

Management Plan for Antarctic Specially Protected Area No 123

BARWICK AND BALHAM VALLEYS, SOUTHERN VICTORIA LAND

1. Description of values to be protected

An area of 325km² at Barwick Valley, including part of adjacent Balham Valley, was originally designated in Recommendation VIII-4 (1975, SSSI No 3) after a proposal by the United States of America on the grounds that it was "one of the least disturbed and contaminated of the Dry Valleys of Victoria Land" and was important as a reference base against which to measure changes in comparable ecosystems of the other Dry Valleys where scientific investigations were being regularly conducted. The site remains distant from field stations and has not been subjected to intensive visitation or research. The Barwick Valley was first visited in 1958 and several subsequent expeditions were conducted in the 1960s through to 1975, after which time visits have been few because of the designation of the SSSI. Although some human impacts from these early expeditions were visible within the region in 1993-94, Barwick and Balham Valleys are believed to remain one of the least impacted areas in the Victoria Land Dry Valleys region of Antarctica.

The boundaries of the original Area were enlarged in 2002 (Measure 1) to include more of the Balham Valley catchment, and rationalized to exclude the Victoria Upper Glacier catchment which was previously within the Area, resulting in a total area of 480km². The current Management Plan has been updated to include additional provisions to reduce the risk of microbial and vegetation introductions from soils at other Antarctic sites, or from regions outside Antarctica.

The Victoria Land Dry Valleys have a unique and extreme polar desert ecosystem. The Area contains examples of a wide variety of the environments found in this ecosystem, including desert pavements, sand dunes, patterned ground, glacial and moraine features, streams, freshwater and saline lakes, valleys and high-altitude ice-free ground. Some of the best examples of ventifact pavements and weathering-pitted dolerites are found on the valley floors, along with examples of chasmolithic lichens, layered communities of endolithic lichens, fungi, algae and associated bacteria, and populations of soil and lake microflora. Special protection of the Area provides the opportunity to conserve a relatively pristine example of this ecosystem as a baseline for future reference. Protection on a catchment basis serves to provide greater representation of the ecosystem features, and also facilitates management of the Area as a geographically distinct and integrated ecological system. The high ecological values, as well as the scientific, aesthetic and wilderness values derived from the isolation and relatively low level of human impact are important reasons for special protection at Barwick and Balham Valleys.

2. Aims and objectives

Management at Barwick and Balham Valleys aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- conserve the natural ecosystem as a reference area largely undisturbed by direct human activities;
- allow scientific research on the natural ecosystem and physical environment in the Area provided it is for compelling reasons which cannot be served elsewhere;

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- minimize human disturbance to the Area by preventing unnecessary sampling;
- minimize the possibility of introduction of alien plants, animals and microbes to the Area;
- allow visits for management purposes in support of the protection of the values and features of the Area.

3. Management activities

- Copies of this management plan, including maps, shall be kept available in the principal research hut facilities in the vicinity of the Area and at McMurdo Station and Scott Base;
- Visits shall be made as necessary to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate;
- National Antarctic Programs operating in the region shall consult together for the purpose of ensuring that the above provisions are implemented.

4. Period of designation

Designated for an indefinite period.

5. Maps

Map 1: ASPA No 123 Barwick and Balham Valleys, Topography and boundary. Map specifications: Projection: Lambert conformal conic; Standard parallels: 1st 77° 15' S; 2nd 77° 25' S; Central Meridian: 161° 10' E; Latitude of Origin: 78° 00' S; Spheroid: WGS84 approximation; Datum: 'Camp Area' Local.

- Inset 1: Ross Sea region, showing the location of the McMurdo Dry Valleys and Inset 2.
- Inset 2: McMurdo Dry Valleys and Ross Island, showing location of McMurdo Station (US) and Scott Base (NZ), Antarctic Specially Managed Area No 2 McMurdo Dry Valleys (ASMA No 2), and the location of other Antarctic Specially Protected Areas in the McMurdo Dry Valleys (ASPAs No 131, Canada Glacier, and ASPA No 138, Linnaeus Terrace).

6. Description of the Area

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

Barwick Valley (161° E, 77° 20' S) is situated about 65km inland from the Ross Sea coast of southern Victoria Land (Map and Insets). The Area includes Barwick and Balham Valleys and their respective catchments and is bordered on the south, west and north by the McKelvey Valley, the Willet Range and the divide between the Victoria and Barwick Valleys, respectively.

