

Management Plan for Antarctic Specially Protected Area No. 109

MOE ISLAND, SOUTH ORKNEY ISLANDS

Introduction

The primary reason for the designation of Moe Island, South Orkney Islands (Latitude 60°44'S, Longitude 045°41'W), as Antarctic Specially Protected Area (ASPA) No. 109 is to protect environmental values, and primarily the terrestrial flora and fauna within the Area.

The Area was originally designated in Recommendation IV-13 (1966, SPA No. 13) after a proposal by the United Kingdom on the grounds that the Area provided a representative sample of the maritime Antarctic ecosystem, that intensive experimental research on the neighbouring Signy Island might alter its ecosystem and that Moe Island should be specially protected as a control area for future comparison.

These grounds are still relevant. Whilst there is no evidence that research activities at Signy Island have significantly altered the ecosystems there, a major change has occurred in the low altitude terrestrial system as a result of the rapidly expanding Antarctic fur seal (*Arctocephalus gazella*) population. Plant communities on nearby Signy Island have been physically disrupted by trampling by fur seals and nitrogen enrichment from the seals' excreta has resulted in replacement of bryophytes and lichens by the macro-alga *Prasiola crispa*. Low-lying lakes have been significantly affected by enriched run-off from the surrounding land. So far Moe Island has only been invaded by fur seals to a limited extent and its topography makes it less likely that seals will penetrate to the more sensitive areas inland. Moe Island has been visited on few occasions and has never been the site of occupation for periods of more than a few hours.

Resolution 3 (2008) recommended that the "Environmental Domains Analysis for the Antarctic Continent", be used as a dynamic model for the identification of Antarctic Specially Protected Areas within the systematic environmental-geographical framework referred to in Article 3(2) of Annex V of the Protocol (see also Morgan et al., 2007). Using this model, ASPA 109 is contained within Environment Domain G (Antarctic Peninsula off-shore islands geologic). The scarcity of Environment Domain G, relative to the other environmental domain areas, means that substantial efforts have been made to conserve the values found within this environment type elsewhere: other protected areas containing Domain G include ASPAs 111, 112, 125, 126, 128, 145, 149, 150, and 152 and ASMAs 1 and 4.

Resolution 6 (2012) recommended that the Antarctic Conservation Biogeographic Regions (ACBRs) be used for the 'identification of areas that could be designated as Antarctic Specially Protected Areas within the systematic environmental-geographic framework referred to in Article 3(2) of Annex V to the Environmental Protocol. ASPA 109 sits within Antarctic Conservation Biogeographic Region (ACBR) 2 South Orkney Islands.

Through Resolution 5 (2015) Parties recognised the usefulness of the list of Antarctic Important Bird Areas (IBAs) in planning and conducting activities in Antarctica. Within the boundary of ASPA 109 is located IBA ANT020 Moe Island, which was identified due to its extensive colonies of chinstrap penguins, cape petrels and Antarctic prions.

The two other ASPAs present within the South Orkney Islands (ASPA 110 Lynch Island and ASPA 111 Southern Powell Island and adjacent islands) were designated primarily to protect terrestrial vegetation and bird communities. Moe Island complements the local network of

ASPAs by protecting a representative sample of the maritime Antarctic ecosystem including cryptogam-dominated terrestrial and coastal communities.

1. Description of values to be protected

Following a visit to the ASPA in February 2016, the values specified in the earlier designation were reaffirmed. These values are set out as follows:

- The Area contains exceptional environmental values associated with the biological composition and diversity of a near-pristine example of the maritime Antarctic terrestrial and littoral marine ecosystems.
- Moe Island contains the greatest continuous expanses of *Chorisodontium-Polytrichum* moss turf found in the Antarctic.

2. Aims and objectives

Management of Moe Island aims to:

- avoid major changes to the structure and composition of the terrestrial vegetation, in particular the moss turf banks;
- prevent unnecessary human disturbance to the Area;
- prevent or minimise the introduction to the Area of non-native plants, animals and microorganisms;
- allow scientific research in the Area provided it is for compelling reasons which cannot be served elsewhere and which will not jeopardise the natural ecological system in that Area
- allow visits for management purposes in support of the aims of the management plan;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;

3. Management activities

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

- Visits shall be made as necessary to assess whether the ASPA continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.
- The Management Plan shall be reviewed at least every five years and updated as required.
- Markers, signs or other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required.
- In accordance with the requirements of Annex III of the Protocol on Environmental Protection to the Antarctic Treaty, abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area.

