MANAGEMENT PLAN FOR ANTARCTIC SPECIALLY PROTECTED AREA NO.135, NORTH-EAST BAILEY PENINSULA, BUDD COAST, WILKES LAND

Introduction

North-east Bailey Peninsula was designated in 1985 as Site of Special Scientific Interest (SSSI) No 16 through Recommendation XIII-8 (1983), after a proposal by Australia. In accordance with Resolution XX -5 (1996) the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 135. This revised Management Plan reaffirms the scientific values of the original designation. The Area was originally designated because it is representative of a diverse assemblage of vegetation with extremely rich lichen and moss beds and an important stand of liverwort, these values are reaffirmed in this revised Management Plan.

1. Description of Values to be Protected

Windmill Islands Region

Excluding the Antarctic Peninsula, Bailey Peninsula, among Clark and Mitchell Peninsulas, and Robinson Ridge in the Windmill Islands region support some of the most extensive and best-developed plant communities on continental Antarctica. The region has rich associations of macrolichens and bryophytes that occupy very specific ecological niches. The flora of the Windmill Islands region comprises 36 species of lichen, five bryophyte species, a liverwort, and 150 non-marine algae and 120 fungal taxa have been recorded. An ascomycete mycorrhizal fungus has been shown in the liverwort *Cephaloziella varians*. Three species of the lichen genus *Lecidea* have been collected and await identification.

Eleven cryptogamic sociations have been identified. The vegetation forms a continuum of ecological variation along environmental gradients of soil moisture, soil chemistry, and microclimate. On the peninsulas, the major community types are distinguished by the dominance of three bipolar lichens, *Usnea sphacelata, Pseudephebe minuscula* and *Umbilicaria decussata*. Vegetation communities on the islands are dominated by algal species such as *Prasiola crispa*, with moss and lichen being considerably poorer developed than on the peninsulas. Mosses and lichens are all but absent in eutrophic sites near bird colonies with a preponderance of *Prasiola crispa, Prasiococcus calcareous and Desmococcus olivaceus* chlorophyte algae occurring. Lichens constitute the largest part of the Windmill Islands region flora with bryophytes being dominant in moister areas.

North-east Bailey Peninsula Protected Area

North-east Bailey Peninsula, Antarctic Specially Protected Area is representative of a diverse assemblage of the Windmill Islands region flora. As such, the Area has intrinsic ecological value and scientific importance, particularly to botanists, microbiologists, soil scientists and glacial geomorphologists.

The North-east Bailey Protected Area contains three extensive and contrasting moss fields that are the subject of taxonomic, ecological and physiological studies that commenced during the summer of 1982-3. Additional studies include population ecology of invertebrates associated with the vegetation, and soil/water chemistry. Permanent lichen growth monitoring sites have also been established as have sites monitoring annual growth increments in mosses. The cryptogamic plant communities

are also being observed in relation to short-term microclimate fluctuation and long-term climate change in the region since deglaciation 8000-5000 years BP. Studies in the Area were undertaken as part of the Biological Investigations of Terrestrial Antarctic Systems (BIOTAS) program. More recent studies have concentrated on the determination of biodiversity, physiological and biochemical attributes, component interactions, impact of anthropogenic pollutants, and potential effects of global climate change. Casey station is a nominated study site under the Regional Sensitivity to Climate Change in Antarctic Terrestrial and Limnetic Ecosystems (RiSCC) international research program on Antarctic and Peri-Antarctic terrestrial and limnetic organisms and ecosystems.

Moss and lichen communities are used to monitor the environmental impacts of Casey station. The Area provides baseline data with which to compare changes in similar plant communities in the immediate surroundings of Casey station. The Area also serves as a valuable comparative site for similar plant communities in the Clark Peninsula ASPA, which are subject to less environmental stress and disturbance.

Proximity to Casey station minimises logistics problems with respect to field research and, at the same time, maximises the potential for disturbance of study areas. It is primarily for this reason that this Area, where research is concentrated, requires protection.

2. Aims and Objectives

Management at North-east Bailey Peninsula aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance and sampling in the Area;
- preserve a part of the natural ecosystem as a reference Area for the purpose of future comparative studies and to assess direct and indirect effects of Casey station;
- allow scientific research on the ecosystem in the Area 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 for maintenance of the Tandem Delta antenna communications installation and associated facilities without degradation of the Area's values;
- allow visits for management purposes in support of the aims of the Management Plan.

3. Management Activities

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

- signs illustrating the location and boundaries, with clear statements of entry restrictions, shall be placed at appropriate locations at the boundaries of the Area to help avoid inadvertent entry;
- information on the location of the Area (stating special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be

kept available, at the adjacent Casey station and will be provided to ships visiting the vicinity;

- markers, signs or structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required;
- abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the values of the Area;
- visit the Area 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 that management activities are adequate: and
- review the Management Plan at least every five years and update as required.

4. Period of Designation

Designated for an indefinite period.

5. Maps

Map A: East Antarctica, showing location of North-east Bailey Peninsula.
Map specifications:
Projection: Polar Stereographic
Horizontal Datum: WGS84
True scale of latitude 71°.

Map B: Budd Coast, Wilkes Land, showing location of North-east Bailey Peninsula.
Map specifications:
Projection: UTM Zone 49
Horizontal Datum: WGS84.

