibberifrons, N. coriiceps, Nototheniops nudifrons, Trematodus newnesi, T. borchgrewincki* and *Pleuragramma antarcticum*, two Channichthydae species, Hapagiferidae and Zoarcidae.

5(ii) Access to the Area

In order to minimize the risks of accidents, environmental damage or harmful interference with research activities, pedestrians, ships, small boats, aircrafts and land vehicles entering and/or operating in the Area should follow the Environmental Code of Conduct that applies within the Area. (See Section 8).

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

Main permanent structures in the Area (Fig. 2)

Henryk Arctowski Station (Poland) - 62º09'34"S – 058º28'15"W

The station was established by Poland at Thomas Point on 26th February 1977 as a facility for continuous scientific research and associated logistic operations of the Polish Antarctic Programme, and has been in year-round operation since then. It has dormitories with 10 berths in summer and up to 14 in winter; biological, meteorological and geophysical laboratories; storage facilities; a small hospital unit; double-walled fuel tanks with total capacity of 1,000 tonnes; hangars for boats and land vehicles etc. The station is equipped with two helicopter pads.

Comandante Ferraz Station (Brazil) – 62º05'07"S - 58º23'32"W

The station was established in 1984 on the eastern coast of Keller Peninsula as the base for scientific research and associated logistic operations conducted by the Brazilian Antarctic Programme. It started year-round operations in 1986. The station consists of 64 containers including biological, chemical, meteorological and geophysical laboratories; dormitories with a capacity of 46 berths; storage facilities; a garage for land vehicles, diesel generators etc. Fuel is stored in 17 large double-walled steel tanks with a total capacity of 316,000 liters of diesel, and in a small tank (3,000 L) for gas. The station is equipped with one helicopter pad.

Machu Picchu Station (Peru) - 62º05'07"S - 58º23'32"W

The station was established in 1988 at Crépin Point, Mackellar Inlet. At present, it is used for summer operations. The station consists of five metallic modules including: Scientific Laboratory, Power House/Garage/Waste Management, Living quarters, Emergency refuge and Dining-room/ Kitchen. The station is equipped with one portable helicopter pad.

Copacabana Field Station (United States of America) - 62º10'45" S - 58º26'49" W
Llano Point has been in use annually during the summer since 1978 for ornithological research, in close cooperation with Arctowski station.

Refuge at Hennequin Point (Equador) - 62º 07' 16" S - 58º 23' 42"W
The refuge was built in 1989, and has occasionally been used since then during summer.

Minor and/or semi-permanent structures

There are a number of minor structures in the area, such as (Fig. 3):

a) the remains of Italian hut Campo Bove at Italian Valley, Ezcurra Inlet;
b) an old whaling boat, on Keller Peninsula;
c) an assembled whale skeleton on Keller Peninsula;
d) wooden barrels from whaling period at Barrel Point, Ezcurra Inlet;
e) a collection of whaling harpoons assembled on the shores of Admiralty Bay, exhibited at Arctowski Station;
f) a group of five crosses and graves on Keller Peninsula. Four of these are British graves, with crosses erected in memory of members of British expeditions who perished at sea and on ice, and one was erected in honour of a deceased member of the Brazilian military;
g) a wooden cross on top of Mount Flagstaff on Keller Peninsula;
h) two Brazilian emergency refuges on Keller Peninsula;
i) removable Polish caravans functioning as summer field laboratories (e.g. at Demay Point).

5 (iv) Location of protected areas within the ASMA (Fig. 2)

The following areas are currently designated within the proposed ASMA:

ASPA No. 128 (Western shore of Admiralty Bay)

62º09'46"S - 62º14'10"S – 58º25'15"W - 58º29'58"W

This area is the site of long-term studies on bird biology performed by the US Antarctic Program.

Historic Site No. 51, at Arctowski Station – 62° 10'S, 58° 28'W

This consists of the grave with a cross of Eng. W. Puchalski, an internationally acclaimed Polish nature photographer and director of Arctic and Antarctic nature films.

6. Special Zones within the Area

In addition to ASPA No. 128 and Historic Site No. 51, and to sites specified in section 5(iii), the following zones were identified within the ASMA as being zones in which activities should be managed.

6(i) Zones visited by tourists and other visitors

- Arctowski and Ferraz Stations: movement of tourists and other visitors should follow the pre-established tour routes (Fig. 5). In the future, routes for tourists may be established at Machu Picchu Station and Ecuador field camp;

- Isolated laboratory modules, refuges and the area behind Ferraz Station: visits should be only by small accompanied groups.

6(ii) Zones of scientific and/or ecological interest where access by tourists and other visitors should be managed (Fig. 4)

a) Fresh water lakes around Arctowski Station: example of freshwater environment;
b) Italian Valley: concentration of seals;
c) Dufayel Island: concentration of seals;
d) Crépin Point: concentration of seals;
e) Area north-west of Ferraz Station: concentration of seals;
f) Area west of Ferraz Station: concentration of seals;
g) Coastal area from Refuge No. 1 (Ferraz Station) to Plaza Point: concentration of seals and penguins;
h) Crosses Hill on northern flank of Ferraz, on Keller Peninsula: Concentrations of terns. Except in connection with scientific activities, survival cache replacement, or emergencies, and essential station operations, visits should be limited during the critical bird breeding season from 1 October to 31 December.
i) Coastal area up to 7 m in shore, north of Base "G" hill: presence of vegetation banks;
j) Freshwater ponds near Arctowski and Ferraz stations: example of freshwater environment;
k) Ullman Point (Ullman Spur): concentration of seals;
l) Hennequin Point: concentration of seals; plant fossil localities;
m) Cape Vaureal - Chabrier Rock: breeding area for penguins, southern giant petrels and blue-eyed shags. Visits should be avoided during the breeding season, from 1 October to 1 March, except in connection with scientific activities;
n) Shallow marine waters down to 100 m in front of: ASPA No. 128, Martel, Mackellar and Ezcurra Inlets; Napier Rock and Monsinet Cove: diverse benthic communities and scientific experiments and concentrations of different species of adult and juvenile fish.

Although not officially designated as protected areas under Annex V of the Protocol, the zones listed above have considerable scientific/ecological interest as breeding sites and/or concentrations of birds and/or mammals, as feeding sites for birds and marine mammals, as sites of typical vegetation cover, varied marine habitats, or sites of special scientific interest. Some of these zones, such as Chabrier Rock and Vaureal Cape, on the eastern shore of Admiralty Bay (Fig. 2) are of great relevance, as it is the only breeding site for the Antarctic blue-eyed shag, penguins and southern giant petrel outside ASPA 128 Western Shore of Admiralty Bay.

Activities in all zones should be carried out with particular care to avoid or minimize disturbance of wildlife, trampling of vegetation and interference with on-going research. Freshwater lakes around Arctowski and Ferraz should be only accessed for the purpose of water supply and associated station operations and for relevant scientific research.