- A copy of this Management Plan shall be made available at Signy Research Station (UK; 60°42'30" S, 045°36'30" W) and Orcadas Station (Argentina; 60°44'15" S, 044°44'20" W).
- Where appropriate, National Antarctic Programmes are encouraged to liaise closely to ensure management activities are implemented. In particular, National Antarctic Programmes are encouraged to consult with one another to prevent excessive sampling of biological material within the Area. Also, National Antarctic Programmes are encouraged to consider joint implementation of guidelines intended to minimize the introduction and dispersal of non-native species within the Area.
- All scientific and management activities undertaken within the Area should be subject to an Environmental Impact Assessment, in accordance with the requirements of Annex I of the Protocol on Environmental Protection to the Antarctic Treaty.

4. Period of designation

Designated for an indefinite period.

5. Maps

Figure 1. Map of the location of Moe Island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 45 °W.

Figure 2. Map of Moe Island in greater detail. Map specifications: Projection: WGS84 Antarctic Polar Stereographic. Standard parallel: 71 °S. Central meridian 45 °W.

6. Description of the Area

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

BOUNDARIES AND CO-ORDINATES

The boundary co-ordinates of the Area, starting with the most north-westerly position and moving clockwise, are shown in Table 1.

Number	Latitude	Longitude
1	60°43'40" S	045°42'15" W
2	60°43'40" S	045°40'30" W
3	60°43'55" S	045°40'10" W
4	60°44'40" S	045°40'10" W
5	60°44'40" S	045°42'15" W

The Area includes all of Moe Island and unnamed adjacent islands and islets. The Area encompasses all of the ice-free ground, permanent ice and semi-permanent ice found within the boundaries, but excludes the marine environment extending greater than 10 m offshore from the low tide water line (Figure 2). Boundary markers have not been installed.

GENERAL DESCRIPTION OF THE AREA

Moe Island, South Orkney Islands, is a small irregularly-shaped island lying 300 m off the south-western extremity of Signy Island, from which it is separated by Fyr Channel. It is about 1.3 km from the northeast to southwest and 1 km from northwest to southeast (1.22 km²). It should be noted that the position of Moe Island on Admiralty Chart No. 1775 (60°44'S, 45°45'W), does not agree closely with the more accurate coordinates in Figure 2 (60°44'S, 45°41'W).

The island rises precipitously on the north-eastern and south-eastern sides to Snipe Peak (226 m altitude). There is a subsidiary summit above South Point (102 m altitude) and lower hills on each of three promontories on the western side above Corral Point (92 m), Conroy Point (39 m) and Spaul Point (56 m). Small areas of permanent ice remain on the east- and south-facing slopes with late snow lying on the steeply dipping western slopes. There are no permanent streams or pools.

GEOLOGY

The rocks are metamorphic quartz mica schists, with occasional biotite and quartz-rich beds. There is a thin bed of undifferentiated amphibolite on the northeastern coast. Much of the island is overlain with glacial drift and scree. Soils are predominantly immature deposits of fine to coarse clays and sands intermixed with gravels, stones and boulders. They are frequently sorted by freeze-thaw action in high or exposed locations into small-scale circles, polygons, stripes and lobes. There are deep accumulations of peat (up to 2 m thick on western slopes), considerable expanses of the surface of which are bare and eroded.

TERRESTRIAL BIOLOGICAL COMMUNITIES

The dominant plant communities are *Andreaea-Usnea* fellfield and banks of *Chorisodontium-Polytrichum* moss turf (the largest known example of this community type in the Antarctic). Use of satellite remote sensing techniques (Normalised Difference Vegetation Index) showed the area of green vegetation within the ASPA to be 0.58 km² (48% of the ASPA area; Figures 3 and 4). These moss banks constitute a major biological value and a reason for the designation of the Area. The cryptogamic flora is diverse. The majority of these moss banks have received little damage from fur seals, and show few visible signs of degradation. However, the exception to this observation is the northern-most banks located around Spaul Point. Here, although still extensive, the moss turf was estimated to have suffered about 50% damage from Antarctic fur seal (*Arctocephalus gazella*) activity during a survey in January 2006 and still evident during observations in February 2016. One sub-adult male Antarctic fur seal was present on this area of moss turf during the survey in January 2006. Almost certainly fur seals gain access to this plant community via the gentle slope leading inland from the small shingle beach located at the north-eastern corner of Landing Cove.

The mites *Gamasellus racovitzai* and *Stereotydeus villosus* and the springtail *Cryptopygus antarcticus* are common under stones.