The boundary of the Area extends from its eastern extremity in the lower Barwick Valley (around the confluence of the Barwick, Victoria and McKelvey Valleys) several kilometers south towards the ridge leading SW to the summit of Mount Insel (1345m), from where the boundary follows the high points of the ridge of the Insel Range for 5km before descending to a low pass between the McKelvey and Balham Valleys at the location of Bullseye Lake. The boundary crosses the lake before ascending the ridge to a further high point on the Insel Range (approximately 1250m), and continues towards the upper reaches of the Balham Valley. As the terrain becomes gentler in the

upper Balham and approximately 7km east of the summit of Shapeless Mountain (2736m), the boundary extends northward at an elevation of approximately 1800m towards Apocalypse Peaks. The boundary extends NW from the Apocalypse Peaks for approximately 9km towards a prominent ridge leading to the summit of Mount Bastion (2477m, 160°29'E, 77°19'S). This ridge is followed in a northerly direction to Skew Peak (2535m, 160°41'E, 77°13'30'S), located at the head of the Barwick Valley. The boundary then descends along the east ridge of Skew Peak above Webb Glacier, before following the catchment boundary in a more southerly direction toward Parker Mesa. From Parker Mesa the boundary descends further to follow the dividing ridge between the catchments of the Victoria Upper Glacier and the Barwick Valley. The boundary extends east along this ridge for 13km to Sponsors Peak (1454m, 161°24'E, 77°18'S). The boundary descends the SW ridge of Sponsors Peak and Nickell Peak (approximately 1400m) to the lower Barwick to the eastern extremity of the Area, which is about 4km north-west of Lake Vida, Victoria Valley.

An extensive névé south of Skew Peak feeds the Webb Glacier in the upper Barwick Valley. Very little ice from the Polar Plateau flows over the scarp into the Barwick Valley, as flow vectors and debris cover patterns on the Webb Glacier in this location indicate that this part of the glacier is almost stationary. The Barwick and Balham Valleys merge in the south-east of the Area, 9km from where the Barwick joins the Victoria Valley. A series of lakes occupy the Barwick Valley, the largest being Webb Lake (approximate elevation 650m) at the snout of Webb Glacier. Lake Vashka (approximate elevation 507m), partially filling an unusually deep circular depression, is the second largest and 5.7km down-valley from Webb Lake. Hourglass Lake (approximate elevation 625m), the next largest, is approximately half way between Webb Lake and Lake Vashka. An intermittent stream connecting this series of lakes terminates at Lake Vashka, which has a level well below its overflow threshold. Early observations of the smooth surfaces of Lakes Webb and Vashka suggested that they are 'ice-block' lakes that contain no significant liquid water. However, liquid water up to several meters in depth was observed at the perimeter of Lake Vashka in December 1993. Recent studies on the physical features of any of the Barwick Valley lakes have not been made. Lake Balham, a small lake in a depression (<700m elevation) below Apocalypse Peaks, is the only lake in Balham Valley (generally around 800m in elevation).

Multiple glaciations, mainly between 13 Ma and 3.5 Ma ago, have resulted in a thick ground moraine on both valley floors. These deposits are mantled by solifluction sheets at the head of Balham Valley. In addition the valleys bear a small number of fresh and saline lakes on the drift surfaces. In many cases the lakes have evaporated to leave extensive salt deposits. The walls of Barwick and Balham Valleys display remnants of glacial benches at about 800m and 1,200-1,500m altitude. The soils near Lake Vashka consist of moraine debris derived largely from dolerite and sandstone, but granites, gneiss and schist make up as much as 35% of boulders locally. Weathering is often indicated by deep red staining due to oxidation of iron compounds, usually eroded by wind-driven sand on the boulders' windward side. The valley floors are extensively covered with patterned ground of sand-wedge polygons, typical of permafrost areas in the Dry Valleys. The majority is old (high centered), with young (hollow centered) polygons found in recent stream channels, and both typically measure 20m across.

No invertebrates have been found in the dry soils of the Barwick Valley and there is little obvious vegetation. Algal crusts and mats fringe the lakes and streams but the flora reported is essentially microbial: chasmotholithic lichens are present in jagged screes of the Apocalypse Range and dense layered communities of endolithic lichens, fungi, algae and associated bacteria are occasionally found in boulders of Beacon Sandstone. Black lichen growth is reported to be well developed in areas of sandstone on the valley floor of Balham Valley. Significant heterotrophic bacterial populations have been reported in sandy samples from Barwick Valley. The population contained lactose-fermenters, nitrate-reducers, nitrogen-fixers, yeasts and algae but no detectable filamentous fungi or Protozoa.

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While the Barwick and Balham Valleys are one of the most remote areas of the Dry Valleys, south polar skuas (*Catharacta maccormicki*) are known to visit the Area, with about 40 carcasses found at Lake Vashka in 1959-60. The mummified carcasses of two seals have been found near the snout of Webb Glacier, and seven more, mainly crabeaters (*Lobodon carcinophagus*) were found near the Balham/Barwick Valley junction.

Inspection of the Barwick and Balham Valleys in December 1993 from Bullseye Lake to Lake Vashka revealed evidence of prior human activity, particularly around Lake Vashka where field camps had been in use for scientific research in the 1960s. Impacts observed in the Lake Vashka vicinity included stone circles for tents at old camp sites, soil pits and a trench, remains of a wooden crate, a wooden box containing rocks and a paper poster, and a broken food cache partially submerged in the lake. Bamboo poles are situated near the snout of Webb Glacier and at Vashka Crag. Dynamite charges have been used in the vicinity of Lake Vashka and at least one other unknown location in the Barwick Valley. Remediation of the site was carried out in 1995/96 by a New Zealand team. Recent visits have recorded no evidence of human activities or disturbance.