The marine benthic and pelagic organisms are of considerable scientific interest and are fundamental links in the marine food chain of the area. They are critically linked to maintenance of the ecological balance including that of birds and marine mammals.

7. Maps

- Figure 1: Location of ASMA No. 1 in King George Island, Antarctic Peninsula
- Figure 2: Admiralty Bay Antarctic Specially Managed Area – ASMA No. 1
- Figure 3: Location of structures and anchoring sites
- Figure 4: Location of Zones of Scientific and/or Ecological Interest
- Figure 5A: Vehicles and pedestrian limits and tour routes – Comandante Ferraz Station
- Figure 5B: Facilities Zones – Comandante Ferraz Station
- Figure 5C: Vehicles and pedestrian limits and tour routes – Henryk Arktowski Station
- Figure 5D: Facilities Zones – Machu Picchu Station
- Figure 6: Flora (colonized areas) and Birds (occurrence sites)

8. General Code of Conduct

With regard to the provisions of Articles 4-6 of Annex V to the Protocol on Environmental Protection on Area Protection and Management, the following Code of Conduct is proposed as a framework to guide on-going and future research and logistic operations of the parties which have permanent and/or summer installations in the Area; and similar activities of other parties.

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

Ships

- Anchoring inside Mackellar Inlet should be undertaken with caution because of the large number of rocks in its central part. It is recommended that only one ship at any time should anchor in the inlet.
- Anchoring inside Martel Inlet should be limited to three ships as follows: two immediately offshore from Ferraz Station and the third at the eastern end of the inlet;
- Anchoring inside Ezcurra Inlet should be limited to two ships, one immediately east of Dufayel Island and the other south of Dufayel Island, opposite Italian Valley;
- Caution should be exercised when anchoring near Arctowski Station owing to strong currents and winds from different directions.

Small boats

- Landing on the shore in front of Arctowski Station (Arctowski Cove and Halfmoon Cove), Ferraz Station (Visca Anchorage) and other installations should be made at the recommended landing sites shown in Figure 3;
- In addition to the provisions applicable to ASPA No. 128 Western Shore of Admiralty Bay, and except in case of emergencies and activities related to research, monitoring or replacement of survival food and fuel storage, small boats should avoid landing on areas of scientific and/or ecological interest identified in Figure 4.

Aircraft

- Except in emergencies, or in the course of carrying out inspections under Article VII of the Antarctic Treaty, helicopters ferrying scientists and visitors to and from Arctowski, Ferraz and Machu Picchu stations and Ecuador field camp should notify the relevant station/camp

leader well in advance of the estimated time of arrival. They should land only on helicopter pads/landing sites indicated at each of the stations (Figure 2). There are no refueling facilities at the stations;

- In addition to the provisions applicable to ASPA No. 128: Western Shore of Admiralty Bay, and except in case of emergency or research activities, no helicopter should land in or nearby, or fly at altitudes of less than 600 m over the areas of biological/ecological interest shown in Figure 4;
- There are no landing sites for fixed-wing aircraft in the Area.

Land vehicles

- Areas used by land vehicles for station and station-supported research operations should, in general, be restricted from Arctowski up to Thomas Point, and between Ferraz Station and the isolated modular laboratories around Ferraz and refuges on Keller Peninsula. Areas within which most vehicle operation are constrained and routes between Ferraz Station and the modular laboratories and refuges are shown in Figure 5A;
- No land vehicles should enter ASPA No. 128 Western Shore of Admiralty Bay;
- Use of station vehicles to visit Plaza Point laboratories and refuges on the Keller Peninsula should be conditional on previous arrangement with the station leader at Ferraz Station;
- Snow-mobiles and snow-cats should be used only on ground covered by snow or ice.

Pedestrians

- Areas of pedestrian activity are generally associated with stations and station-supported research operations. All movement should be undertaken carefully to minimize disturbance to animals, soil and vegetated areas, and not damage or dislodge flora. Whenever possible, routes shown in Figures 5A and B should be used;
- No person should enter ASPA No. 128 Western Shore of Admiralty Bay, except to conduct scientific research in accordance with a permit issued under Art. 3 of Annex II to the Protocol and with the approved management plan for the area.

8(ii) Activities which may be conducted in the Area, which will not jeopardize the values of the area, and which are consistent with the Code of Conduct

- Scientific research;
- Logistical support of scientific research;
- Visitation for the purpose of education or recreation, including tourism;
- Management activities, including maintenance or removal of facilities; and monitoring the implementation of this Management Plan;
- Media, arts, or other official national program visitors.

Further restrictions apply to activities within ASPA No. 128 Western Shore of Admiralty Bay.

8(iii) Installation, modification or removal of structures

Installation of new stations/refuges and modifications, or removal of already existing installations or other facilities in the Area, and location of field camps should be done only after consultation with the Parties that have active research programmes in the Area, and in conformity with provisions of Article 8 and Annex 1 of the Environment Protocol and this Management Plan; in a manner that does not compromise the values of the Area.

Scientific equipment installed in the Area should be clearly identified by country, name of principal investigator, contact details, and date of installation. All equipment and associated materials should be removed when no longer in use.

Field camps should be located as far as possible on non-vegetated sites, such as on barren ash plains, slopes or beaches, or on thick snow or ice cover when practicable, and should also avoid concentrations of mammals or breeding birds. Previously occupied campsites should be re-used where appropriate.

8(iv) Taking or harmful interference with native flora and fauna

Taking or harmful interference with native flora or fauna is prohibited, except by Permit issued under the provisions of Article 3 of Annex V to the Protocol. Where taking or harmful interference with animals for scientific purposes is involved, the *SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica* should be used as a minimum standard.

Taking of marine organisms for scientific purposes should be limited to that restrictedly necessary to meet the purpose of the research. Geological sampling of bottom sediments, particularly in shallow waters, should be carried out with extreme care so as to minimize adverse impact on the environment, or interference with other scientific research under way on benthic ecology.

8(v) The collection or removal of materials not imported into the Area

Materials should only be collected and removed from the Area for scientific, management or educational purposes, and should be limited to the minimum necessary for those needs.

Souvenirs, specifically rocks, minerals, fossils, eggs, flora and fauna, or any other material not brought into the area by the visitor, should not be collected in, or removed from the Area.

It may be permissible to remove from the site materials such as beach litter, dead or pathological fauna or flora or abandoned relics and artifacts from previous activities.

8(vi) Disposal of waste

Disposal of waste generated by scientific research programmes, tourism and all other governmental or non-governmental activities in the ASMA should be carried out in compliance with the provisions of Annex III to the Protocol.

All wastes, other than human and domestic liquid waste, should be removed from the Area.

8(vii) Requirements for Reports

The ASMA coordinator should maintain a record and provide summary descriptions of the reports of activities in the Area in the Annual Exchange of Information under the Antarctic Treaty for the preceding year.

