Management Plan for

Antarctic Specially Protected Area (ASPA) No. 170

MARION NUNATAKS, CHARCOT ISLAND, ANTARCTIC PENINSULA

Introduction

Marion Nunataks (75o15' W, 69o 45' S) lie on the northern edge of Charcot Island, a remote ice-covered island to the west of Alexander Island, Antarctic Peninsula, in the eastern Bellingshausen Sea. Marion Nunataks form a 12 km chain of rock outcrops on the mid-north coast of the island and stretch from Mount Monique on the western end to Mount Martine on the eastern end. The Area is 176 km2 (maximum dimensions are 9.2 km north-south and 19.2 km east-west) and includes all of the known ice-free land on Charcot Island.

Past visits to the Area have been few, rarely more than a few days in duration and focussed initially on geological research. However, during visits between 1997 and 2000, British Antarctic Survey scientists discovered a rich biological site, located on the nunatak at 69o44'55" S, 75o15'00" W.

The nunatak has several unique characteristics including two lichens species that have not been recorded elsewhere in Antarctica, mosses that are rarely found at such southerly latitudes and, perhaps most significantly off all, a complete lack of predatory arthropods and Collembola which are common at all other equivalent sites within the biogeographical zone. The nunataks are extremely vulnerable to introduction of locally and globally non-indigenous species that could be carried unintentionally to the site by visitors.

The Area fits into the wider context of the Antarctic Protected Area system by protecting the unique species assemblage found on Marion Nunataks and being the first to protect a substantial area of ground that is representative of the permanent ice-cap and nunataks that exist commonly in the southern Antarctic Peninsula. The Area is therefore designated as an Antarctic Specially Protected Area to protect its outstanding environmental values and to facilitate ongoing and planned scientific research.

1. Description of values to be protected

The outstanding environmental values of the Area are based on the following unique species assemblages found in the terrestrial environment:

1. The terrestrial fauna is unique for the maritime Antarctic in that it appears to contain neither predatory arthropods nor Collembola (springtails), which are otherwise ubiquitous and important members of the terrestrial fauna of the zone. As such, the site provides unique opportunities for the scientific study of terrestrial biological communities from the maritime Antarctic where key ecological components are absent.
2. The Marion Nunataks flora includes an exceptional development of three mosses that are encountered only rarely at latitudes south of 65 °S (*Brachythecium austrosalebrosum*, *Dicranoweisia crispula* and *Polytrichium piliferum*).
3. The Area includes two lichen species that are previously unrecorded from Antarctica (*Psilolechia lucida* and *Umbilicaria* aff. *thamnodes*) and represents the furthest south known occurrence for several lichen species (including *Frutidella caesioatra*, *Massalongia* spp., *Ochrolechia frigida*, *Usnea aurantiaco-atra* and *Usnea trachycarpa*).

2. Aims and Objectives

The aims and objectives of this Management Plan are to:

- Permit only research of a compelling scientific nature, which cannot be served elsewhere, particularly relating to the simple ecosystems and isolated terrestrial communities of the maritime Antarctic.
- Minimise the risk of introduction of locally non-native soils, plants, animals and microorganisms into the Area and avoid changes to the structure and composition of the terrestrial biota
- Avoid degradation of the values of the Area by preventing unnecessary human disturbance and sampling in the Area

3. Management Activities

Management activities that involve visits to the Area and erection of permanent structures may themselves significantly increase the risk of irreversible human impact, through introductions of locally non-native species. The emphasis for management of the site should be to avoid (1) unnecessary visits to the Area and (2) erection of permanent structures such as location notice boards and signs. The following management activities are to be undertaken to protect the values of the Area:

- Due to the sensitive nature of the Area and the severity of the consequences should non-native species be introduced, management visits shall be kept to an absolute minimum.
- Field parties shall be fully briefed by the national authority on the values that are to be protected and the precautions and mitigation measures detailed in this Management Plan.
- National Antarctic Programmes operating in the region are encouraged to consult together with a view to minimising human impact.