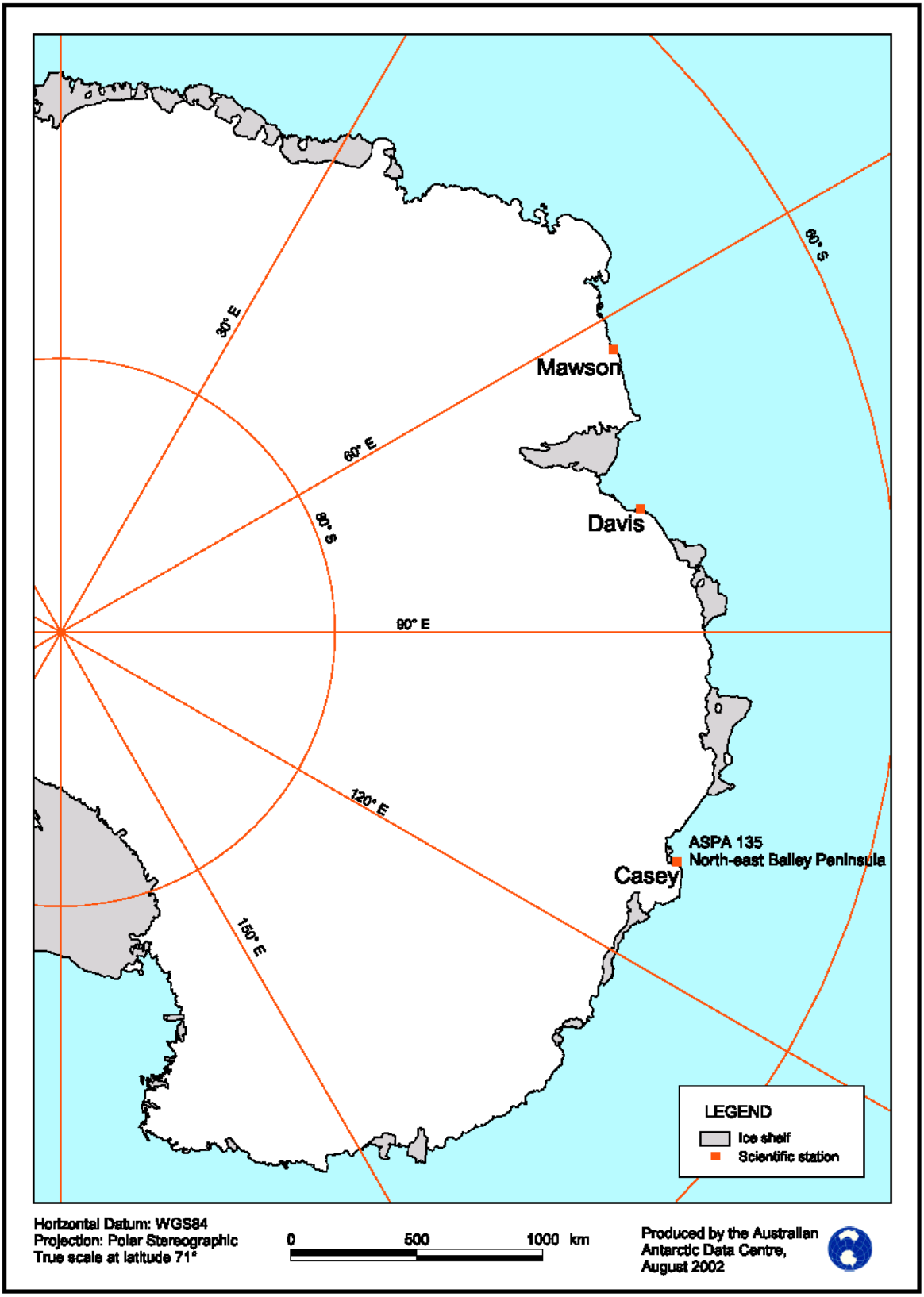
Map C: Topographic map of North-east Bailey Peninsula.
Map specifications:
Projection: UTM Zone 49
Horizontal Datum: WGS84.
Contour Interval: 10 m.

Map D: Vegetation map of North-east Bailey Peninsula
Map specifications:
Projection: UTM Zone 49
Horizontal Datum: WGS84.

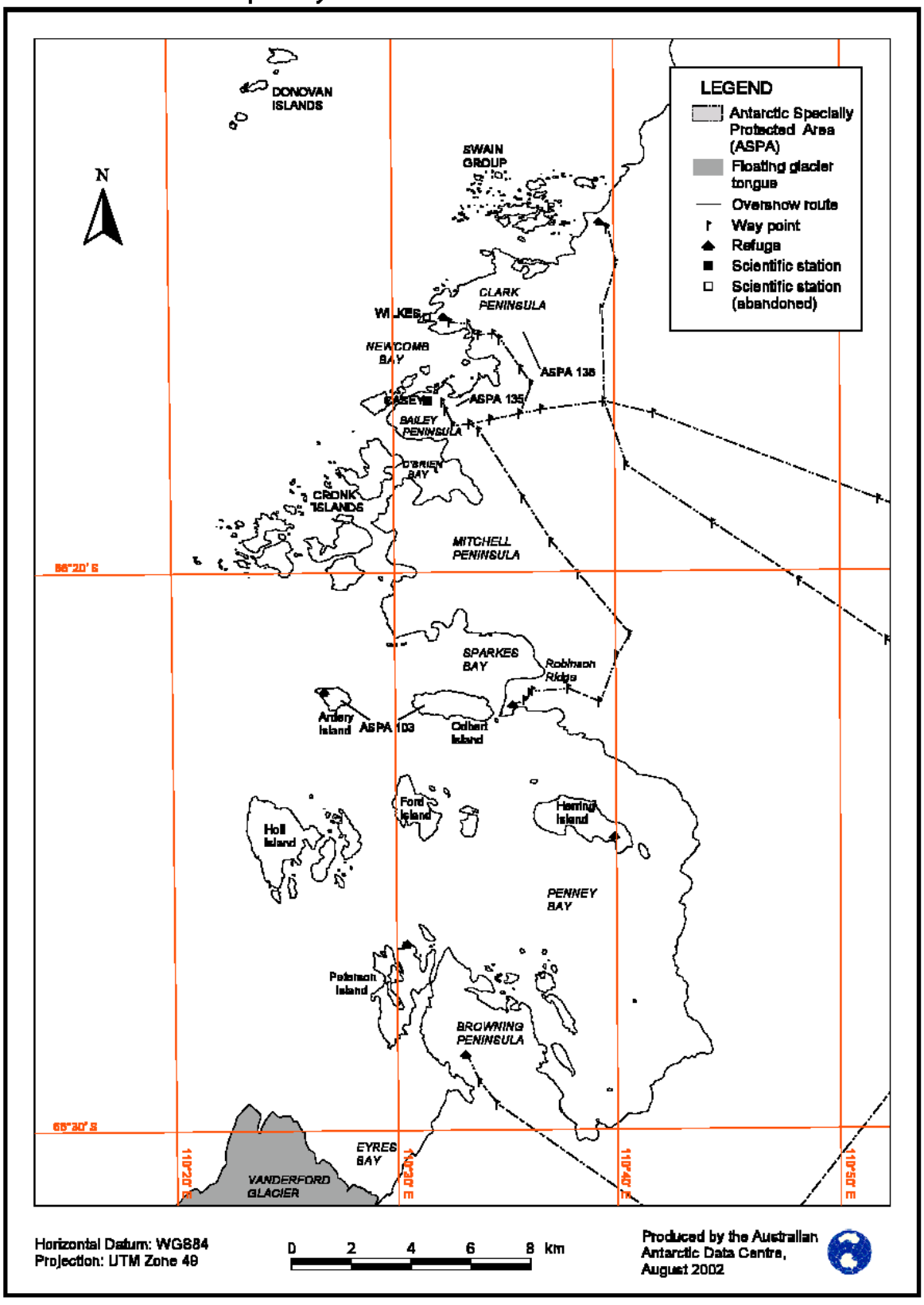
Map E: Geology of North-east Bailey Peninsula.
Map specifications:
Projection: UTM Zone 49
Horizontal Datum: WGS84.

Map F: Detail of North-east Bailey Peninsula vegetation, structures and lakes.
Map specifications:
Projection: UTM Zone 49
Horizontal Datum: WGS84.