8(viii) Exchange of information

Parties proposing to conduct, support, or authorize research or other activities in the Admiralty Bay ASMA are requested to inform the ASMA Coordinator as far in advance as possible of their planned activities. The Coordinator should make the information available to the other Parties. This will enable greater integration to be achieved between research programmes, enhance cooperation and avoid cumulative impacts, facilitating monitoring and management of the Area. Where applicable, provisions related to environmental impact assessment as established in the Protocol on Environmental Protection to the Antarctic Treaty should be followed.

At the end of each summer field season, Parties should notify the Coordinator of:

- any activities carried out by its nationals or other parties including tourists and participants in non-governmental expeditions in the ASMA, contrary to the provisions of this Management Plan; and
- steps taken to enforce the provisions of this Management Plan.

IAATO should, as far as practicable, provide the ASMA Coordinator with details of scheduled visits by IAATO-registered vessels. Tour operators not affiliated to IAATO should also inform the coordinator of planned visits.

9. Supporting documentation

A proposal prepared by Brazil and Poland, in coordination with Ecuador and Peru, that Admiralty Bay, King George Island (South Shetland Islands) be designated as an Antarctic Specially Managed Area (ASMA) 1996. Agenda item 20a XX ATCM WP 15 (Rev). Now reviewed.Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas, appended to Resolution 2 (1998) of Antarctic Treaty Consultative Meeting XXII.

Final Report of the Twelfth Antarctic Treaty Special Consultative Meeting**.** The Hague, 11-15 September 2000. Management Plan for Site of Special Scientific Interest No.8 (ASPA 121), Western shore of Admiralty Bay, King George Island, South Shetland islands, pp. 68-73.

Final Report of the Twelfth Antarctic Treaty Special Consultative Meeting**.** The Hague, 11-15 September 2000. Management Plan for Site of Special Scientific Interest No. 34. (ASPA 151) Lions Rump, King George Island, South Shetland Islands, pp. 95-102.

APPENDIX A

Preliminary plant checklist from adjacent ice-free areas to Admiralty Bay, King George Island

ANGIOSPERMAE

POACEAE
Deschampsia antarctica Desv.

CARYOPHYLLACEAE
Colobanthus quitensis (Kunth) Bartl.

MOSSES

AMBLYSTEGIACEAE
Orthotheciella varia (Hedw.) Ochyra
Sanionia uncinata (Hedw.) Loeske
S. georgico-uncinata (Mull Hal..) Ochyra & Hedenas
Warnstorfia laculosa (Müll. Hal.) Ochyra & Matteri
Warnstorfia sarmentosa (Wahlenb.) Hedenäs

ANDREAEACEAE
Andreaea depressinervis Card.
Andreaea gainii Card.
Andreaea regularis Muell.

BARTRAMIACEAE
Bartramia patens Brid.
Conostomum magellanicum Sull.

BRACHYTHECIACEAE
Brachythecium austrosalebrosum (Müll. Hal.) Kindb.
Brachythecium glaciale B.S.G.

BRYACEAE
Bryum amblyodon Müll. Hal.
Bryum argenteum Hedw.
Bryum orbiculatifolium Card. et Broth.
Bryum pallescens Schleich. ex Schwaegr.
Bryum pseudotriquetrum (Hedw.) Schwaegr.
Pohlia cruda (Hedw.) Lindb.
Pohlia drummondii (Müll. Hal.) A. L. Andrews in Grout
Pohlia nutans (Hedw.) Lindb.
Pohlia wahlenbergii (Web. Et Mohr.) Andrews

DICRANACEAE
Anisothecium cardotii (R. Br. ter.) Ochyra
Chorisodontium aciphyllum (Hook. f. et. Wills.) Broth.
Kiaeria pumila (Mitt. in Hook. f.) Ochyra – very rare.

DITRICHACEAE
Ceratodon purpureus (Hedw.) Brid.
Distichum capillaceum (Hedw.) B.S.G.
Ditrichum hyalinum (Mitt.) Kuntze
Ditrichum lewis-smithii Ochyra

ENCALYPTACEAE
Encalypta rhaptocarpa Schwaegr.

GRIMMIACEAE
Grimmia reflexidens Müll. Hal.
Racomitrium sudeticum (Funck) Bruch & Schimp. in BSG.
Schistidium amblyophyllum (Müll. Hal.) Ochyra & Hertel
Schistidium antactici (Card.) L. I. Savicz & Smirnova
Schistidium cupulare (Müll. Hal.) Ochyra
Schistidium falcatum (Hook. f. at Wils.) B. Bremer
Schistidium halinae Ochyra
Schistidium occultum (Müll. Hal.) Ochyra & Matteri
Schistidium rivulare (Brid.) Pobp.
Schistidium steerei Ochyra
Schistidium urnulaceum (Müll. Hal.) B. G. Bell.

HYPNACEAE
Hypnum revolutum (Mitt.) Lindb.
Platydictya jungermannioides (Brid.) Crum

MEESIACEAE
Meesia uliginosa Hedw.

ORTHOTRICHACEAE
Muelleriella crassifolia (Hook. f. et Wils.) Dus.

POLYTRICHACEAE
Polytrichastrum alpinum (Hedw.) G. L. Smith
Polytrichum strictum Brid.
Polytrichum juniperinum Hedw.
Polytrichum piliferum Hedw.

POTTIACEAE
Dydimodon gelidus Card.
Hennediella antarctica (Angstr.) Ochyra & Matteri
Hennediella heimii (Hedw.) Zand.
Stegonia latifolia (Schwaegr. in Schult.) Vent in Broth.
Syntrichia filaris (Müll. Hal.) Zand.
Syntrichia princeps (De Not.) Mitt.
Syntrichia saxicola (Card.) Zand.

SELIGERACEAE
Dicranoweisia brevipes (Müll. Hal.) Card..
Dicranoweisia crispula (Hredw.) Milde
Dicranoweisia grimmiaceae (Müll. Hal.) Broth.

ALGAE

MACROSCOPIC CONTINENTAL ALGAE
Prasiola crispa (Lightfoot) Menegh

MICROSCOPIC CONTINENTAL ALGAE
Bacillariophyceae
Coscinodiscales
Orthoseira cf. *dendroteres* (Ehrenberg) Crawford

Naviculales

Amphora veneta Kützing
Achnanthes lanceolata (Brébisson) Grunow
Achnanthes marginulata Grunow
Caloneis cf. *silicula* (Ehrenberg) Cleve
Caloneis cf. *schumanniana* (Grunov) Cleve
Cocconeis sp., *Fragilaria bidens* Heiberg
Fragilaria capucina Desmazieres
Fragilaria construens f. *binodis* (Ehrenberg) Hustedt
Fragilaria pinnata Ehrenberg
Gomphonema parvulum (Kützing) Kützing
Hantzschia amphioxys (Ehrenberg) Grunow
Luticola muticopsis (Van Heurck) D. G. Mann
Luticola mutica var. *ventricosa (*Kützing) Cleve et Grunow
Navicula cf. *bryophila* Petersen
Navicula elginensis (Gregory) Ralfs
Navicula glaciei Van Heurck,
Navicula phyllepta Kützing
Nitzschia agnita Hustedt
Nitzschia cf. *fontifuga* Cholnoky
Nitzschia frustulum (Kützing) Grunow
Nitzschia gracilis Hantzsch
Nitzschia homburgiensis Lange-Bertalot
Nitzschia cf. *hybrida* Grunow
Nitzschia inconspicua Grunow
Nitzschia perminuta (Grunow) M. Pergallo
Opephora olsenii Moeller
Pinnularia borealis Ehrenberg
Pinnularia ignobilis (Krasske) Cleve-Euler
Pinnularia microstauron (Ehrenberg) Cleve
Stauroneis cf. *anceps* Ehrenberg
Stauroneis cf. *simulans* (Donkin) R. Ross.