VERTEBRATE FAUNA

There were five colonies of chinstrap penguins (*Pygoscelis antarctica*) totalling about 11,000 pairs in 1978-79. A visit in February 1994 noted fewer than 100 pairs on the northern side of Landing Cove and more than a thousand on the southern side. A visit in February 2011 noted c. 75 pairs on the northern side of Landing Cove and c. 750 pairs on the southern side. Approximately 100 breeding pairs were observed on Spaul Point during a visit in January 2006. Numerous other birds breed on the island, notably about 2,000 pairs of cape petrels (*Daption*

capensis) in 14 colonies (1966) and large numbers of Antarctic prions (*Pachyptila desolata*). Snow Petrels (*Pagodroma nivea*) were recorded breeding on Moe Island in 1957/58 when the colony comprised 34 breeding pairs (Croxall *et al.* 1995), and were confirmed breeding during a survey in 2005/06 (R. Fijn pers. comm. 2015, quoted in Harris *et al.*, 2015).

Weddell seals (*Leptonychotes weddellii*), crabeater seals (*Lobodon carcinophaga*) and leopard seals (*Hydrurga leptonyx*) are found in the bays on the west side of the island. Increasing numbers of fur seals (*Arctocephalus gazella*), mostly juvenile males, come ashore on the north side of Landing Cove and have caused some damage to vegetation in that area (25 seals were counted in this area in February 2016). However, it is possible that the nature of the terrain will restrict these animals to this small headland where damage may intensify.

6(ii) Access to the Area

- Where possible, access shall be by small boat. There are no restrictions on landing from the sea. Landings are usually most safely made at the northeast corner of Landing Cove (Lat. 60°43'55" S, Long. 045°41'06" W; Figure 2). If Landing Cove is inaccessible due to the ice conditions, an alternative landing site is at the western-most point of Spaul Point (Lat. 60°43'54" S, Long. 045°41'15" W), directly opposite an offshore rock of 26 m altitude.
- Under exceptional circumstances, necessary for purposes consistent with the objectives of the Management Plan, helicopters may be permitted to land within the Area.
- Helicopters may land only on the col between hill 89 m and the western slope of Snipe Peak (Lat. 60°44'09" S, Long. 045°41'23" W, Figure 2). Landing on vegetation in the col should be avoided to the maximum extent practicable. To avoid overflying bird colonies, approach should preferably be from the south, though an approach from the north is permissible.
- Within the Area the operation of aircraft should be carried out, as a minimum requirement, in compliance with the 'Guidelines for the Operation of Aircraft near Concentrations of Birds' contained in Resolution 2 (2004). When conditions require aircraft to fly at lower elevations than recommended in the guidelines, aircraft should maintain the maximum elevation possible and minimise the time taken to transit the Area.
- Use of helicopter smoke grenades is prohibited within the Area unless absolutely necessary for safety. If used, all smoke grenades should be retrieved.

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

A marker board is located at the back of the small shingle beach in the northeast corner of Landing Cove, beyond the splash zone on top of a flat rock, to which it is bolted (Lat. 60°43'55" S, Long. 045°41'05" W). During periods of heavy snowfall, the marker board may be buried and difficult to locate.

There is a cairn and the remains of a survey mast, erected in 1965-66, on Spaul Point (Lat. 60°43'49" S, Long. 045°41'05" W). This mast is of interest for lichenometric studies and should not be removed. There are no other structures on Moe Island.

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

ASPANo. 110, Lynch Island, lies about 10 km north-north-east of Moe Island. ASPANo. 111, Southern Powell Island and adjacent islands, is about 41 km to the east (Figure 1).

6(v) Special zones within the Area

None

7. Permit conditions

7(i) General permit conditions

Entry into the Area is prohibited except in accordance with a Permit issued by an appropriate national authority as designated under Article 7 of Annex V of the Protocol on Environmental Protection to the Antarctic Treaty.

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

- it is issued for a compelling scientific purpose which cannot be served elsewhere; or
- it is issued for essential management purposes such as inspection, maintenance or review;
- the actions permitted will not jeopardise the natural ecological system in the Area;
- any management activities are in support of the objectives of this Management Plan;
- the actions permitted are in accordance with this Management Plan;
- the Permit, or an authorised copy, must be carried within the Area;
- permits shall be issued for a stated period;
- a report or reports are supplied to the authority or authorities named in the Permit;
- the appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

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

- Land vehicles are prohibited within the Area
- Movement within the Area shall be on foot.
- Pilots, helicopter or boat crew, or other people on helicopters or boats, are prohibited from moving on foot beyond the immediate vicinity of their landing site unless specifically authorised by Permit.
- Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects, i.e. all movement should be undertaken carefully so as to minimise disturbance to the soil and vegetated surfaces, walking on rocky terrain if practical.
- Overflight of bird colonies within the Area by Remotely Piloted Aircraft Systems (RPAS) shall not be permitted unless for scientific or operational purposes, and in accordance with a permit issued by an appropriate national authority.