6(ii) Restricted and managed zones within the Area

None.

6(iii) Structures within and near the Area

None.

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

Barwick and Balham Valleys lie within Antarctic Specially Managed Area (ASMA) No 2, McMurdo Dry Valleys. Within the ASMA, the nearest Special Features include the Sand Dune Field in the Lower Victoria Valley, Argo Gully, Boulder Pavement and Prospect Mesa in the Wright Valley, and Don Juan Pond in the Upper Wright Valley. The nearest protected areas to Barwick and Balham Valleys are Linnaeus Terrace (ASPA No 138) 35km south in the Wright Valley, and Canada Glacier (ASPA No 131) 50km SE in the Taylor Valley (Inset 2, Map 1).

7. Permit conditions

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

- it is issued for 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 jeopardize the physical, ecological, scientific or aesthetic and wilderness values of the Area, nor the pristine value of the Area and its potential as a largely undisturbed reference site;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;
- the permit, or a copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the permit;
- permits shall be issued for a stated period.

7(i) Access to and movement within the Area

- Access to and movement within the Area shall be on foot. Vehicles are prohibited within the Area;
- Landing of aircraft and overflight below 750m (~2500 ft) is prohibited within the Area, except for scientific or management purposes specifically authorized by permit;
- Use of smoke grenades is prohibited within the Area and discouraged within 1km of the Area;
- No special restrictions apply to the air or land routes used to move to and from the Area. Scientists are encouraged to access the Area at a practicable point closest to their site of study to minimize the amount of the Area that is traversed;
- Pedestrian routes should avoid lakes, ponds, stream beds, areas of damp ground and areas of soft sediments or dunes;
- Pedestrian traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects.

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

Activities that may be conducted within the Area include:

- scientific research that will not jeopardize the scientific or ecosystem values of the Area, or its pristine value and potential as a reference site, and which cannot be served elsewhere;
- essential management activities, including monitoring.

7(iii) Installation, modification or removal of structures

- No structures are to be erected within the Area except as specified in a permit;
- Permanent structures are prohibited;
- All scientific equipment installed in the Area must be approved by permit 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, and shall be a condition of the Permit.

7(iv) Location of field camps

Camping should generally be avoided within the Area, and two campsites outside of, but close to, the east and south boundaries are identified for access into the Area. One of these is at the confluence of the lower Barwick and Victoria Valleys (161° 41' 15" E, 77° 21' 45" S), while the other is close to Bullseye Lake in the McKelvey Valley (161° 13' 08" E, 77° 25' 40" S) (see Map 1). If deemed to be essential, camping should be at previously impacted sites, preferably on snow or ice-covered ground if available. Researchers should consult with the appropriate national authority to obtain up-to-date information on any sites where camping may be preferred.

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

- No living animals, plant material or microorganisms shall be deliberately introduced into the Area, and the precautions listed below shall be taken against accidental introductions;
- To help maintain the ecological and scientific values of the isolation and relatively low level of human impact at the Area visitors shall take special precautions against the introduction of animals, plant material and microorganisms. Of particular concern are microbial and vegetation introductions from soils at other Antarctic sites, including stations,

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or from regions outside Antarctica. To minimize 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;

- To reduce the risk of microbial contamination, the exposed surfaces of footwear, sampling equipment and markers should, to the greatest extent practical, be sterilized before use within the Area. Sterilization should be by an acceptable method, such as by washing in 70% ethanol solution in water or in a commercially available solution such as ‘Virkon’;
- No herbicides or pesticides shall be brought into the Area;
- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted;
- Fuel is not to be brought into the Area, unless specifically authorized by permit for specific scientific or management purposes;
- All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of their introduction into the environment is minimized;
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material *in situ*.

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

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

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

- Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted if there is a reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, native flora or fauna that their distribution or abundance within the Area would be significantly affected;
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorized, may be removed unless the impact of removal is likely to be greater than leaving the material *in situ*. If this is the case the appropriate authority should be notified.

7(viii) Disposal of waste

All wastes, including water used for any human purpose and including all human wastes, shall be removed from the Area. Individuals or groups shall carry appropriate containers for human waste and gray water so they may be safely transported and removed from the Area.

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

- Visitors should consult and apply where appropriate the comprehensive Code of Conduct and *Guidelines for Conduct of Scientific Research* developed for use within the McMurdo Dry Valleys (ASMA No 2).
- Any specific sites of long-term monitoring should be appropriately marked;

7(x) Requirements for reports

- Parties should ensure that the principal holder for each permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports should include, as appropriate, the information identified in the Visit Report form contained in Appendix 4 of Resolution 2 (1998)(CEP I).
- Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the Management Plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the Management Plan and in organizing the scientific use of the Area.
- The appropriate authority should be notified of any activities/measures undertaken, and / or of any materials released and not removed, that were not included in the authorized Permit.