MACOSCOPIC FUNGI

Omphalina antarctica Sing.
Galerina moelleri Bas.

LICHENS AND LICHENICOLOUS FUNGI

Acarospora macrocyclos Vain.
Alectoria minuscula – Lindsay
Arthopyrenia maritima Øvstedal
Arthrorhaphis citrinella (Ach.) Poelt
Austrolecia antarctica Hertel
Bacidia stipata Lamb
Biatorella antarctica Murray
Bryonora castanea (Hepp) Poelt
Bryoria chalybeiformis (L.) Brodo et D. Hawksw.
Buellia anisomera Vain.
Buellia augusta Vain.
Buellia cladocarpiza Lamb
Buellia coniops (Wahlenb. in Ach.) Th. Fr.
Buellia granulosa (Darb.) Dodge
Buellia latemarginata Darb.
Buellia papillata (Sommerf.) Tuck.
Buellia perlata (Hue) Darb.
Buellia pycnogonoides Darb.
Buellia russa (Hue) Darb.
Buellia subpedicillata (Hue) Darb.
Caloplaca amniospila
Caloplaca athallina Darb.
Caloplaca buelliae Olech & Søchting
Caloplaca cirrochrooides (Vain.) Zahlbr.
Caloplaca citrina (Hoffm.) Th. Fr.
Caloplaca iomma Olech & Søchting
Caloplaca millegrana
Caloplaca psoromatis Olech & Søchting
Caloplaca regalis (Vain.) Zahlbr.
Caloplaca siphonospora Olech & Søchting
Caloplaca sublobulata (Vain.) Zahlbr.
Caloplaca tetraspora (Nyl.) H. Oliv.
Caloplaca tiroliensis Zahlbr.
Candelaria murrayi (Dodge) Poelt
Candelariella hallettensis (Murray) Øvstedal
Candelariella vitellina (Hoffm.) Müll. Arg.
Carbonea vorticosa (Flörke) Hertel
Catapyrenium daedaleum (Kremp.) Stein
Catapyrenium lachneum (Ach.) R. Sant.
Catillaria corymbosa (Hue) Lamb
Cladonia cariosa (Ach.) Spreng.
Cladonia furcata (Huds.) Schrader
Cladonia phyllophora Ehrh. ex Hoffm.
Cladonia pyxidata (L.) Hoffm.
Coelocaulon aculeatum (Schreber) Link

Coelocaulon epiphorellum (Nyl. in Crombie) Kärnef.
Cystocoleus ebeneus (Dillwyn) Thwaites
Dermatocarpon intestiniforme (Körb.) Hasse
Haematomma erythroma (Nyl.) Zahlbr.
Himantormia lugubris (Hue) Lamb
Hypogymnia lugubris (Pers.) Krog
Hypogymnia lububris (Pers.) Krog f. *compactior* (Zahlbr.) D. C. Linds.
Japewia tornoensis (Nyl.) Tønsberg
Lecania brialmontii (Vain.) Zahlbr.
Lecania gerlachei (Vain.) Zahlbr.
Lecanora dispersa (Pers.) Sommerf.
Lecanora expectans Darb.
Lecanora physciella (Darb.) Hertel
Lecanora polytropa (Hoffm.) Rabenh.
Lecidea assimilata Nyl.
Lecidea atrobrunnea (Ramond ex Lam. et DC.) Schaer.
Lecidea lapicida (Ach.) Ach.
Lecidea sarcogynoides Körb.
Lecidea sciatrapha Hue
Lecidella aff. *carpathica* Körb. –
Lecidella stigmatea (Ach.) Hertel and Leuckert
Lecidella wulfenii (Hepp) Körb.
Leptogium puberulum Hue
Massalongia carnosa (Dicks.) Körb.
Mastodia tesselata Auct.
Megaspora verrucosa (Ach.) Hafellner
Microglaena antarctica Lamb
Ochrolechia frigida (Sw.) Lynge
Ochrolechia parella (L.) A. Massal.
Pannaria hookeri (Borrer ex Sm.) Nyl.
Parmelia saxatilis (L.) Ach.
Physcia caesia (Hoffm.) Fürnr.
Physcia dubia (Hoffm.) Lettau
Physcia cf. *wainioi* Räs.
Physconia muscigena (Ach.) Poelt
Placopsis contortuplicata Lamb
Poeltidea perusta (Nyl.) Hertel et Hafellner
Polyblastia gothica Th. Fr.
Porpidia albocaerulescens (Wulfen) Hertel et Knoph
Porpidia crustulata (Ach.) Hertel et knoph
Pseudephebe minuscula (Nyl. ex Arnold) Brodo et D. Hawksw.
Pseudephebe pubescens (L.) Choisy
Pseudevernia pubescensPsoroma hypnorum (Vahl) Gray
Ramalina terebrata Hook et Tayl.
Rhizocarpon geminatum Körb.
Rhizocarpon geographicum (L.) DC.
Rhizocarpon polycarpon (Hepp) Th. Fr.
Rhizoplaca aspidophora (Vain.) Redón
Rhizoplaca melanophthalma (DC. in Lam. et DC.) Leuck. et Poelt

Rinodina deceptionis Lamb
Rinodina mniaraea (Ach.) Körb.
Rinodina petermanii (Hue) Darb.
Rinodina turfacea (Wahlenb.) Körb.
Sphaeorophorus fragilis (L.) Pers.
Sphaeorophorus globosus (Hudson) Vain.
Sphaeorophorus cfr. *melanocarpus* (Sw.) DC.
Staurothele gelida (Hook & Tayl.) Lamb
Stereocaulon alpinum Laurer ex Funck
Stereocaulon glabrum (Müll. Arg.) Vain.
Tephromela atra (Hudson) Hafellner
Thelocarpon cyaneum Olech et Alstrup
Tremolecia atrata (Ach.) Hertel
Umbilicaria aprina Nyl.
Umbilicaria cfr. *cristata* Dodge et Baker
Umbilicaria decussata (Vill.) Zahlbr. –
Umbilicaria propagulifera (Vain.) Llano
Umbilicaria rufidula (Hue) Filson
Usnea acromelana Stirton
Usnea antarctica Du Rietz
Usnea aurantiaco-atra (Jacq.) Bory
Verrucaria ceuthocarpa Wahlenb.
Verrucaria cylindrophora Vain.
Verrucaria dispartita Vain.
Verrucaria elaeoplaca Vain.
Verrucaria psycrophila Lamb
Verrucaria tesselatula Nyl.
Xanthoria candelaria (L.) Th. Fr. –
Xanthoria elegans (Link.) Th. Fr.