4. Period of Designation

Designation is for an indefinite period of time.

5. Maps

Map 1. Charcot Island in relation to Alexander Island and the Antarctic Peninsula. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 55 °W.

Map 2. Charcot Island including the Marion Nunataks Antarctic Specially Protected Area boundary. Map specifications: Projection: Universal Transverse Mercator UTM Zone 18 S. Central meridian 75 °W. The map was produced from a Landsat image (reference number: 223109_26012002) from 26 January 2002.

Map 3. Marion Nunataks with Antarctic Specially Protected Area boundary. The Area comprises the icesheet, nunataks, rocks, sea ice and islands lying within the rectangle. The Area does not include the marine environment below the low water mark. The circle shows the location of the known biological site. The penguin symbol shows the approximate location of the Adelie penguin colony.

Map specifications: Projection: Universal Transverse Mercator UTM Zone 18 S. Central meridian 75 °W. The map was produced from a Landsat image (reference number: 223109_26012002) from 26 January 2002.

Map 4. Environmental domains analysis for Charcot Island (Morgan *et al.*, 2005; Landcare Research NZ) [see section 6(i) Biogeography and environmental domains analysis]. Map specifications: Projection: Universal Transverse Mercator UTM Zone 18 S. Central meridian 75 °W.

6. Description of the Area

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

Charcot Island is roughly circular in shape, approximately 50 km across and is separated from northwest Alexander Island (~100 km away) by Wilkins Sound and Wilkins Ice shelf (Maps 1 and 2). Charcot Island is ice-covered with the exception of Marion Nunataks (69°45' S, 75°15' W), which form a 12 km chain of rock outcrops that overlook the mid-north coast of Charcot Island, and consist predominantly of steep north–

facing cliffs (Map 3). Mount Monique lies towards the western end of the Marion Nunataks chain and Mount Martine to the eastern end. The summits of both peaks are between 750 and 1000 metres above sea level.

The Area comprises the icesheet, nunataks, rocks, sea ice and islands [including Cheeseman Island (69°43'24" S, 75°11'00" W)] lying within a rectangle enclosed by the following coordinates (Map 3):

	Latitude	Longitude
1	69°43'00"	75°30'00"
2	69°43'00"	75°00'00"
3	69°48'00"	75°30'00"
4	69°48'00"	75°00'00"

There are no boundary markers delimiting the Area. The maximum dimensions of the Area are 9.2 km north-south and 19.2 km east-west. The Area does not include the marine environment below the low water mark. The protected land area is 176 km^2 and includes all of the ice-free land on Charcot Island (known as of 2008). The Area also includes ice cap that extends at least 4 km to the south and east of the nunataks, which is intended to act as a buffer zone to prevent accidental importation of species not native to the Area (see Map 3).

Reports suggest that no landing on Charcot Island has ever been made by sea. The steep ice cliffs on the north coast of Charcot Island, make access from the sea difficult.

Climatic conditions

No climatic data are available, but Charcot Island lies in the track of depressions approaching the Antarctic Peninsula from the west. Satellite imagery indicates that the island is predominantly covered by cloud, and may not become free of winter pack ice until late summer, if at all.

Biogeography and environmental domains analysis

Research by Smith (1984) and Peat *et al.* (2007) describes the recognised biogeographical regions present within the Antarctic Peninsula. Antarctica can be divided into three major biological provinces: northern maritime, southern maritime and continental. Charcot Island lies within the southern maritime zone (Smith, 1984), approximately 600 km north of the major biogeographic discontinuity that separates the Antarctic Peninsula and continental Antarctica known at the Gressitt Line (Chown and Convey, 2007).

According to Morgan *et al.* (2005), almost all of Charcot Island falls within environmental domain C of the environmental domains analysis for the Antarctic continent. Domain C is generally found at the base of the Antarctic Peninsula, and also includes most of Alexander Island and adjacent coastal, islands and low-lying areas connected to the main continent by ice shelf. The high latitude results in lower estimated solar radiation and a shorter period with normal diurnal patterns than more northerly environments. Seasonal temperature ranges are also more pronounced.