7(iii) Activities which may be conducted in the Area

- Compelling scientific research which cannot be undertaken elsewhere and which will not jeopardize the ecosystem of the Area
- Essential management activities, including monitoring

7(iv) Installation, modification or removal of structures

No new structures are to be erected within the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be undertaken in a manner that minimises disturbance to the values of the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation. All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7(v) Location of field camps

Camp in the Area is not normally permitted. If camping is essential for reasons of safety, tents should be erected having regard to causing the least damage to vegetation or disturbance to fauna.

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. To the maximum extent practicable, footwear and other equipment used or brought into the Area (including bags or backpacks) shall be thoroughly cleaned before entering the Area. Further guidance can be found in the CEP Non-native Species Manual (Edition 2011) and COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species. In view of the presence of breeding bird colonies within the Area, no poultry products, including wastes from such products and products containing uncooked dried eggs, shall be released into the Area or into the adjacent sea.

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. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable should be avoided. Fuel or other chemicals shall not be stored in the Area unless specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental introduction into the environment. Materials introduced into the Area shall be for a stated period only and shall be removed by the end of that stated period. If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material in situ. The appropriate authority should be notified of anything released and not removed that was not included in the authorised Permit.

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

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

7(viii) The collection or removal of materials not brought into the Area by the Permit holder

Collection or removal of anything not brought into the Area by the permit holder shall only be in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs.

Other material of human origin likely to compromise the values of the Area which was not brought into the Area by the permit holder or otherwise authorised, may be removed from the Area unless the environmental 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(ix) Disposal of waste

As a minimum standard, all waste shall be disposed of in accordance with Annex III to the Protocol on Environmental Protection to the Antarctic Treaty. In addition, all wastes shall be removed from the Area. Liquid human wastes may be disposed of into the sea. Solid human waste should not be disposed of to the sea, but shall be removed from the Area. No solid or liquid human waste shall be disposed of inland.

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

- Permits may be granted to enter the Area to carry out scientific research, monitoring and site inspection activities, which may involve the collection of a small number of samples for analysis, to erect or maintain signboards, or to carry out protective measures.
- Any long-term monitoring sites shall be appropriately marked and the markers or signs maintained.
- Scientific activities shall be performed in accordance with *SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica*.

7(xi) Requirements for reports

The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and no later than six months after the visit has been completed. Such reports should include, as appropriate, the information identified in the visit report form contained in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas. If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan. Wherever possible, Parties should deposit the original or copies of the original visit reports, in a publicly accessible archive to maintain a record of usage,

for the purpose of any review of the Management Plan and in organising the scientific use of the Area.

8. Supporting documentation

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Longton, R.E. 1967. Vegetation in the maritime Antarctic. In Smith, J.E., *Editor*, A discussion of the terrestrial Antarctic ecosystem. *Philosophical Transactions of the Royal Society of London*, B, 252, 213-235.

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Figure 1. Map showing the location of Moe Island in relation to the South Orkney Islands and the other protected areas in the region. Inset: the location of the South Orkney Islands in Antarctica.

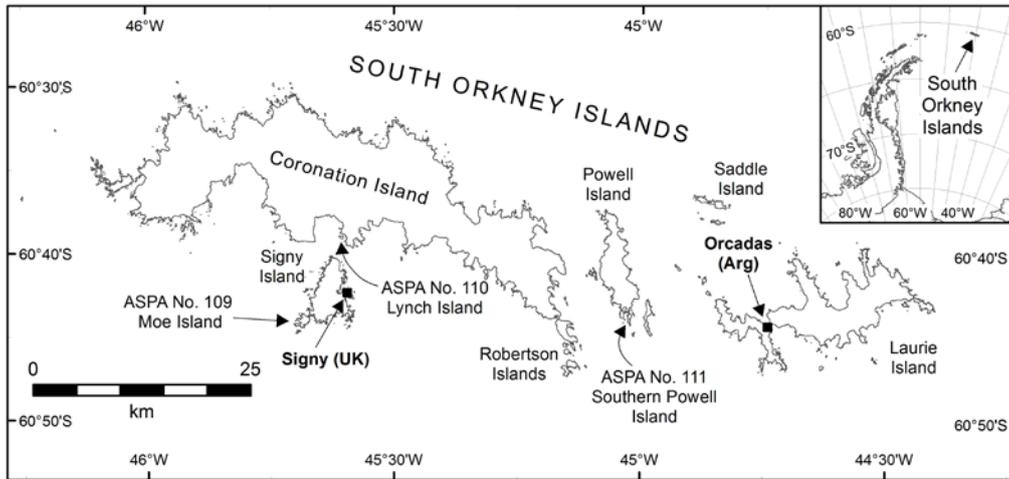


Figure 2. Map of Moe Island in greater detail.

