

Antarctic Specially Protected Area No. 138 (Site of Special Scientific Interest No. 19)

Linnaeus Terrace, Asgaard Range, Victoria Land

1. Description of Values to be Protected

Linnaeus Terrace was originally designated in Recommendation XIII-8 (1985, SSSI No. 19) after a proposal by the United States of America on the grounds that the Area is one of the richest known localities for the cryptoendolithic communities that colonize the Beacon Sandstone. Exposed surfaces of the Beacon Sandstone are the habitat of cryptoendolithic microorganisms, which may colonize a zone of up to 10 millimetres deep below the surface of the rocks. The sandstones exhibit a range of biological and physical weathering forms, as well as trace fossils, and many of the formations are fragile and vulnerable to disturbance and destruction by trampling and sampling. Cryptoendolithic communities are known to develop over time periods in the order of tens of thousands of years, and damaged rock surfaces would be slow to recolonize. The excellent examples of these communities found at the site are the subject of the original detailed Antarctic cryptendolithic descriptions. As such, Linnaeus Terrace is considered a type locality with outstanding scientific values related to this ecosystem. These values, as well as the vulnerability of the site to disturbance and destruction, require that it receives long-term special protection.

2. Aims and objectives

Management at Linnaeus Terrace aims to:

- avoid degradation of, or substantial risk to, the values of the Area;
- prevent unnecessary human disturbance to the Area and protect the fragile rock formations from breakage;
- permit research on the cryptoendolithic communities while ensuring they are protected from over-sampling;
- permit visits for management purposes in support of the objectives of the management plan.

3. Management activities

- Durable wind direction indicators should be erected close to the designated helicopter landing site whenever it is anticipated there will be a number of landings at the Area in a given season. These should be replaced as needed and removed when no longer required.
- Brightly colored markers, which should be clearly visible from the air and pose no significant threat to the environment, shall be placed to mark the helicopter landing pad.
- Markers or structures erected within the Area for scientific or management purposes shall be 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 Programs operating in the region shall consult together with a view to ensuring these steps are carried out.