A small area of environmental domain B exists over Marion Nunataks. The different classification is due to the increased average slope at the nunataks compared to the surrounding ice sheet.

The only other protected area in domain C is ASPA No. 147, Ablation Valley, Ganymede Heights, which is situated on the eastern coast of Alexander Island. ASPA No. 147 is atypical of domain C as it encompasses a large biologically rich area of ice-free ground. Marion Nunataks are more representative of domain C with a substantial proportion of the Area consisting of permanent ice cap.

Geology

The rocks of Marion Nunataks are turbiditic sandstones and mudstones, similar in appearance to those found on nearby Alexander Island. However, geochronology and isotopic analyses from detrital minerals (grains that survive erosion, transport and deposition and so preserve information on the source rock) suggest that Charcot Island rocks are different to those on Alexander Island, and possibly the whole of the Antarctic Peninsula (Michael Flowerdew, pers. comm.).

Alexander Island rocks are thought to have formed from sediments eroded off rocks from the Antarctic Peninsula. However, Charcot Island sediments were originally deposited within a deep marine trench that formed as a result of the destruction of the Pacific plate beneath the edge of the ancient continent of Gondwana. The sedimentary rocks were scraped off the Pacific plate as it was destroyed and accreted to the Gondwana continent, causing them to be folded and methamorphosed under high pressure. Charcot Island sedimentary rocks are thought to be Cretaceous (deposited around 120 million years ago), and may have been transported over long distances in a relatively short time interval before becoming juxtaposed to Alexander Island around 107 million years ago.

All geological samples taken from Charcot Island have been sampled from within the Area.

Biology

The known terrestrial biological site (located on the nunatak at 69°44'55" S, 75°15'00" W) extends approximately 200 m east-west, by a maximum of 50 m north-south and harbours an extensive biota (Convey *et al.*, 2000). This vegetated bluff consists of rock gently sloping to the north-west, which rapidly steepens to broken cliffs which drop to the sea. Water has been observed to be freely available at the site during all summer visits between December 1997 and January 2000.

Biota in the known terrestrial biological site include:

- Bryophytes: 16 mosses (including *Andreaea* spp., *Bartramia patens*, *Bryum pseudotriquetrum*, *Brachythecium austrosalebrosum*, *Ceratodon purpureus*, *Dicranoweisia crispula*, *Grimmia reflexidens*, *Hennediella heimii*, *Hypnum revolutum*, *Pohlia* spp., *Polytrichum piliferum*, *Schistidium antarctici*, *Syntrichia princeps*) and one liverwort (*Cephaloziella varians*). The dominant species are *Andreaea* spp., *Dicranoweisia crispula* and *Polytrichum piliferum*, which are usually only common in the sub-Antarctic. The abundance of *B. austrosalebrosum* is remarkable as it is a hydric species requiring a continuous supply of water. The mosses generally occur on wet rock slabs irrigated by trickling melt water from late snow patches which has allowed the formation of cushions c. 15 cm deep. (Smith, 1998; Convey *et al.*, 2000).
- Foliose alga: *Prasiola crispa* (Smith, 1998; Convey *et al.*, 2000).
- Lichens: 34 species, plus two identified to genus level. The dominant lichen species are *Pseudophebe minuscule*, *Umbilicaria decussata*, *Usnea sphacelata* and various crustose taxa (Smith, 1998; Convey *et al.*, 2000). Lichen communities occupy much of the dry, windswept stony ground and ridges. Melt channels on sloping rock slabs are lined with large thalli (up to ~15 cm across) of *Umbilicaria antarctica*. The Area includes two lichen species that are previously unrecorded from Antarctica (*Psilolechia lucida* and *Umbilicaria aff. thamnodes*) and represents the furthest south known occurrence for several lichen species (including *Frutidella caesioatra*, *Massalongia* spp., *Ochrolechia frigida*, *Usnea aurantiaco-atra* and *Usnea trachycarpa*). Unusually, the widespread *Usnea antarctica* was not recorded from the site.
- Invertebrates: Seven species of Acari, seven Nematoda and four Tardigrada were present in collections from Marion Nunataks. Uniquely, neither acarine predators nor Collembola were recorded (Convey, 1999; Convey *et al.*, 2000).
- Vertebrates: A small colony of 60 Adelie penguins (*Pygoscelis adeliae*) containing many chicks was reported from the small islands just to the northwest of Mount Monique (Henderson, 1976; Croxall and Kirkwood, 1979). If still present, this is the most southerly colony of Adelie penguins on the Antarctic Peninsula. Other than the penguin colony, the Area has little vertebrate influence. South polar skuas (*Catharacta maccormicki*) are observed in the Area and a single nest was found on moss turf. Other birds observed and considered likely to breed in the area were small numbers of Antarctic terns (*Sterna vittata*), snow petrels (*Pagodroma nivea*), Antarctic petrels (*Thalassoica*