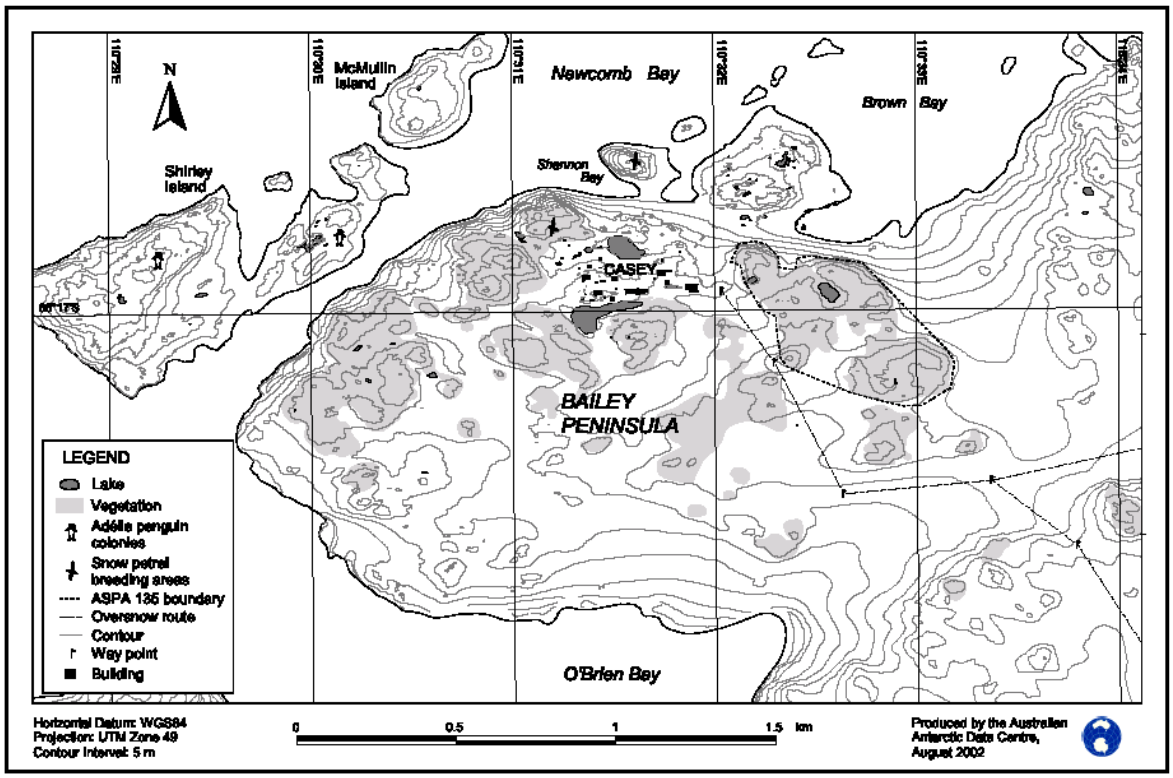
MAP A East Antarctica, Location of North-east Bailey Peninsula, Antarctic Specially Protected Area No.135



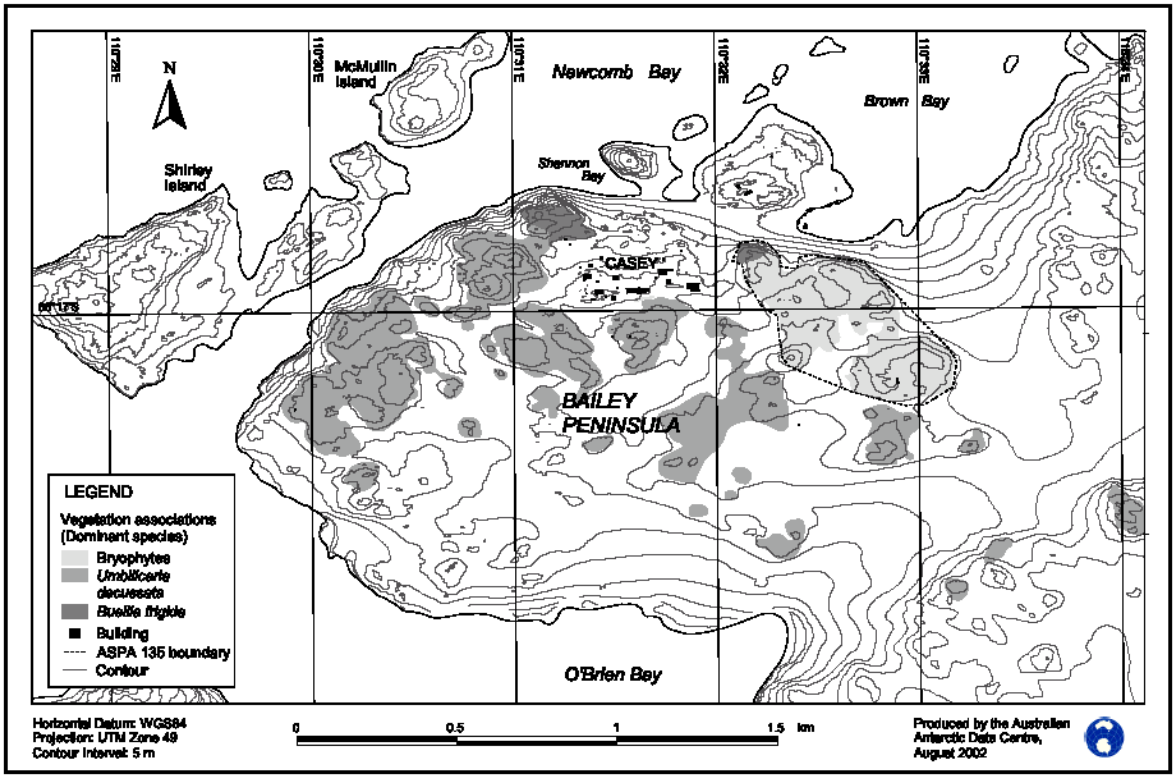
MAP B North-east Bailey Peninsula, Budd Coast, Wilkes Land. Antarctic Specially Protected Area No.135



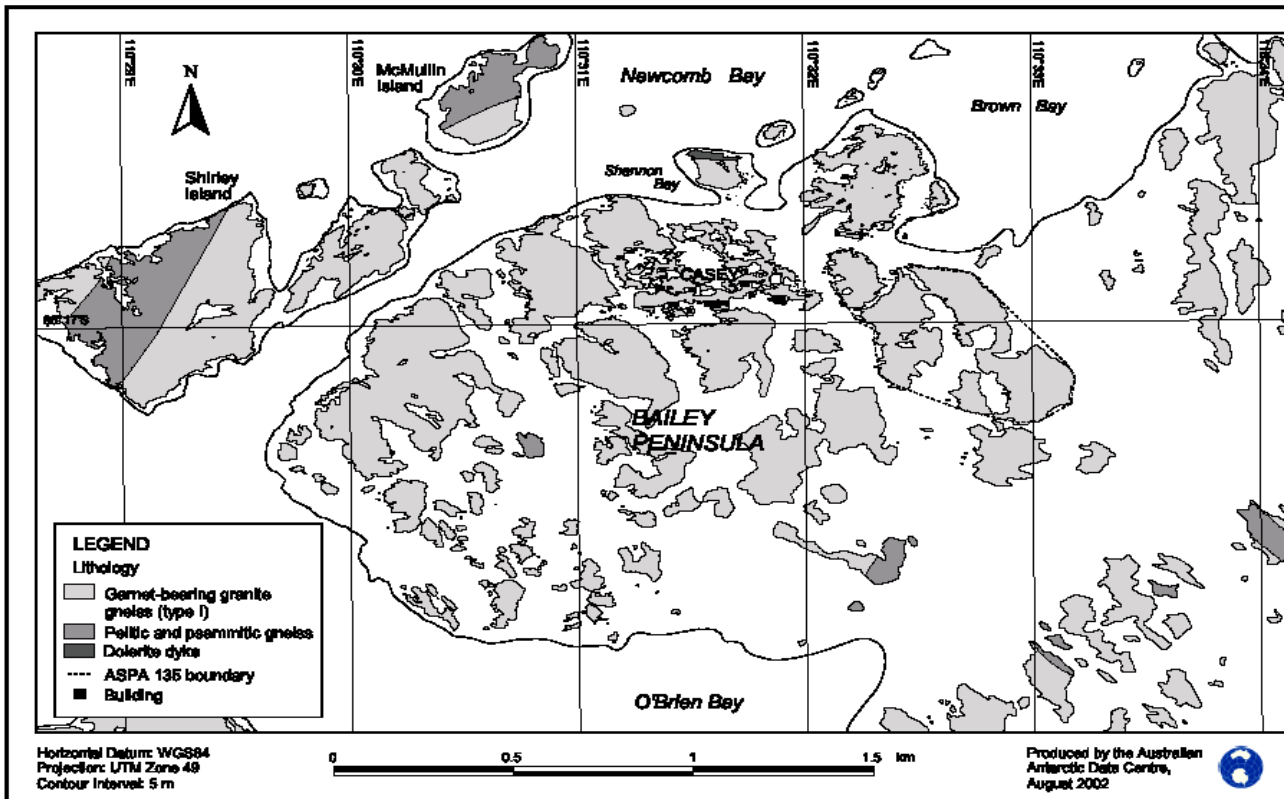
MAP C North-east Bailey Peninsula, Antarctic Specially Protected Area No.135, Topography.