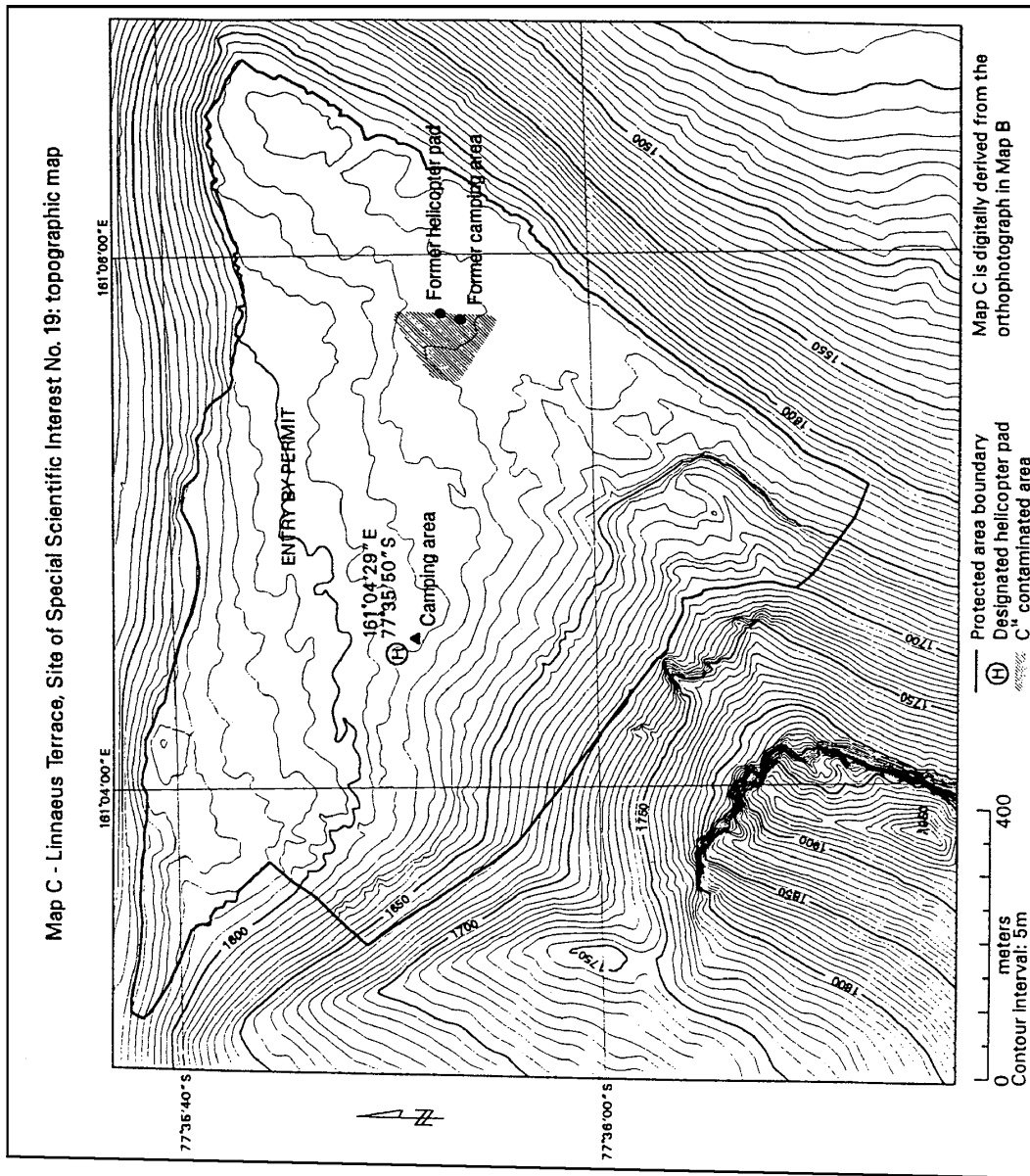
4. *Period of designation*

Designated under ATCM Measure XX-1 (1995) for an indefinite period.

5. *Maps and photographs*

Map C: Linnaeus Terrace, topographic map.

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°01'16.211"S Spheriod: WGS84; Positional accuracy of original orthophotograph at 1:2,500 is ca. 0.5m.



ASP A 138
Map A*

6. Description of the Area

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

Linnaeus Terrace (161°05'00"E, 77°35'50"S) is an elevated bench of weathered Beacon Sandstone approximately 1.5 km in length and 1 km in width. It is located at the east end of the Asgaard Range, 1.5 km north of Oliver Peak (161°02'30"E, 77°36'40"S) at an elevation of about 1600 m. The Area overlooks the South Fork of the Wright Valley, is about 4 km from Don Juan Pond and 10 km from the terminus of the Wright Upper Glacier (Map A and Figure 1). The boundaries of the Area and prominent features are shown in the accompanying maps and figures.

On the ground, the lower (northern) boundary of the Area is characterized by the presence of a predominantly sandstone outcrop of approximately 3 m in height which extends for much of the length of the terrace. The lower boundary of the Area is defined as the upper edge of this outcrop, and as straight lines adjoining the visible edges where the outcrop is covered by surface talus (Figure 2). The upper (southern) boundary of the Area is characterized by a line of sandstone outcrop of about 2-5 m in height, occurring between the elevations of 1660-1700 m about 70 m above the general elevation of the terrace. The upper boundary of the Area is defined as the uppermost edge of this outcrop, and shall be considered a straight line between the visible edges where the outcrop is covered by surface talus (Map B, Figure 2). The west end of the Area is defined as where the terrace narrows and merges with a dolerite talus slope on the flank of the NW ridge of Oliver Peak. The boundary at the west dips steeply from where the upper outcrop disappears, following the border of the dolerite talus with the terrace sandstone down to the westernmost corner. The east boundary is defined as the 1615 m contour, which follows closely the edge of an outcrop which extends much of the width of the terrace. At the southernmost corner of the Area the terrace merges with the slopes into the valley to the east: from this point the boundary extends upward to the 1700 m contour, from where it follows the line of outcrop defining the south boundary (Map B, Figure 2).