antarctica) and Wilson's storm petrels (*Oceanites oceanicus* Kühl) (Henderson, 1976; Smith, 1998; Convey *et al.*, 2000).

Although all elements of the biota recorded are typical of the maritime Antarctic biogeographical zone (Smith, 1984), community composition differs strikingly in detail from that found at other sites in the biome. The apparent absence of Collembola, recorded at all other known maritime Antarctic sites, contrasts directly with their importance elsewhere. Numbers of other animal species recovered from Marion Nunataks, suggest population densities comparable with those found in many other coastal maritime Antarctic sites and at least an order of magnitude greater than those usually found in Continental Antarctic sites, or on south-east Alexander Island at the southern limit of the maritime Antarctic. The numerical contribution made by springtails to faunas elsewhere in the maritime Antarctic appears to be replaced by several smaller prostigmatid mites (*Nanorchestes nivalis* and *Eupodes minutes*) on Charcot Island. The absence of predatory taxa is also an exceptional element of the Charcot Island arthropod community, particularly given the arthropod population densities.

The terrestrial biological communities on Charcot Island are extremely vulnerable to accidental human-mediated introduction of both native Antarctic and alien biota. Convey *et al.* (2000) write:

> *'As visitors to this island will inevitably arrive from other locations within the [Antarctic] Maritime zone, the potential for accidental transfer in soil or vegetation adhering to boots or clothing, rucksacks, etc. is great. Extreme caution is therefore required to avoid the transfer of native species between isolated populations within the Maritime Antarctic, highlighting an urgent need for strict control measures to be applied to all visitors to the site and others like it to conserve them for the future.'*

Past human activity

The Area is extremely isolated and difficult to access, other than by air, and as a result has been visited by only a small number of people, and these visits have been generally brief. Charcot Island was discovered on 11 January 1910 by Dr Jean Baptiste Charcot of the French Antarctic Expedition. The first landing on the island was made on 21 November 1947 by the Ronne Antarctic Research Expedition (RARE) when parts of the island were photographed from the air (Searle, 1963).

A temporary hut (30 m^2) and airstrip were established by the Chilean Antarctic Expedition and Chilean Air Force (FACH) in November 1982. The camp was situated on ice a few kilometres east of Mount Martine (69°43'S 75°00'W), on what is now the eastern boundary of the Area. The hut was buried by snow during the winter of 1983 and no evidence of the station remains on the surface (Comite Nacional de Investigaciones Antarcticas, 1983; Veronica Valejos, pers comm.).

British Antarctic Survey (BAS) geologists and cartographers made brief visits to Marion Nunataks in January 1975, 9-13 February 1976 and 17 January 1995. BAS biologists made day trips to the nunatak at 69°44'55" S, 75°15'00" W on 22 December 1997, 20-21 January 1999, 5 February 1999 and 16 January 2000. Reports suggest that there have been less than 10 field party visits to Marion Nunataks since their first visit in 1975. Visits have generally been limited to a few days or hours. Importantly, no further visits have been made to Marion Nunataks Area since the discovery of its unique ecosystems (Convey *et al.*, 2000). As a result, it is probable that the ecosystem still exists in it original pristine state and no introduction of macrobiota has occurred.