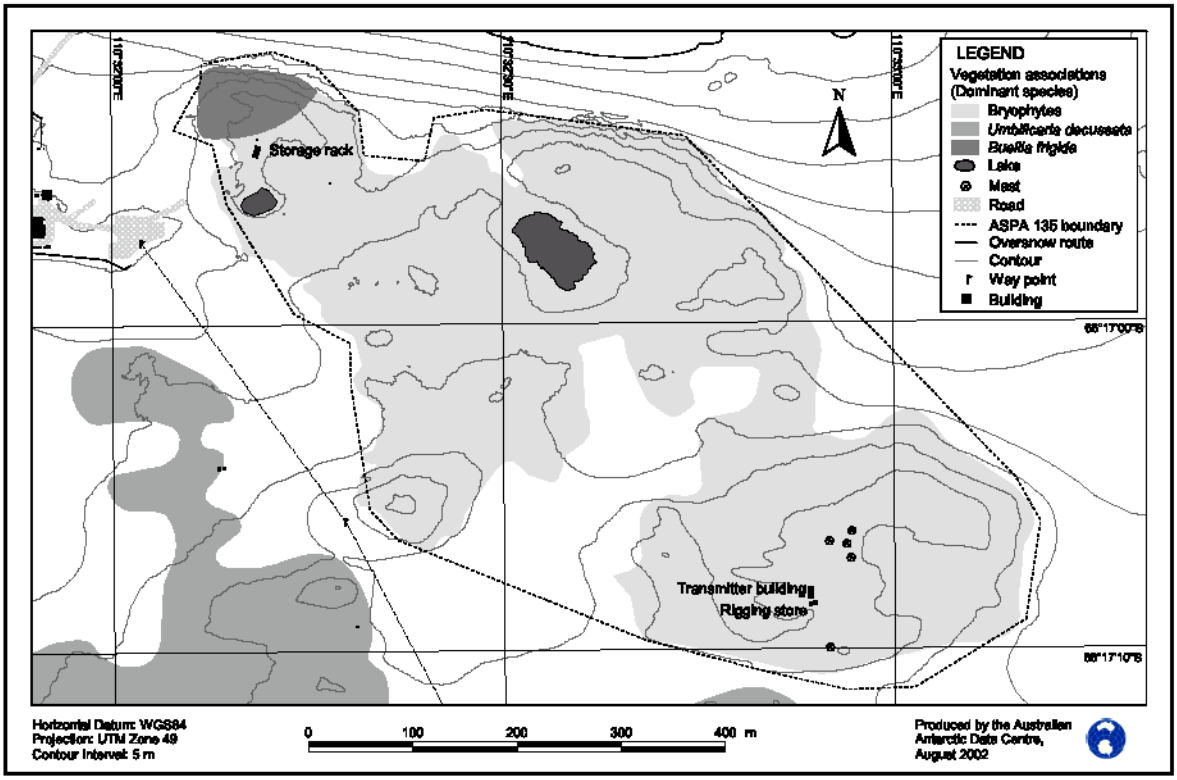
MAP D North-east Bailey Peninsula, Antarctic Specially Protected Area No.135, Vegetation.



MAP E North-east Bailey Peninsula, Antarctic Specially Protected Area No.135, Geology.



MAP F North-east Bailey Peninsula, Antarctic Specially Protected Area No.135.



6. Description of the Area

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

General Description

The North-east Bailey Peninsula Antarctic Specially Managed Area is approximately 0.28 square kilometres in area and located on Bailey Peninsula adjacent to the Windmill Islands Group on the Budd Coast, Wilkes Land, East Antarctica, (Maps A and B). Bailey Peninsula is an area of rock exposures and permanent snow and ice fields and lies between Newcomb Bay and O'Brien Bay, two kilometres south of Clark Peninsula. The Area consists of an irregular area of exposed rock during summer on the northeast of Bailey Peninsula, with the north-western portion of the Area approximately 70 metres south of Brown Bay with Casey station (66°16'59.9"S, 110°31'59.9"E) approximately 200 metres to the west. Boundary coordinates for the Area are shown in Appendix I, Table 1. Topographically, Bailey Peninsula comprises low lying, rounded ice-free rocky outcrops (maximum altitude approximately 40 metres), and, approximately three kilometres east rising to the Løken Moraines (altitude approximately 130 metres). Intervening valleys are filled with permanent snow or ice, or glacial moraine and exfoliated debris and contain water catchment areas. The topography of Bailey Peninsula is shown at Map C.

Climate

The climate of the Windmill Islands region is frigid-Antarctic. Meteorological data for the period 1957 to 1983, from Casey station (altitude 32 m) on Bailey Peninsula show mean temperatures for the warmest and coldest months of 0.3 and -14.9˚C, respectively, with extreme temperatures ranging from 9.2 to -41˚C, mean annual temperature for the period was –9.3˚C. The climate is dry with a mean annual snowfall of 195 mm year^{-1} (rainfall equivalent), precipitation as rain has been recorded in the summer. However, within the last decade the mean annual temperature has changed to –9.1˚C and mean annual snowfall to 230 mm year^{-1} (rainfall equivalent).

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

Geology and Soils

Windmill Islands Region

The Windmill Islands region represent one of the eastern most outcrops of a Mesoproterozoic low-pressure granulite facies terrain that extends west to the Bunger Hills and further to the Archaean complexes in Princess Elizabeth Land, to minor exposures in the east in the Dumont d'Urville area and in Commonwealth Bay. The total outcrop areas do not exceed more than a few square kilometres. The Mesoproterozoic outcrop of the Windmill Islands and the Archaean complexes of Princess Elizabeth Land are two the few major areas in East Antarctica that can be directly correlated with an Australian equivalent in a Gondwana reconstruction. The Mesoproterozoic facies terrain comprise a series of migmatitic metapelites and metapsammites interlayered with mafic to ultramafic and felsic sequences with rare

calc-silicates, large partial melt bodies (Windmill Island supacrustals), undeformed granite, charnockite, gabbro, pegmatite, aplites and cut by easterly-trending late dolerite dykes.