APPENDIX B

Fauna recorded at Admiralty Bay, King George Island

Birds recorded at Admiralty Bay

Breeding species

Pygoscelis adeliae
Pygoscelis papua
Pygoscelis antarctica
Macronectes giganteus
Daption capense
Oceanites oceanicus
Fregetta tropica
Phalacrocorax bransfieldensis
Chionis alba
Catharacta maccormicki
Catharacta lonnbergi
Larus dominicanus
Sterna vittata

Non-breeding

Frequent:

Eudyptes chrysolophus
Fulmarus glacialoides
Pagodroma nivea
Sterna paradisaea

Sporadic:

Aptenodytes patagonicus
Aptenodytes forsteri
Edyptes chrysocome
*Spheniscus magellanicus**
Talassarche melanophris
*Phoebetria fusca**
*Phoebetria palpebrata**
Thalassoica Antarctica
Halobaena caerulea
*Pachyptila desolata**
Bubulcus ibis
Cygnus melanocoryphus
*Anas sibilatrix**
Anas georgica
Calidris fuscicollis
Steganopus tricolor*
Catharacta chilensis*

Pinnipeds recorded at Admiralty Bay

Mirounga leonina
Lobodon carcinophagus,
Leptonychotes weddelli,
Hydrurga leptonyx,
Arctocephalus gazella,
Ommatophoca rossi *

* Only one visit.

APPENDIX C

Code of Conduct for Visitors

1. Introduction

This code of conduct has been produced for commercial tour operators (IAATO and non-IAATO affiliated), private expeditions and National Antarctic Programme scientists and staff when undertaking recreational visits to Admiralty Bay.

2. General Guidelines

- Leaders of tourist and non-governmental expeditions wishing to visit Arctowski, Ferraz or Machu Picchu stations should contact the Department of Antarctic Biology, Polish Academy of Sciences (02-141 Warsaw, Poland, Ustrzycka), the Comissão Interministerial para os Recursos do Mar (Ministério da Marinha, Esplanada dos Ministérios, 70055-900, Brasília, DF, Brazil), or the Instituto Antártico Peruano – INANPE (Jr. Ucayali 259, Lima – Perú) respectively, well in advance of the planned visit to make the necessary arrangements. This does not preclude visits in emergency situations.
- The State Party responsible for tour operators should ensure that tour operators, their staff, tourists and other visitors are fully informed of, and comply with, the provisions of this Management Plan.
- Expedition Leaders of cruise ships and Masters of national programme support vessels are encouraged to exchange itineraries in order to avoid two ships unintentionally converging on a site simultaneously.
- For commercial cruise operators, no more than 100 passengers may be ashore at a site at any time, accompanied by a minimum of one member of the expedition staff for every 20 passengers.
- Members of non-governmental and tourist expeditions visiting Arctowski and Ferraz stations should use the routes shown in Fig. 5.A and B. These routes give the opportunity to observe wildlife and the station installations, while minimizing disturbance to station activities and the environment, and avoiding habitat degradation.
- In order to avoid environmental impact, disturbance of wildlife and interference with on-going scientific research, landing at or entering of the special zones listed in section 6(ii) should not take place, except in emergencies.
- All movement on land should be undertaken carefully to minimize disturbance to animals, soil and vegetated areas, or disturb scientific equipment. The visitor should:
  - avoid walking on vegetation such as moss or lichen.
  - maintain an appropriate distance from birds or seals which is safe and does not cause them disturbance. As a general rule, maintain a distance of 5 metres. Where practicable, keep at least 15 metres away from fur seals.
  - wash boots and clean clothes, bags, tripods and walking sticks before landing, in order to prevent biological introductions.
  - not leave any litter.

- not take biological or geological souvenirs or disturb artefacts.
- not write or draw graffiti on any man-made structure or natural surface.
- not touch or disturb scientific instruments or markers.
- not touch or disturb field depots or other equipment stored by National Antarctic Programmes.

Figure 1: Location of ASMA Nº. 1 in King George Island, Antarctic Peninsula.