6 (ii) Restricted zones within the Area

None.

6 (iii) Location of structures within the Area

No installations or caches are known to exist in the Area. One cairn was constructed on the highest point (~126 m above sea level) of the small nunatak at 69°44'55" S, 75°15'00" W during the 1975-76 United States Geological Survey-British Antarctic Survey Doppler Satellite Programme (Schoonmaker and Gatson, 1976). The 0.6 m high cairn marks the site of Station Jon and contains a standard USGS brass Antarctica tablet stamped 'Jon 1975-1976' set loosely in faulted rock. A metal tent pole (2.4 m) was erected in the

cairn; however, there was no record of it in visit reports from 1995 onwards (Anonymous, 1977; Morgan, 1995).

6 (iv) Location of other ASPAs and ASMAs within close proximity

There are no other protected or managed areas nearby, with the nearest being ASPA No. 147, Ablation Valley - Ganymede Heights, which is situated 270 km away on the eastern coast of Alexander Island.

7. Permit conditions

Entry into the Area is prohibited except in accordance with a permit issued by an appropriate national authority under Article 3, paragraph 4, and Article 7 of Annex V to the Enviromental Protocol to the Antarctic Treaty.

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

- it is issued only for a compelling scientific reason, which cannot be served elsewhere
- the activities permitted will not jeopardize the natural ecological system in the Area
- any management activities are in support of the objectives of the Management Plan
- the Permit, or an authorised copy, must be carried within the Antarctic Specially Protected Area
- a report is supplied to the authority or authorities named in the permit, which shall include a section on the environmental state of the Area
- any permit shall be issued for a stated period

7(i) Access to and movement within the Area

No access points are specified, but landings are usually most safely made by aircraft as access from the sea is made difficult due to step ice cliffs around much of the coastline.

Where possible, day visits to the Area are strongly recommended in order to reduce the requirement for camping equipment, and the associated risk of transferring locally non-native species. If scientific or management requirements cannot be met within the time scale of a single day visit, then longer visits requiring camping within the Area are permitted, but only after all other options have been full explored and rejected.

Entry of personnel or equipment arriving directly from other biological field sites to the Area is prohibited. It is a condition of entry into the Area that all visitors and equipment must travel via an Antarctic station or ship where thorough cleaning of clothing and equipment has been performed, as detailed in this Management Plan [section 7(ix)].

To protect the values of the Area and minimise the risk of introduction of locally non-native species, the following restrictions apply within the Area:

(a) Aircraft

Aircraft are only permitted to land in the Area if they have performed the measures as detailed in this Management Plan [section 7(ix)]. Otherwise aircraft must land outside the Area. Fixed and rotory wing aircraft are prohibited from landing within 100 m of rock outcrops and associated flora and fauna within the Area.

Aircraft flying near the Adelie penguin colony on the small islands just to the northwest of Mount Monique (69°45'30" S, 75°25'00" W) must comply with the guidelines detailed in 'Guidelines for the operation of aircraft near concentrations of birds in Antarctica' (Antarctic Treaty Consultative Meeting, 2004).

(b) Land vehicles and sledges

Land vehicles shall not be taken into the Area unless essential for scientific, management or safety reasons.

Land vehicles and sledges are only permitted within the Area if they are compliant with the measures as detailed in this Management Plan [section 7(ix)].

Once inside the Area, skidoos, sledges and other land vehicles are prohibited within 100 m of rock outcrops and associated flora and fauna. The remaining 100 m of the approach to rock outcrops must be made on foot.

(c) Human movement

Pedestrian traffic shall be keep to an absolute minimum necessary to be consistent with the objectives of any permitted activities.