Bailey Peninsula

Bailey Peninsula is part of a the northern gradation of a metamorphic grade transition which separates the northern part of the Windmill Islands region from the southern part. The metamorpohic grade ranges from amphibolite facies, sillimanite-biotite-orthoclase in the north at Clark Peninsula, through biotite-cordierite-almandine granulite, to hornblende-orthopyroxene granulite at Browning Peninsula in the south. The Ardery Charnockite of the south is prone to deep weathering and crumbles readily because of its mineral assemblage, whereas the metamorphic sequences of the northerly parts of the region have a much more stable mineral assemblage and crystalline structure. This difference has a significant influence on the distribution of vegetation in the Windmill Islands region with the northern rock types providing a more suitable substrate for slow growing lichens.

The leucocratic granite gneiss which constitutes the main outcrop on Bailey Peninsula, may be subdivided into leucogneiss and two different types of garnet-bearing gneiss. The outcrop on Bailey Peninsula is characterised as a garnet-bearing gneiss type 1 which is white, medium grained and foliated. The foliation is defined by the alignment of an early biotite generation that is tight to openly folded, with a garnet and a later biotite generation that overgrows the fabric. Unmetamorphosed and undeformed dolerite dykes occur over Bailey Peninsula such as at “Penguin Pass” (-66°17’18”, 110°33’16”E), to the south of the ASPA. Small outcrops of metapelite, metapsammite and leuco- gneisses occur on the Peninsula. Recent geochronology of the rocks of the Windmill Islands region suggest two major phases of metamorphism, the first at c. 1400-1310 Ma, an upper amphibolite facies event, followed by a granulite facies overprint c. 1210-1180 Ma. The geology of Bailey Peninsula is shown at Map F.

Glaciation

The Windmill Islands region was glaciated during the Late Pleistocene. The southern region of the Windmill Islands was deglaciated by 8000 corr. yr B.P., and the northern region, including Bailey Peninsula deglaciated by 5500 corr. yr B.P. Isostatic uplift has occurred at a rate of between 0.5 and 0.6 m/100 yr, with the upper mean marine limit, featured as ice-pushed ridges, being observed on Bailey Peninsula at approximately 30 metres where they extend in continuous rows from the present sea-level.

Soils

Soils on Bailey Peninsula are derived from weathered gneiss, moraine deposits and outwash gravels stemming from glacial episodes. Seabirds have a large impact on soil formation in the entire landscape. Soils are frozen much of the year, during summer the upper 30-60 cm thaws with the few top centimetres, refreezing at night. Soils are mainly formed by cryoturbation and cryoclastic weathering. In the vicinity of Casey station most soils are classified by Blume, Kuhn and Bölter (2002) as cryosols with lithic, leptic, skeletal, turbic and stagnic subunits. Other soils in the Area are gelic subunits of histosols, podzols, and regosols, boulder and rock outcrops with ecto- and enolithic flora are classified as Lithosols.

Lakes

Cold monomictic lakes and ponds occur throughout the Windmill Islands region in bedrock depressions and are usually ice-free during January and February. Nutrient rich lakes are found near the coast , in close proximity to penguin colonies or abandoned colonies, sterile lakes are located further inland and are fed by meltwater and local precipitation. A number of these lakes and ponds occur across Bailey Peninsula with two large lakes located 500 metres to the west of the Area. Two ponds occur within the protected Area, the largest being approximately 75 metres by 50 metres and the smaller approximately 25 metres diameter. The distribution of lakes and ponds on Bailey Peninsula is shown at Map E.

Vegetation

The vegetation of Bailey Peninsula is exceptionally well developed and diverse and represents one of the most important botanical sites on continental Antarctica. Within the relatively complex plant communities and contrasting habitats found on Bailey Peninsula, are found at least 23 lichens, three mosses, and an important stand of liverwort. The flora forms dense stands of macrolichens and in the moister and more sheltered areas bryophytes form closed stands of 25-50 m2 moss turf up to 30 cm in depth. The lichens, *Umbilicaria decussata, Pseudephebe minuscula* and *Usnea sphacelata* with mixed bryophytes dominate the vegetation cover of most of the ice-free areas, particularly on the north-east and centre of the Peninsula in dense lichen communities similar to those found on Clark Peninsula. Abandoned penguin colonies are dominated by *Xanthoria candelaria*, *Candelariella hallettensis, Buellia frigida* and *Usnea antarctica*. The most complex bryophyte communities are restricted to small locally moist hollows adjacent to melt pools and streams in the central north-east and central parts of the Peninsula. Vegetation is absent or poorly developed on the ice-free areas of the Peninsula's southern coast. Annex I, Table 2 provides a list of bryophytes and lichens identified in the Bailey Peninsula ASPA.

Two principal cryptogamic subformations are recognised; a lichen dominated association occupying a variety of windswept substrata ranging from bedrock to gravel, and, a short cushion and turf moss subformation comprising four moss dominated sociations. The vegetation of Bailey Peninsula is shown at Maps D and F.

At least 145 taxa of non-marine algae and cyanobacteria flora have been isolated and include 50 cyanobacteria, 70 chlorophytes and 23 chromophytes. The taxa have been found in snow and ice, soil, rocks, ephemeral ponds, tarns and lakes, 24 of these cyanobacterial and algal species occur in the snow. Snow algae are abundant and widespread in the icy corridors between the rocky outcrops and in semi-permanent snow drifts. A list of cyanobacterial and algal species from the Area, Bailey Peninsula, and the Windmill Islands region is shown in Appendix I, Table 3.

The vegetated soils of Bailey Peninsula contain fungal hyphae, yeasts, fungal propagules, an assortment of algae, cyanobacteria, protozoa, and provide a significant habitat for soil microfauna such as nematodes, mites, rotifers and tardigrades. There is relatively low fungal diversity in the Windmill Islands region, with 35 taxa representing 22 genera of fungi being isolated from soils, mosses, algae and lichens. Compared with mosses and algae, fungal distribution and diversity are poor in lichens. Thirty taxa have been detected in the soils in the vicinity of Casey station with 12 of these taxa restricted to anthropologically influenced soils around the station, *Penicillium* species dominated in these sites. Eight fungi taxa have been

isolated from soils within the Area. More broadly within the Windmill Islands region, 21 taxa have been isolated from the mosses, *Bryum pseudotriquetrum, Ceratodon purpureus* and *Grimmia antarctici*, with 12 taxa isolated from algae and 6 taxa from the lichens, *Xanthoria candelaria, Umbilicaria decussata* and *Usnea sphacelata*. A number of fungi have also been found associated with animals of the region. Appendix I, Table 4 provides detail of the taxa and their source.

