

## Management Plan for Antarctic Specially Protected Area No. 164

### SCULLIN AND MURRAY MONOLITHS, MAC.ROBERTSON LAND

#### ***Introduction***

Scullin Monolith ( $67^{\circ}47'37''S$ ,  $66^{\circ}43'8''E$ ) and Murray Monolith ( $67^{\circ}47'3''S$ ,  $66^{\circ}53'17''E$ ) (Map A) were designated as Antarctic Specially Protected Area (ASPA) No 164 under Measure 2 (2005), following a proposal by Australia. A revised management plan for the Area was adopted under Measure 13 (2010). The Area is designated to protect the greatest concentration of breeding colonies of seabirds in East Antarctica. Seven species occupy territories in the Area: five species of petrel (Antarctic petrels *Thalassica antarctica*, Cape petrels *Daption capense*, southern fulmars *Fulmarus glacialisoides*, snow petrels *Pagodroma nivea*, Wilson's storm petrel *Oceanites oceanicus*), one penguin (Adélie penguin *Pygoscelis adeliae*) and one larid (south polar skua *Catharacta maccormicki*).

Compared to some other sites in East Antarctica, Scullin and Murray Monoliths are visited infrequently, and with the one known exception, all visits have been brief (less than a day). Scullin and Murray Monoliths were first visited during the second British, Australian and New Zealand Antarctic Research Expedition (BANZARE) voyage in 1930-31, on 13 February 1931. Sir Douglas Mawson named both monoliths during this visit. Murray Monolith was named after Sir George Murray, Chief Justice of South Australia, Chancellor of the University of Adelaide and a patron of the Expedition, while Scullin Monolith was named after James H. Scullin, Prime Minister of Australia from 1929-31.

A brief landing was made at Scullin Monolith on 26 February 1936 from the R.R.S. William Scoresby, when an ascent was made to a height of several hundred metres. The Norwegian Lars Christensen landed on 30 January 1937 and visited Scullin Monolith. Australian Antarctic program personnel occasionally make visits to the Area from Mawson station, approximately 160 km to the west. The only recorded stay within the Area was a six-day visit (1 to 6 February 1987), when comprehensive ornithological surveys were conducted. The first visit by a commercial tourist vessel to the area was made on 10 December 1992, and a small number of brief visits have been made in subsequent years.

#### ***1. Description of values to be protected***

The Area is primarily designated to protect the outstanding ecological and scientific values associated with the important assemblage of seabirds found at Scullin Monolith and Murray Monolith.

With at least 160,000 pairs, the Antarctic petrel colony on Scullin Monolith is second in population size only to the colony at Svarthameren in the Mühlig Hofmannfjella, in Dronning Maud Land (ASPA 142). Thus, about a third of the estimated global population of approximately half a million pairs breeds at Scullin Monolith.

Adélie penguin colonies occupy the lower slopes of both monoliths, extending almost to the foreshore. The most recent survey in December 2010 found approximately 43,000 birds on Scullin Monolith and a further 80,000 pairs on Murray Monolith. (At this stage of the breeding season (mid incubation) the number of birds present will approximate the number of breeding pairs.) This represents approximately 5% of the Adélie penguin breeding population for East Antarctica and approximately 2% of the global population.

Many of the ocean-facing slopes of both monoliths are occupied by the other petrel species. Extensive breeding colonies occur on many of the steeper, higher-altitude slopes of both monoliths. South polar skuas nest throughout the Area, making use of the high density of breeding seabirds as prey during their breeding season.

Some large colonies of seabirds are known from elsewhere in East Antarctica (e.g. the Rauer Group). However, the combined breeding population conservatively estimated at 230,000 pairs and the rich species diversity within the two very small ice-free areas of Scullin and Murray Monoliths (about 1.9 and 0.9 km<sup>2</sup>, respectively) mean that the monoliths support the greatest concentration of breeding seabirds, and one of the most diverse seabird breeding localities in East Antarctica (Appendix 1).

In addition to the outstanding ecological and scientific values, the Area possesses outstanding aesthetic values arising from the geomorphology of the two monoliths and the spectacular backdrop of glaciers that descend from the continental plateau and flow around the monoliths to end in calving glaciers.

The very large and diverse breeding assemblage of seabirds in a setting of high aesthetic and wilderness values warrants the highest level of protection.

## **2. Aims and Objectives**

Management of Scullin and Murray Monoliths aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- maintain the undisturbed nature of the Area to permit its future use as a reference area;
- allow scientific research on the ecosystem and values of the Area, providing it is for compelling reasons which cannot be served elsewhere and will not impact on the values of the Area, particularly ornithological values;
- grant high priority to the collection of seabird census data from representative sample areas, reference breeding groups (RBGs) or of whole breeding populations. These census data will be major determinants in, and contributions to, future revisions of the management strategy for the Area;
- accord high priority to the collection of other biological survey data, in particular flora and invertebrate surveys. These survey data will be incorporated into future revisions of the management strategy for the Area;
- allow visits for management purposes in support of the aims of the management plan; and
- minimise the potential for introduction of non-native plants, animals and micro-organisms, particularly avian pathogens.