No pedestrian routes are designated but persons on foot should at all times avoid disturbance or damage to vegetation and periglacial features.

Visitors shall avoid walking on areas of visible vegetation or moist soil.

Strict personal quarantine precautions shall be taken as described in section 7(ix) of this Management Plan

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

Compelling scientific research that cannot be undertaken elsewhere and which will not jeopardize the ecosystem of the Area.

Essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

No structures may be erected in the Area, nor equipment installed, except for essential scientific or management activities, as specified in the permit. If equipment is installed every effort must be taken to ensure the equipment is sterile and free of imported seeds, spores, propagules, soil, microorganisms and invertebrates [see section 7(ix)]. Existing structures must not be removed.

7(iv) Location of field camps

Camping within the Area is only permitted if scientific and management objectives cannot be achieved during a day trip to the Area. Camping may also occur within the Area during an emergency.

Unless unavoidable for safety reason, tents should be erected on snow or ice, at least 500 m from the nearest rock outcrops.

Field camp equipment must be cleaned and transported as described in section 7(ix) of this Management Plan

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

It is essential that activities conducted by visiting scientists or managers do not introduce new species into the Area. No living animals, plant material or microorganisms shall be deliberately introduced into the Area. All necessary precautions shall be taken to prevent accidental introductions. All sampling equipment brought into the Area shall have been thoroughly cleaned [see section 7(ix)].

No poultry products, including food products containing uncooked dried eggs, shall be taken into the Area.

No herbicides or pesticides shall be brought into the Area. Any other chemicals, which may be introduced for a compelling scientific purpose specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.

Fuel, food and other materials are not to be deposited in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. All such materials introduced are to be removed when no longer required. Fuel, food and other materials must only be deposited on snow or ice that is at least 500 m from the nearest rock outcrop. Permanent depots are not permitted.

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

Any removal or disturbance of soil, vegetation or invertebrates is prohibited, except in accordance with a permit issued under Article 3 of Annex II to the Environmental Protocol by the appropriate national authority. Any sampling is to be kept to an absolute minimum required for scientific or management purposes, and carried out using techniques which minimise disturbance to surrounding soil, ice structures and biota. Any sampling of experimental sites should be photographed and the location recorded in detail and reported to the permitting authority. When 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 and removal of anything not brought into the Area by the permit holder

Material may be collected or removed from the Area only in accordance with a permit issued under Article 3 of Annex II by the appropriate national authority. Debris of man-made 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, unless the impact of removal is likely to be greater than leaving the material *in situ*. If this is the case, the appropriate authority should be notified.

7(viii) Disposal of waste

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

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

To help protect the ecological and scientific values derived from the isolation and low level of human impact at the Areas, visitors shall take special precautions against the introduction of non-native species. Of particular concern are animal or vegetation introductions sourced from:

- soils from any other Antarctic sites, including those near the stations
- soils from regions outside Antarctica

It is a condition of entry to the Area that visitors shall minimize the risk of introductions in accordance with the following measures:

(a) Aircraft

The interior and exterior of aircraft shall have been carefully inspected and cleaned as near as possible to the time of departure of the aircraft from the originating Antarctic station or ship. It is recommended that this include thorough sweeping and vacuuming of the inside of the aircraft and steam-cleaning or brushing of the exterior of the aircraft.

Any aircraft that has landed at other rock airstrips or near biologically rich sites since being cleaned at the Antarctic station or ship is not permitted to enter the Area.

Fixed-wing aircraft that departed from a gravel runway must have landed, or trailed their skis, on clean snow outside the Area in an attempt to dislodge any soil from the skis, before landing within the Area.

(b) Land vehicles and sledges

Before land vehicles and sledges enter the Area, all mud, soil, vegetation and excessive dirt and grease must have been removed. Ideally, this should have been completed on the originating Antarctic station or ship before transfer of the vehicles into the field.

Land vehicles shall not enter the Area if after cleaning they have been driven over areas of rock or soil outside the Area.