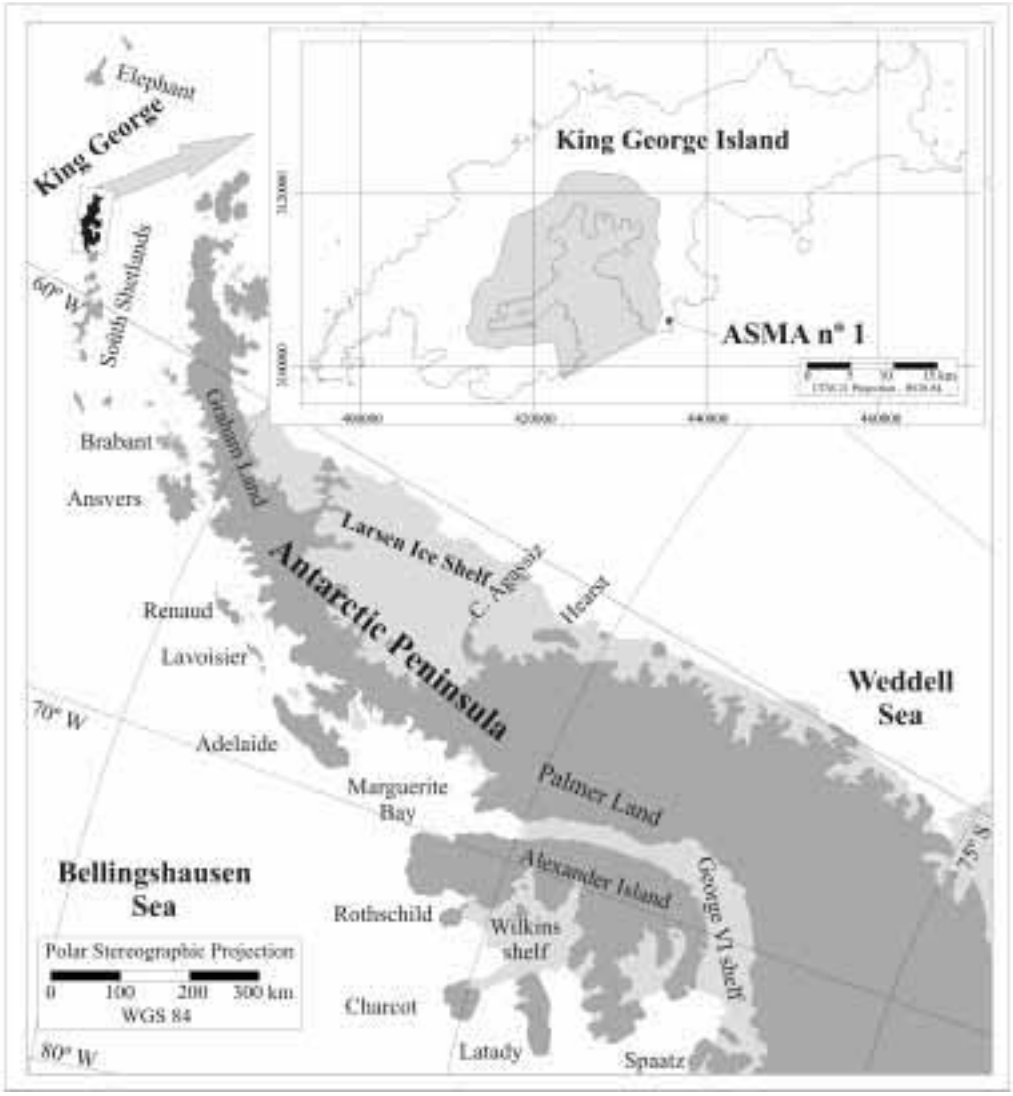


Figure 2: Admiralty Bay Antarctic Specially Managed Area - ASMA Nº. 1.

Figure 3: Location of minor and/or semi-permanent structures and anchorage sites.

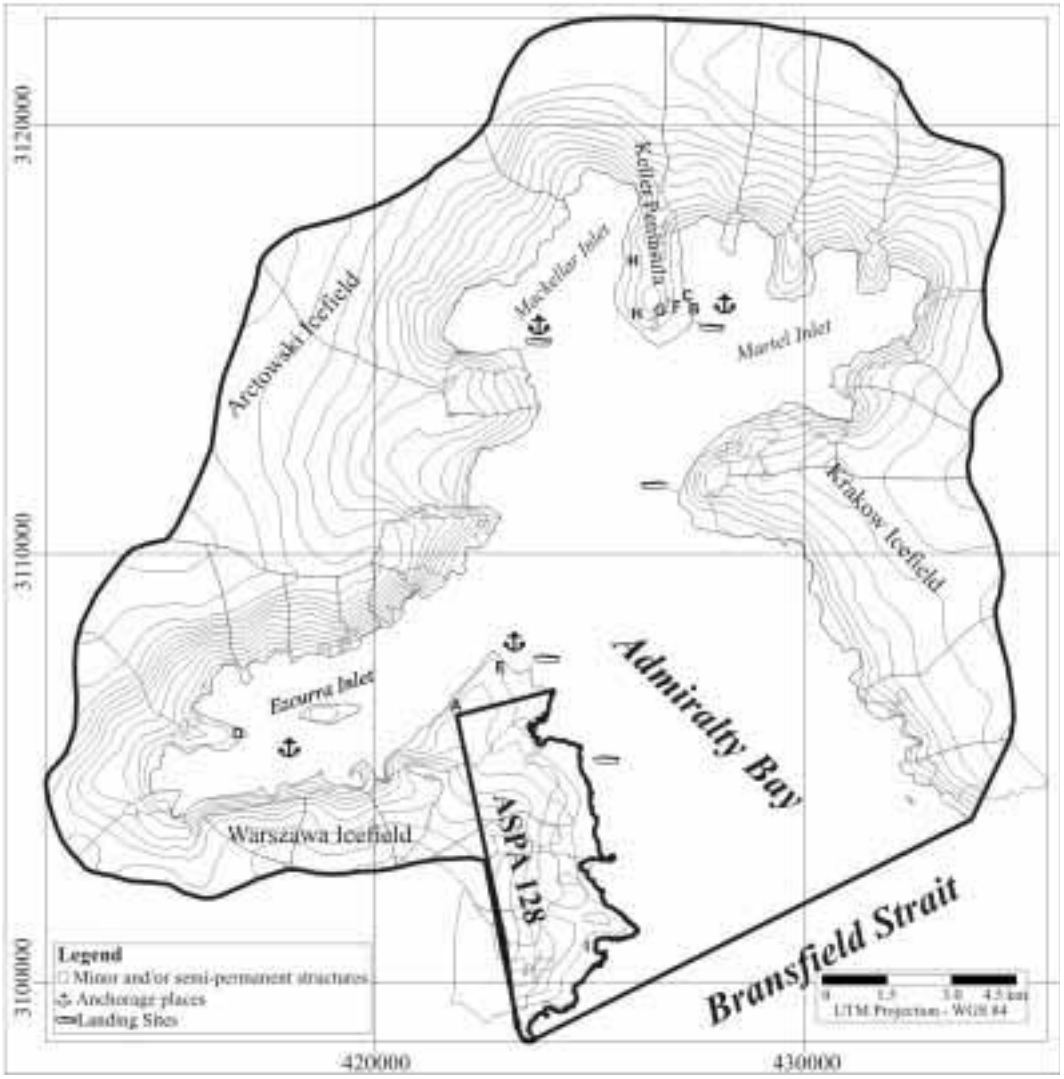


Figure 4: Location of Zones of Scientific and/or Ecological Interest.