Winter air temperature at Linnaeus Terrace ranges between -20°C and -45°C, while in January the daily mean is -5°C. Cryptoendolithic microorganisms typically colonize porous Beacon sandstones with a 0.2 - 0.5 mm grain size, with an apparent preference for rocks stained tan or brown by Fe⁺³-containing oxyhydroxides. A silicified crust of about 1 mm thickness on many of the rocks probably facilitates colonization by stabilizing the surface and reducing wind erosion. Three of the five described cryptoendolithic microbial communities have been found on Linnaeus Terrace: the Lichen Dominated, Red-Gloeocapsa and Chroococciopsis Communities. Linnaeus Terrace is the type locality of the endemic green algal genus *Hemichloris* and of the endemic Xanthopycean algal species *Heterococcus endolithicus*. The Area is unusual in that so many different living and fossil endolithic communities are present within a small area. The main physical and biological features of these communities and their habitat are described in Friedmann, E.I. (ed) 1993 *Antarctic Microbiology*, Wiley-Liss, New York.

A small area (Map C) has been contaminated by release of the C(14) radioactive isotope. While the contamination poses no significant human or environmental threat, any samples gathered within this area are considered unsuitable for scientific work using C(14) techniques.

6(ii) Restricted zones within the Area

None.

6(iii) Structures within the Area

A number of rocks within the Area have small instruments installed into them for scientific purposes and should not be disturbed.

6(iv) Location of other Specially Protected Areas or Sites of Special Scientific Interests within close proximity of the Area

None.

7. Permit conditions

Permits may be issued only by appropriate national authorities as designated under Annex V, Article 7 of the Protocol on Environmental Protection to the Antarctic Treaty. Conditions for issuing a Permit to enter the Area are that:

- it is issued only for scientific study of the cryptoendolithic ecosystem, or for a compelling scientific or management purpose that cannot be served elsewhere;
- the actions permitted will not jeopardize the natural ecological system 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 authorized copy, shall be carried within the Area;
- a Visit Report is supplied to the authority named in the Permit;
- any Permit issued shall be valid for a stated period.

7(i) Access to and movement within the Area

Access to the Area is permitted by foot or by helicopter. No special restrictions apply to the routes used to move to and from the Area. Helicopters shall land only at the designated site at the west end of the terrace (161°04'29"E, 77°35'50"S, elevation 1610 m: Maps B and C), except when specifically authorized by Permit otherwise for a compelling scientific or management purpose. Use of helicopter smoke bombs within the Area is discouraged. When transporting permitted 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 sites unless specifically authorized by a Permit. Land vehicles are prohibited within the area.

Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities. Visitors should avoid breaking fragile rock formations.

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

- Scientific research which will not jeopardize the ecosystem of the Area;
- Essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

No structures, except boundary markers and signs, 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 of the Area. Removal of specific equipment for which the Permit has expired shall be the responsibility of the authority which granted the original Permit.

7(iv) Location of field camps

Camping is permitted within the Area only at the designated site in the immediate vicinity of the helicopter landing pad (Maps B and C).

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

To avoid compromising the microbial ecosystem for which this site is protected, no living animals, plant material or microorganisms shall be deliberately introduced into the Area and precautions should 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. Food, fuel, and other materials are not to be stored in the Area, unless required for essential purposes connected with the activity for which the Permit has been granted. All such materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized.

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 be in accordance with the SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica, as a minimum standard.

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. Material of human origin, not brought into the Area by the Permit Holder, but which is likely to compromise the values of the Area may be removed from any part of the Area.

7(viii) Disposal of waste

All wastes, including all human wastes, must 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 amounts of biological material for analysis or audit, or to carry out protective measures.

7(x) Requirements for reports

Parties should ensure that the principal holder of each permit issued submit to the appropriate authority a report describing the activities undertaken. Such report should include, as appropriate, the information identified in the Visit Report form suggested by SCAR. Parties should provide summary descriptions of activities conducted by persons subject to their jurisdiction, in sufficient detail to allow evaluation of the effectiveness of the management plan. Parties should, wherever possible, deposit originals of 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.