(c) Field camp equipment

All camping equipment, including emergency camping equipment, shall have been thoroughly cleaned (i.e. free of soil and propagules and, if practicable, sealed in plastic bags or sheeting) before being taken into the Area. This includes emergency camping equipment carried aboard any aircraft landing in the Area.

(d) Sampling equipment, scientific apparatus and field-site markers

To the greatest extent possible, all sampling equipment, scientific apparatus and markers brought into the Area shall have been sterilized, and maintained in a sterile condition, before being used within the Area. Sterilization should be by an accepted method, including UV radiation, autoclaving or by surface sterilisation using 70% ethanol or a commercially available biocide (e.g. Virkon®).

(e) General field equipment

General equipment includes harnesses, crampons, climbing equipment, ice axes, walking poles, ski equipment, temporary route markers, pulks, sledges, camera and video equipment, rucksacks, sledge boxes and all other personal equipment

All equipment used inside the Area should be free of biological propagules such as seeds, eggs, insects, fragments of vegetation and soil. To the maximum extent practicable, all equipment used, or brought into the Area, shall have been thoroughly cleaned and sterilized at the originating Antarctic station or ship. Equipment shall have been maintained in this condition before entering the Area, preferably by sealing in plastic bags or other clean containers.

(f) Outer clothing

Outer clothing includes hats, gloves, fleeces or jumpers, jackets, fabric or fleece trousers, waterproof trousers or salopettes, socks, boots and any other clothing likely to be worn as a surface layer. Outer clothing worn inside the Area should be free of biological propagules such as seeds, eggs, insects, fragments of vegetation and soil. To the maximum extent practicable, footwear and outer clothing used, or brought into the Area, shall have been thoroughly laundered and cleaned since previous use. Particular attention should be given to removing seeds and propagules from Velcro®. New clothing, taken straight out of the manufacturer's packaging just before entering the Area, need not undergo cleaning.

Further procedures for ensuring non-native species are not transferred into the Area on boots and clothing depend upon whether the visit is via (i) a direct aircraft landing in the Area, or (ii) overland movement into the Area from outside its boundaries.

i. Direct aircraft landing in the Area

Sterile protective over-clothing shall be worn. The protective clothing shall be put on immediately prior to leaving the aircraft. Spare boots, previously cleaned using a biocide then sealed in plastic bags, should be unwrapped and put on just before entering the Area.

ii Overland movement into the Area from outside its boundaries

Sterile protective over-clothing is not recommended as, once within the Area, significant amounts of travel over crevassed ground may be required and use of sterile protective over-clothing may interfere with safety equipment such as ropes and harnesses.

For overland movement into the Area, alternative measures must be used. Each visitor is required to bring at least two sets of outer clothing. The first set should be worn for the journey to the Area boundary. The second set of outer clothing, which has previously be cleaned and sealed in plastic, should only be worn inside the Area. Immediately before entering the Area, visitors should change into their clean set of outer clothing. Spare boots, previously cleaned using a biocide then sealed in plastic bags, should be unwrapped and put on just before entering the Area. The removed unclean outer clothing should be stored in sealed, labelled plastic bags, preferably outside the Area.

On leaving the Area by overland travel, the clothing worn in the Area should be (1) removed and stored in a clean, labelled plastic bag until needed for any further trips into the Area, or (2) returned to the originating Antarctic station or ship for cleaning.

7(x) Requirements for reports

Parties shall require the principal holder of each permit issued by it to submit to the appropriate authority a report describing the activities undertaken within six months of the visit. Such reports should include, as appropriate, the information identified in the Visit Report Form suggested by SCAR. Under item 10 of this form (mode of transport to/from the area) particular note should be made of locations where aircraft took off and landed. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary description of activities conducted by persons subject to their jurisdiction, in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the Management Plan and in organising the scientific use of the Area.

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Map 1. Charcot Island in relation to Alexander Island and the Antarctic Peninsula. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 55 °W.