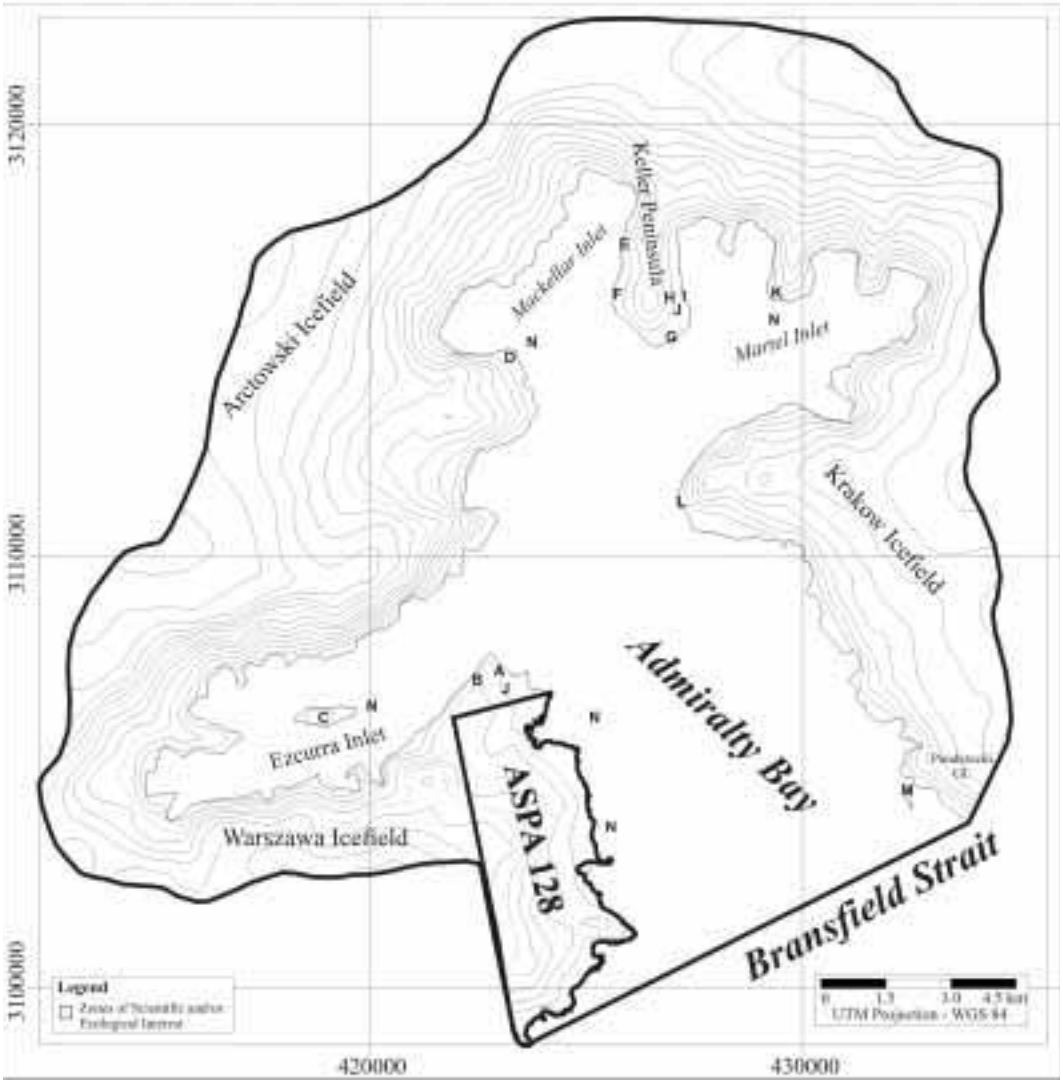


Figure 5A: Tour Routes - Comandante Ferraz Station.

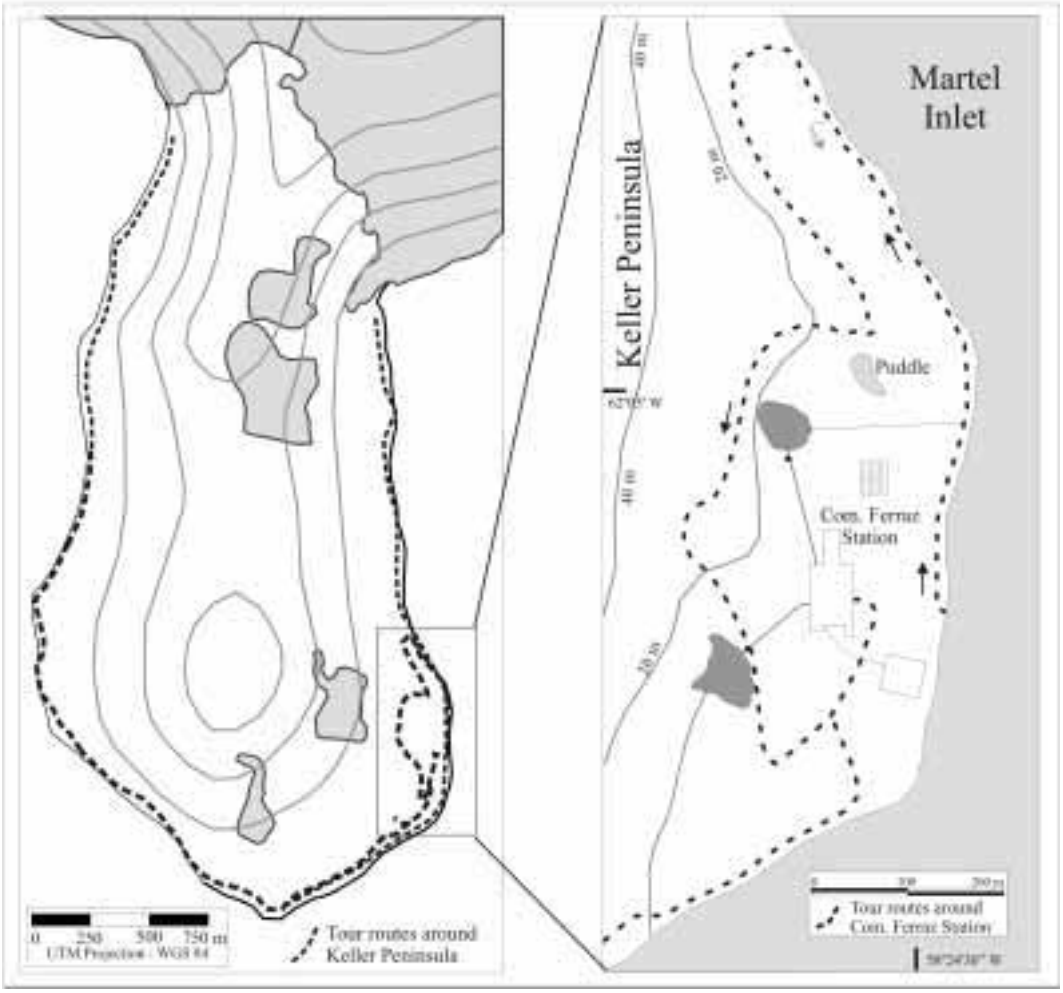


Figure 5B: Facilities Zone - Comandante Ferraz Station.

1. Disembarkation point
2. Old whaling boat
3. Fuel tanks
4. Assembled whale skeleton
5. Site of former Base "G" (UK)
6. "Spanish tower"
7. Geomagnetism - VHF unit
8. North lake and water pump
9. Crosses and graves
10. South lake and water pump
11. Ruins of old British radiosonde
12. Meteorological Unit
13. Old buildings
14. Helicopter pad
15. Chemistry lad
16. Main station complex
17. Refuge 1

Figure 5C: Tour Routes - Henryk Arktowski Station.