Birds

Four species of birds are known to nest in the vicinity of Bailey Peninsula. These include Adélie Penguin *Pygoscelis adeliae*, which is the most abundant bird species in the Area. The nearest breeding colony is on Shirley Island about 1.5 km west of Casey station. Snow Petrels *Pagodroma nivea*, are seen all year-round and breed throughout the Windmill Islands region including Reeve Hill about 750 metres west of the Area and Budnick Hill, 600 metres to the northwest. Wilson's Storm Petrel *Oceanites oceanicus*, breeds throughout the Windmill Islands region and nests in the Area. The Antarctic Skua *Catharacta maccormicki*, breeds throughout the Windmill Islands region at widely dispersed nests, mostly near Adélie Penguin colonies.

Other birds that breed in the Windmill Islands region but not in the immediate vicinity of Bailey Peninsula include Southern Giant Petrel *Macronectes giganteus*, Cape Petrel *Daption capense*, Southern Fulmar *Fulmarus glacialoides* and Antarctic Petrel *Thalassoica antarctica*. The Emperor Penguin *Aptenodytes forste*ri is a common visitor to the Windmill Islands region and a breeding colony of approximately 2000 pairs is established in the area of Peterson Bank.

Terrestrial invertebrates and microbial communities

The Antarctic flea *Glaciopsyllus antarcticus,* has been found in the nests of Southern fulmars, *Fulmarus glacialoides.* The anopluran louse, *Antarctophthirus ogmorhini*, is found on the Weddell Seal, *Leptonychotes weddellii.* A number of species of mallophagan lice have also been found on birds.

The mite *Nanorchestes antarcticus* has been found on Bailey Peninsula at sites characterised as having sandy or gravelly soils, free of extensive moss or lichen cover, and moist but not water-logged.

Five species of tardigrades have been collected on Bailey Peninsula, *Pseudechiniscus suillus, Macrobiotus* sp.*, Hypsibius antarcticus, Ramajendas frigidus and Diphascon chilenense.* Significant positive associations between bryophytes and the most common species of tardigrades, *P. suillus, H. antarcticus* and *D. chilenense*, have been found, and strong negative associations between those species and algae and lichens have been established. No systematic or ecological accounts of nematodes have yet been published for the Windmill Islands region.

Protozoa have been studied on at a number of sites on Bailey Peninsula and in the Area, ciliates and testate amoebae are active. Twenty seven ciliate species and six testacean species have been found. The species are shown in Table 5.

6(ii) Special Zones within the Area

There are no special zones within the Area.

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

Casey station (Australia) is located west of the northern portion of the Area. Prior to the designation of the Area as a protected site in 1986 an array of radio transmitters

had been established on the site progressively from 1964. During the summer of 2001/2002 redundant aerials and infrastructure were removed. A number of structures remain within the Area. These are a small storage rack in the north-west of the Area, the transmitter building and rigging store of 52.3 m^2, a 45 metre high tandem delta antenna mast located in the south east of the protected Area. Another 35 metre mast is located approximately 100 metres south of the Area.

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

The nearest protected Area to North-east Bailey Peninsula is Clark Peninsula, Antarctic Specially Protected Area No. 136, 2.5 km north-east of Bailey Peninsula, across Newcomb Bay, adjacent to abandoned Wilkes 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 lying in Vincennes Bay, is approximately 11 km south of Casey station, west of Robinson Ridge.

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 compelling scientific research, maintenance of the Tandem Delta antenna communications installation and associated facilities, or for essential management purposes consistent with the Management Plan's objectives and provisions, and providing that the actions permitted will not jeopardise the ecological or scientific values of the Area or interfere with existing scientific studies. Conditions that must be included in the Permit are that the Permit or an authorised copy shall be carried within the Area, and that the Permit specify the period for specific activities. 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

Vehicles are prohibited within the Area and access should be by foot. The Area is accessible by walking, the Casey station precinct lies approximately 200 west of the north-west of the Area. Helicopters are prohibited from landing within the Area. Visitors should avoid walking on visible vegetation. Care should be exercised walking in areas of moist ground, where foot traffic can easily damage sensitive soils, plant or algae 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 walk on bare rocks and minimise impacts.

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

- Compelling scientific research which cannot be undertaken elsewhere and which will not jeopardise the ecosystem of the Area.
- Essential management activities, including monitoring.
- Sampling, but this should be the minimum required for the approved research programs.
- Maintenance and activities associated with the antennas and transmitter facility.

7(iii) Installation, modification or removal of structures

Any structures erected or installed within the Area are to be specified in a Permit. Scientific markers and equipment must be secured and maintained in good condition, clearly identifying the permitting country, name of principal investigator and year of installation. All such items should be made of materials that pose minimum risk of contamination of the Area. Removal of equipment associated with scientific research before the Permit for that research expires, shall be a condition of the Permit. Details of markers and equipment left in situ (GPS locations, description, tags, etc. and expected "use by date") should be reported to the permitting Authority.

7(iv) Location of field camps

Parties are prohibited from camping within the Area.

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

- No living animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions shall be taken against accidental introductions.
- No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in a Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted.
- Fuel is not to be stored in the Area unless required for essential purposes connected with the activity for which the Permit has been granted. Permanent fuel depots are not permitted.
- All material introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction to 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 taking or harmful interference with animals is involved this should, as a minimum standard, be in accordance with the *SCAR Code of Conduct for the Use of Animals For Scientific Purposes in Antarctica.*

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

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

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

7(viii) Disposal of waste

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

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

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

Remove the storage rack and supplies located in the north-west of the Area, provided doing so does not adversely impact on the values of the Area.

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

To help maintain the ecological and scientific values of the plant communities found in the Area persons entering the Area 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 footwear and any equipment to be used in the Area – including sampling equipment and markers – shall be thoroughly cleaned before entering the Area.

7(x) Requirements for reports

Parties should ensure that the principal Permit 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 contained in Appendix 4 of Resolution 2 (1998)(CEPI). 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. Supporting Documentation

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Annex I

Table 1: North-east Bailey Peninsula, Antarctic Specially Protected Area No 135, boundary coordinates.

Boundary Point	Longitude	Latitude	Boundary Point	Longitude	Latitude
1	110°32′42″	66°17′3″	**15**	110°32′12″	66°16′51″
2	110°32′56″	66°17′11″	**16**	110°32′16″	66°16′52″
3	110°32′50″	66°17′11″	**17**	110°32′19″	66°16′53″
4	110°32′41″	66°17′10″	**18**	110°32′19″	66°16′55″
5	110°32′22″	66°17′7″	**19**	110°32′24″	66°16′55″
6	110°32′20″	66°17′6″	**20**	110°32′25″	66°16′53″
7	110°32′18″	66°17′2″	**21**	110°32′29″	66°16′53″
8	110°32′18″	66°17′0″	**22**	110°32′44″	66°16′54″
9	110°32′14″	66°16′60″	**23**	110°33′9″	66°17′5″
10	110°32′9″	66°16′56″	**24**	110°33′11″	66°17′6″
11	110°32′8″	66°16′54″	**25**	110°33′10″	66°17′9″
12	110°32′5″	66°16′54″	**26**	110°33′2″	66°17′11″
13	110°32′7″	66°16′52″	**27**	110°32′56″	66°17′11″
14	110°32′7″	66°16′52″			

Table 2: Mosses, Liverworts and Lichens identified from North-east Bailey Peninsula Antarctic Specially Protected Area No. 135, (from Mellick 1994, Seppelt pers. comm.).