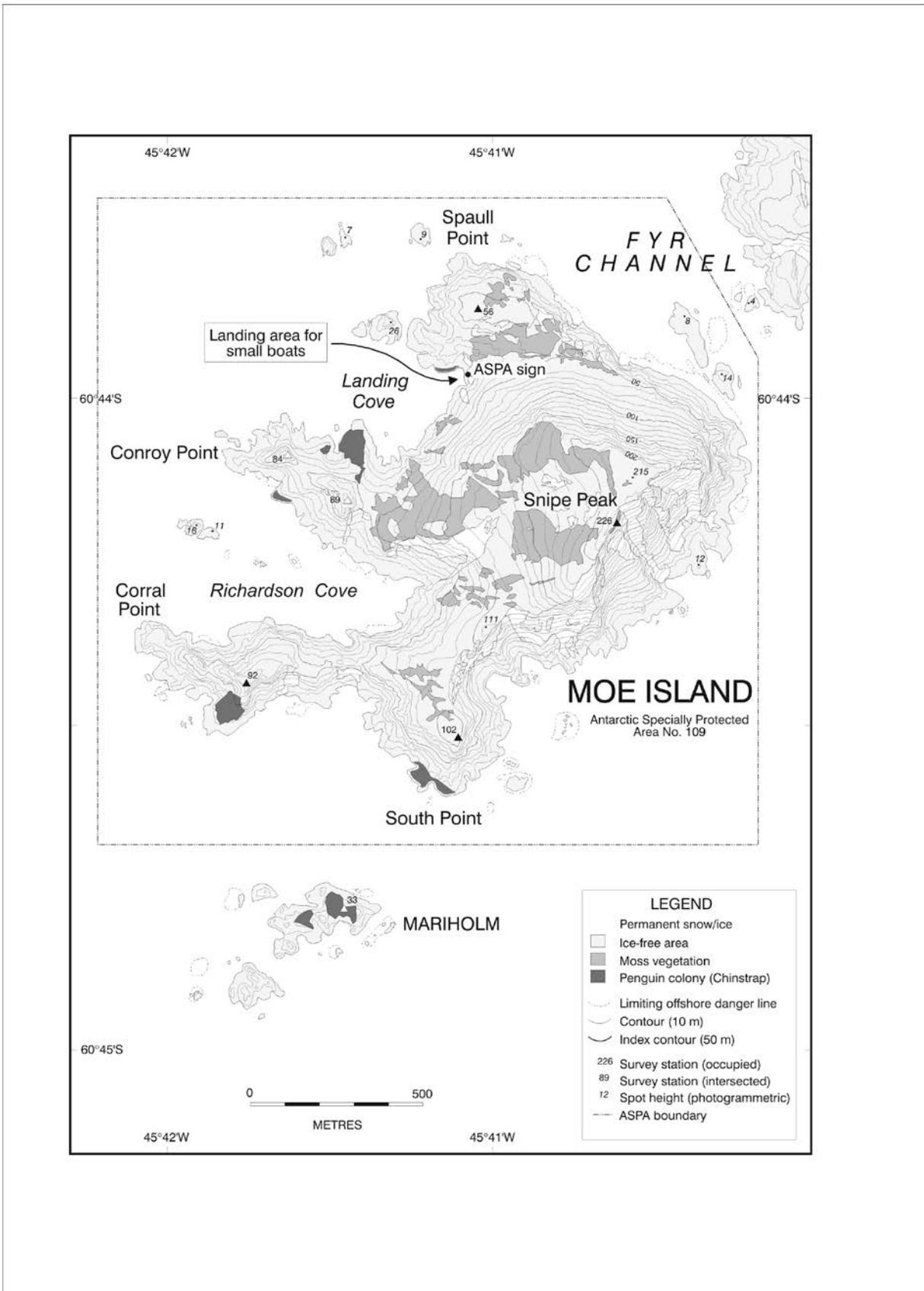


Figure 3. False colour satellite image of ASPA No. 109 Moe Island, South Orkney Islands, which highlights vegetation in red.



Figure 4. Normalised Difference Vegetation Index (NDVI), derived from satellite imagery, for ASPA No. 109 Moe Island, South Orkney Islands, showing vegetation cover using a colour scale of white → orange → red, with red indicating the highest NDVI values.