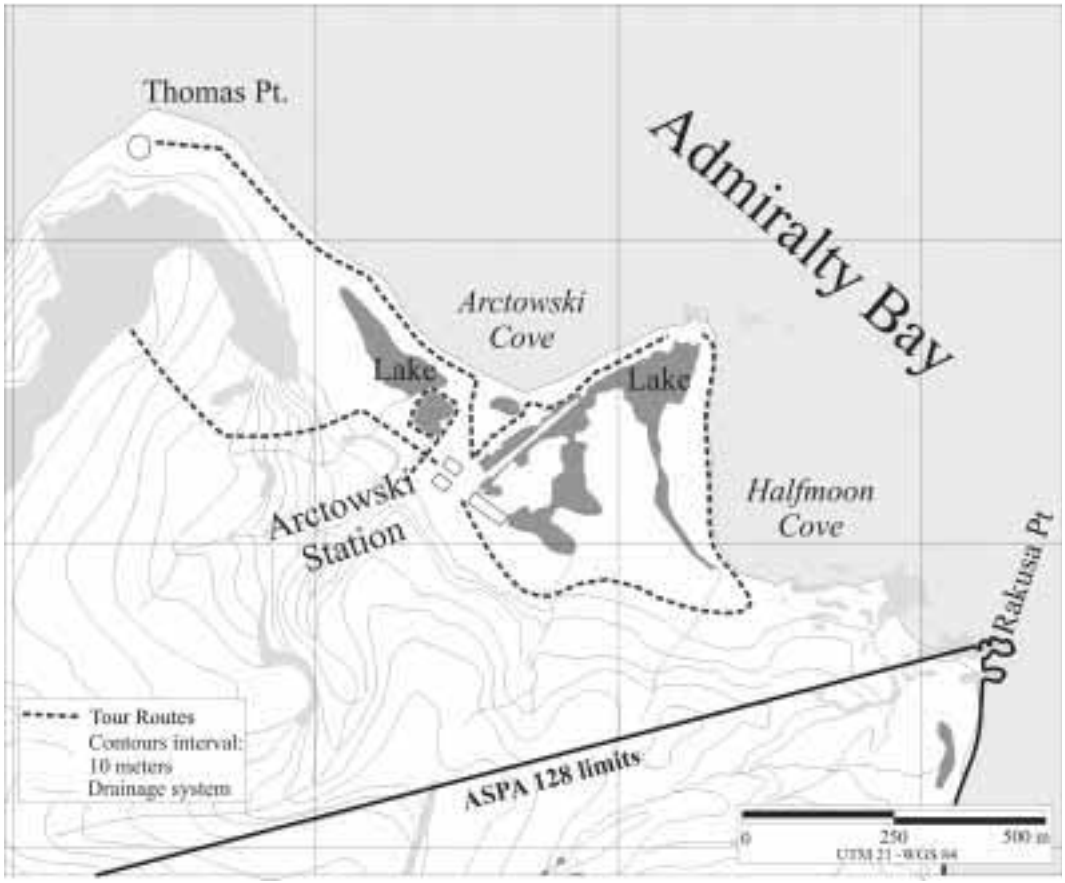
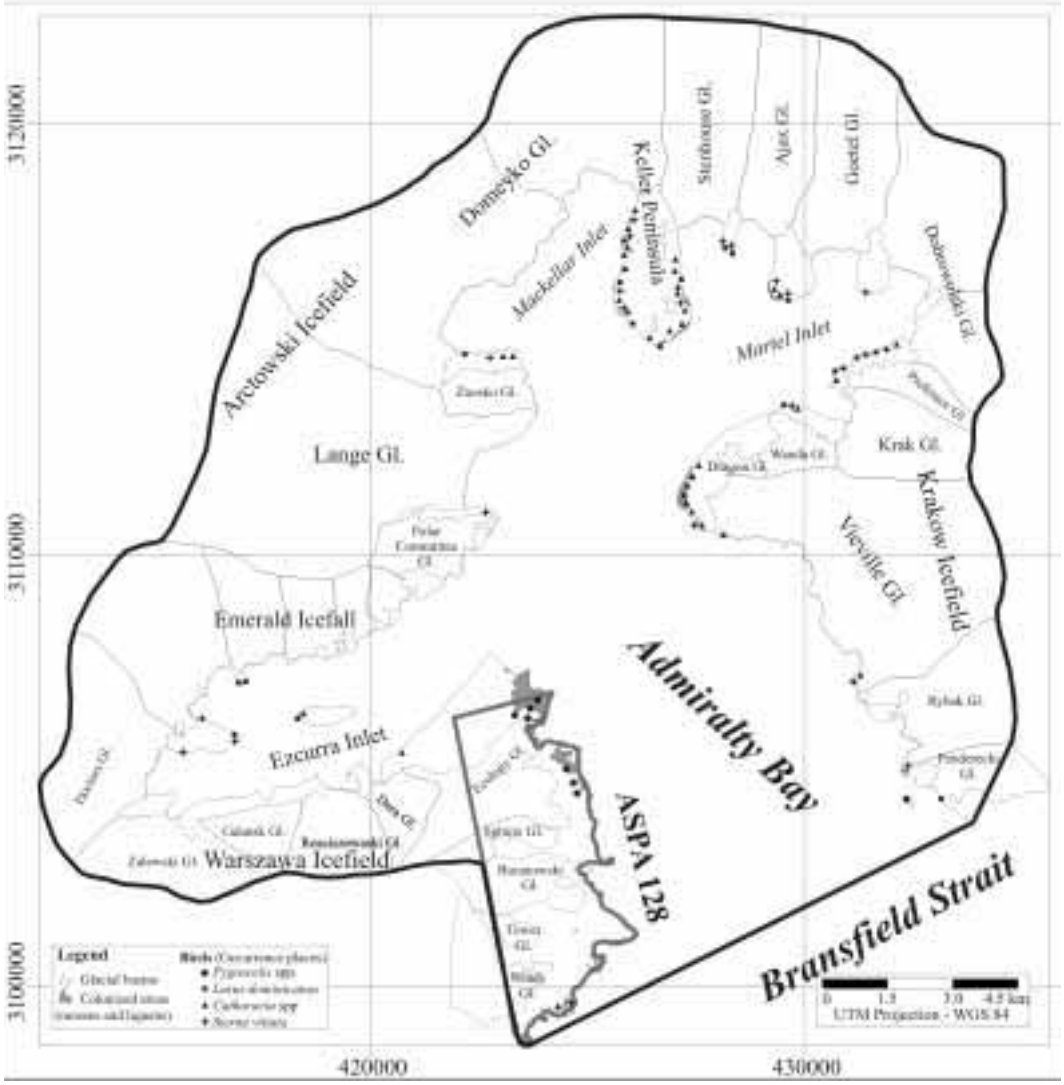


Figure 5D: Facilities Zone - Machu Picchu Station

1. Disembarkation point
2. Scientific Laboratory
3. Portable helicopter pad
4. Power House / Garage / Waste Management
5. Living quarters
6. Emergency refuge
7. Dining-room/ Kitchen
8. Flag
9. MST Radar

Figure 6: Flora (colonized areas) and Birds (occurrence sites).



Measure 3 (2006)

Antarctic Historic Sites and Monuments: Rocher du Débarquement

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";

Desiring to add Rocher du Débarquement, Terre Adélie, to that list;

Recommend to their Governments the following Measure for approval in accordance with paragraph 2 of Article 8 of Annex V to the Protocol on Environmental Protection to the Antarctic Treaty:

That the following site be added to the "List of Historic Sites and Monuments" annexed to Measure 3 (2003):

No. 81: Rocher du Débarquement, Terre Adélie

Rocher du Débarquement (Landing Rock) is a small island where Admiral Dumont D'Urville and his crew landed on 21 January 1840 when he discovered Terre Adélie.

Location: 66° 36.30'S, 140° 03.85'E

Original proposing Party: France

Party undertaking management: France

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