Mosses
Bryum pseudotriquetrun (Hedw.) Gaertn., Meyer et Scherb.
Ceratodon purpureus (Hedw.) Brid.
Schistidium antarctici (Card.)
Liverworts
Cephaloziella varians Steph.
Lichens
Acarospora gwynii Dodge & Rudolph
Amandinea petermannii (Hue) Matzer, H. Mayrhofer & Scheid.
Buellia cf. cladocarpiza Lamb?
Buellia frigida (Darb.) Dodge
Buellia grimmiae Filson
Buellia cf. lignoides Filson
Buellia papillata Tuck.
Buellia pycnogonoides Darb.
Buellia soredians Filson
Caloplaca athallina Darb.
Caloplaca citrina (Hoffm.) Th. Fr.
Candelariella flava (C.W. Dodge & Baker) Castello & Nimis
Lecanora expectans Darb.
Lecidea spp.
Lecidea cancriformis Dodge & Baker (=*Lecidea phillipsiana* Filson)
Lecidea andersonii Filson
Lepraria sp.
Pleopsidium chlorophanum (Wahlenb.) Zopf
Rhizocarpon flavum Dodge & Baker
Rhizoplaca melanophthalma (Ram.) Leuck. & Poelt
Rinodina olivaceobrunnea Dodge & Baker
Rinodina petermannii (Hue) Darb.
Physcia caesia (Hoffm.) Hampe
Umbilicaria aprina Nyl.
Umbilicaria decussata (Vill.) Zahlbr.
Umbilicaria cf. propagulifera (Vainio) Llano
Xanthoria elegans (Link) Th. Fr.
Xanthoria mawsonii Dodge.
Pseudephebe minuscula (Nyl ex Arnold) Brodo & Hawksw.
Usnea antarctica Du Rietz
Usnea sphacelata R. Br.

Table 3: Fungi isolated from soils, mosses, lichens and algae from ASAP No 135, North-east Bailey Peninsula and from species of wider distribution in the Windmill Islands region (from Azmi and Seppelt 1998)

			Windmill Islands Region Species				
	ASPA No. 135	Bailey Peninsula	Bryum pseudotri-quetrum	Ceratodon purpureus	Grimmia antarctici	Algae	Lichens*
Acremonium sp.					✓		
Acremonium crotociningenum		✓					✓
Alternaria alternata		✓					
Arthrobotrys			✓	✓			
Aspergillus nidulans		✓					
Aspergillus sp.						✓	
Botrytis cinerea		✓					
Chrysosporium sp	✓		✓	✓	✓		
Chrysosporium pannorum	✓	✓	✓	✓	✓	✓	✓
Cladosporium sp.		✓					
Diplodia sp.		✓					
Fusarium oxysporum		✓					
Geomyces sp.		✓	✓	✓		✓	✓
Geotrichum sp.							
Mortierella sp.		✓	✓		✓	✓	✓
Mortierella gamsii		✓	✓				
Mucor pyriformis		✓	✓		✓		
Mycelia sterilia 1	✓		✓	✓	✓	✓	✓
Mycelia sterilia 2	✓		✓	✓	✓	✓	
Mycelia sterilia 3	✓		✓	✓	✓		
Mycelia sterilia		✓					
Nectria peziza		✓	✓		✓		
Penicillium chrysogenum	✓		✓		✓	✓	
P. commune		✓					
P. corylophilum		✓					
P. expansum		✓	✓	✓		✓	
P. hirsutum		✓					
P. palitans		✓	✓	✓	✓		
P. roqueforti		✓					
Penicillium sp.			✓	✓	✓	✓	
Penicillium sp. 1							
Penicillium sp. 2							
Phialophora malorum		✓	✓	✓	✓	✓	
Phoma herbarum		✓	✓	✓	✓		
Phoma sp.	✓						
Phoma sp. 1			✓	✓	✓		
Phoma sp. 2				✓	✓		
Rhizopus stolonifer		✓				✓	
Sclerotinia sclerotiorum		✓					
Thelebolus microsporus	✓	✓	✓	✓	✓	✓	✓
Trichoderma harzianum		✓					
T. pseudokoningi		✓					

*Lichens are *Xanthoria candelaria, Umbilicaria decussata and Usnea sphacelata.*

Table 4: Cyanobacterial and algal species identified from the Windmill Islands region.
The taxa are listed in alphabetical order under each phylum together with their habitats and whether they are maintained in culture. *A = Aquatic, T = Terrestrial* (from soil), *S = Snow* or ice and *C = Culture*. (from Ling and Seppelt 1998)

Cyanobacteria	
Aphanothece castagnei (BRÉB.) RABENH.	A
Aphanocapsa elachista var. irregularis BOYE-PET.	A
Aphanocapsa muscicola (MENEGH.) WILLE	A
Aphanothece saxicola NAGELI	A
Aphanothece sp.	A
Calothrix parietina THUR.	A
Chamaesiphon subglobosus (ROS-TAF.) LEMMERM.	A
Chroococcus dispersus (KEISSL.) LEMMERM.	A
Chroococcus minutus (KÜTZ.) NÄGELI	A
Chroococcus turgidus (KÜTZ.) NÄGELI	A
Dactylococcopsis antarctica F E. FRITSCH	A
Dactylococcopsis smithii R. et E CHODAT (= *Rhabdogloea smithii* (R. et E CHODAT)	A
Eucapsis sp.	T
Gloeocapsa dermochroa NÄGELI	A
G. kuetzingiana NÄGELI	A
Hammatoidea sp.	A
Homoeothrix sp.	A
Isocystis pallida WORON.	AT
Katagnymene accurata GEITLER	AT
Lyngbya attenuata FRITSCH	A
Lyngbya martensiana MENEGH.	A
Merismopedia tenuissima LEMMERM.	AT
Myxosarcina concinna PRINTZ	A
Nodularia harveyana var. *sphaerocarpa* (BORN. et FLAH.)ELENKIN	A
Nostoc commune VAUCHER	ATC
Nostoc sp.	T
Oscillatoria annae VAN GOOK	A
Oscillatoria fracta CARLSON	A
Oscillatoria irrigua KÜTZ.	A
Oscillatoria lemmermannii Wolosz.	A
Oscillatoria proteus SKUJA	A
Oscillatoria sp. (BROADY 1979a, *Oscillatoria* cf. *limosa* AGARDH)	A
Oscillatoria sp. (BROADY 1979a, *Oscillatoria* sp. C)	T
Phormidium autumnale(AGARDH) GOMONT	T
Phormidium foveolarum GOMONT	A
Phormidium frigidum F.E. FRITSCH	A
Phormidium subproboscideum (W et G. S. WEST) ANAGNOST et KOMAREK.	A
Phormidium sp.	A
Plectonema battersii GOMONT	A
Plectonema nostocorum BORNET	A
Pseudanabaena mucicola (HUB.-PEST. et NAUM.) BOURR.	A
Schizothrix antarctica F E. FRITSCH	A
Stigonema mesentericum GEITLER f.	T
Stigonema minutum (AGARDH) HASSALL	T
Stigonema sp.	T
Synechococcus aeruginosus NÄGELI	T
Synechococcus maior SCHROETER	AT
Tolypothrix byssoidea (BERK.) KIRCHNER f	A
Tolypothrix distorta var. *penicillata* (AGARDH)LEMMERM.(= Tolypothrix penicillata THURET)	A
Chlorophyta	
Actinotaenium cucurbita (BRÉB.) TEILING	AC
Apodochloris irregularis LING et SEPPELT	AC
Asterococcus superbus (CIENK.) SCHERFF.	AC
Binuclearia tatrana WITTR.	AC
Binuclearia tectorum (KÜTZ.) BEGER	AC
Chlamydomonas pseudopulsatilla GERLOFF	S
Chlamydomonas sphagnicola (F.E. FRITSCH) FE. FRITSCH et TAKEDA	TC
Chlamydomonas subcaudata WILLE	A
Chlamydomonas sp. 1	A
Chlamydomonas sp. 2	A
Chlorella vulgaris BEIJ.	AT
Chloromonas brevispina HOHAM, ROEMER et MULLET	S
Chloromonas polyptera (F.E. FRITSCH) HOHAM, MULLET et ROEMER	SC
Chloromonas rubroleosa LING et SEPPELT	SC
Chloromonas sp. 1	SC
Chloromonas sp. 2	A
Coenochloris sp.	T
Desmococcus olivaceus (PERS. ex ACH.) LAUNDON	ATC
Desmotetra sp. 1	SC
Desmotetra sp. 2	SC
Dictyosphaerium dichotomum LING et SEPPELT	T
Fernandinella alpina CHODAT	AC
Geminella terricola BOYE-PET.	T

Gloeocystis polydermatica (KÜTZ.) HINDAK	T
Gloeocystis vesiculosa NÄGELI	T
Gongrosira terricola BRISTOL	AC
Gonium sociale (DUJARD.) WARM.	AC
Hormotila sp.	SC
Kentrosphaera bristolae G.M.SMITH	A
Klebsormidium dissectum var. 1(BROADY 1979a, *Chlorhormidium dissectum* var. A)	T
Klebsormidium subtilissimum (RABENH.) SILVA, MATTOX et BLACKWELL	A
Klebsormidium sp. (BROADY 1981, *Klebsormidium* sp. A)	SC
Lobococcus sp.?	T
Lobosphaera tirolensis REISIGL	TC
Macrochloris multinucleate (REISIGL)ETTL et GARTNER	ATC
Mesotaenium berggrenii (WITTR.) LAGERH. f.	S
Monoraphidium contortum (THUR.) KOMARK.-LEGN.	A
Monoraphidium sp.	S
Myrmecia bisecta REISIGL	T
Palmella sp. 1	TC
Palmella sp. 2	A
Palmellopsis sp.	SC
Prasiococcus calcarius (BOYE-PET.) VISCHER	ATSC
Prasiola calophylla (CARMICH.) MENEGH.	TC
Prasiola crispa (LIGHTF.) MENEGH.	ATSC
Prasiola sp.?	A
Pseudochlorella subsphaerica REISIGL	T
Pseudococcomyxa simplex (MAINX) FOTT	T
Pyramimonas gelidicola MCFADDEN, MOESTRUP et WETHERBEE	A
Pyramimonas sp.	A
Raphidonema helvetica KOL	S
Raphidonema nivale LAGERH.	S
Raphidonema sempervirens CHODAT	TC
Raphidonema tatrae KOL	S
Schizogonium murale KÜTZ.	ATC
Schizogonium sp.	AT
Staurastrum sp.	A
Stichococcus bacillaris NÄGELI	TSC
Stichococcus fragilis (A. BRAUN) GAY	A
Stichococcus minutus GRINTZESCO et PETERFI	S
Tetracystis sp. 1	TC
Tetracystis sp. 2	TC
Trebouxia sp.	TC
Trichosarcina mucosa (B BROADY) CHAPPELL et O'KELLY	TC
Trochiscia sp. (BROADY 1979x,	A

Trochiscia sp. A)	
Ulothrix implexa (KÜTZ.) KÜTZ. A	
Ulothrix zonata (WEBER et MOHR) KÜTZ	
Ulothrix sp. 1	A
Ulothrix sp. 2	S
Uronema sp.	S
Xanthophyta	
Botrydiopsis sp.	TC
Bumilleriopsis sp.	TC
Ellipsoidion sp.?	S
Fremya sp.	ATC
Gloeobotrys sp.	A
Heterococcus filiformis PITSCHM.	TC
Heterococcus sp.	TC
Heterothrix debilis VISCHER	TC
Tribonema microchloron ETTL	A
Chrysophyta	
Chrysococcus sp.	S
Chroomonas lacustris PASCHER et RUTTNER	A
Dinophyta	
Gymnodinium sp.	A
Bacillariophyta	
**Achnanthes coarctata* var. *elliptica* KRASSKE	S
Amphora veneta KÜTZ.	A
**Cocconeis imperatrix* A. SCHMIDT	S
**Diploneis subcincta* (A. SCHMIDT) CLEVE	S
**Eucampia balaustium* CASTRAY	S
Fragilaria sp.	A
Fragilariopsis antarctica (CASTRAY) Hust.	A
Hantzschia amphioxys (EHRENB.) GRUN.	A
Navicula atomus (NÄG.)GRUN.	A
Navicula murrayi W. et G. S. WEST	A
Navicula muticopsis VAN HEURCK	AT
Navicula sp.	A
Nitzschia palea (KÜTZ.) W. S M.	AT
Pinnularia borealis EHRENB.	AT
Torpedoes laevissima W et G. S. WEST	A

*Believed to be marine diatoms from wind-borne sea spray.

Table 5: Ciliates and Testate Amoebae active in the vicinity of Casey station on Bailey Peninsula. (Modified from Petz and Foissner 1997)

Ciliates
Bryometopus sp
Bryophyllum cf. loxophylliforme
Colpoda cucullus (Mueller, 1773)
Colpoda inflata (Stokes, 1884)
Colpoda maupasi Enriques, 1908
Cyclidium muscicola Kahl, 1931
Cyrtolophosis elongata (Schewiakoff, 1892)
Euplotes sp.
Fuscheria terricola Berger and others, 1983
Gastronauta derouxi Blatterer and Foissner, 1992
Halteria grandinella (Mueller, 1773)
Holosticha sigmoidea Foissner, 1982
Leptopharynx costatus Mermod, 1914
Odontochlamys wisconsinensis (Kahl, 1931)
Oxytricha opisthomuscorum Foissner and others, 1991
Parafurgasonia sp.
Paraholosticha muscicola (Kahl, 1932)
Platyophrya vorax Kahl, 1926
Pseudocohnilembus sp.
Pseudoplatyophrya nana (Kahl, 1926)
Pseudoplatyophrya cf. saltans
Sathrophilus muscorum (Kahl, 1931)
Sterkiella histriomuscorum (Foissner and others, 1991)
Sterkiella thompsoni Foissner, 1996
Trithigmostoma sp.
Vorticella astyliformis Foissner, 1981
Vorticella infusionum Dujardin, 1 841
Testate amoebae
Assulina muscorum Greeff, 1888
Corythion dubium Taranek, 1881
Euglypha rotunda Wailes and Penard, 1911
Pseudodifflugia gracilis var. *terricola* Bonnet and Thomas, 1960
Schoenbornia viscicula Schoenborn, 1964
Trachelocorythion pulchellum (Penard, 1890)