## **3. Management Activities**

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

- where practical, the Area shall be visited as necessary, and preferably no less than once every five years, to conduct censuses of seabird breeding populations, including mapping of colonies and nest sites;
- information on the Scullin and Murray Monoliths ASPA, including copies of this management plan, will be made available at both Davis and Mawson stations and to all visitors;
- national Antarctic programs operating in the vicinity or intending to visit the Area shall consult with other national programs to ensure that research projects do not overlap or conflict; and
- where practical, management visits will be made to remove unnecessary materials currently located within the Area.

#### **4. Period of Designation**

The Area is designated for an indefinite period.

#### **5. Maps and Photographs**

- **Map A:** Antarctic Specially Protected Area No 164, Scullin and Murray Monoliths, Mac.Robertson Land, East Antarctica. The inset map indicates the location in relation to the Antarctic continent.
- **Map B:** Antarctic Specially Protected Area No. 164, Scullin Monolith: Topography and Bird Distribution.
- **Map C:** Antarctic Specially Protected Area No. 164, Murray Monolith: Topography and Bird Distribution.
- **Map D:** Antarctic Specially Protected Area No. 164: Scullin Monolith: Helicopter approach and landing site.

Specifications for all maps: Horizontal Datum: WGS84; Vertical Datum: Mean Sea Level.

#### **6. Description of the Area**

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

Scullin Monolith ( $67^{\circ}47'37"S$ ,  $66^{\circ}43'8"E$ ) and Murray Monolith ( $67^{\circ}47'3"S$ ,  $66^{\circ}53'17"E$ ) are situated on the coast of Mac.Robertson Land some 160 km east of Mawson station (Map A). The monoliths are approximately seven kilometres apart and abut the sea at the edge of the continental ice sheet. The coastline to the west and east, and between the monoliths, consists of ice cliffs 30 – 40 m high; the Antarctic plateau rises steeply from there to the south. Scullin Monolith is a crescent-shaped massif whose highest point is 443 m above sea level. It encloses a broad north-facing cove with an entrance approximately one kilometre wide. All upper slopes of the monolith are precipitous, but in the lower 100 m the slope eases in many parts and these areas are strewn with boulders and large stones. Elsewhere in the lower parts the rock face falls sheer to the sea, and there are some scree slopes.

The walls of Murray Monolith rise from the sea to a dome-shaped summit at 340 m above sea level. On the western side of Murray Monolith, the lower slopes drop to a coastal platform. The Area extends over all ice-free areas associated with the two monoliths, and includes a portion of the adjacent continental ice and Torlyn Mountain to the south-west of Murray Monolith (which rises to about 400 m above sea level). There are no boundary markers delimiting the site.

The Scullin and Murray Monoliths ASPA comprises two sectors (see Map B and Map C):

- Scullin Monolith: the boundary commences at a coordinate on the coastline at  $67^{\circ}46'59"S$ ,  $66^{\circ}40'30"E$ , then in a southerly direction to a coordinate at  $67^{\circ}48'03"S$ ,  $66^{\circ}40'26"E$ , east to a coordinate at  $67^{\circ}48'06"S$ ,  $66^{\circ}44'33"E$  then north to a coordinate on the coast at  $67^{\circ}46'41"S$ ,  $66^{\circ}44'37"E$ , then west following the coast line at the low tide mark to the coordinate  $67^{\circ}46'59"S$ ,  $66^{\circ}40'30"E$ .
- Murray Monolith: the boundary commences on the coastline at  $67^{\circ}46'36"S$ ,  $66^{\circ}51'01"E$ , then continuous in a southerly direction to  $67^{\circ}48'03"S$ ,  $66^{\circ}50'55"E$ , extends east to  $67^{\circ}48'05"S$ ,  $66^{\circ}53'51"E$ , and north to  $67^{\circ}46'38"S$ ,  $66^{\circ}54'00"E$ , then west following the coast line at the low tide mark to the coordinate  $67^{\circ}46'36"S$ ,  $66^{\circ}51'01"E$ .

##### **Birds**

Seven species occupy territories in the Area: five species of petrel (Antarctic petrels *Thalassica antarctica*, Cape petrels *Daption capense*, southern fulmars *Fulmarus glacialisoides*, snow petrels *Pagodroma nivea*, Wilson's storm petrel *Oceanites oceanicus*), one penguin (Adélie penguin *Pygoscelis adeliae*) and one larid

(south polar skua *Catharacta maccormicki*). Scullin Monolith hosts the second largest colony of Antarctic petrels with a population of at least 160,000 pairs and significant Adélie penguin colonies. Less is known about the species diversity of Murray Monolith; however approximately 8,000 Adélie penguins were observed in 2010/11(Appendix 1).

There has been only one attempt (in 1986/87) to estimate the population of all species in the Area. A subsequent aerial survey in 2010/11 focussed on Adélie penguins only. Consequently, the Adélie penguin is the only species for which any data on population change is available. The Adélie population estimates for Scullin Monolith are similar at these two times (approximately 50,000 and 43,000 pairs) and the difference is likely to be within measurement error. The estimates for Murray Monolith differ substantially (approximately 20,000 and 8,000 pairs), but the basis for the early estimate is not clearly described and the value may not be reliable. It is likely that the 1986/87 census of petrels under-estimated the breeding population given the census occurred late in the breeding season.

#### *Geology*

The geology of the two monoliths is poorly understood, as they have been neither the subject of dedicated study nor specific geological mapping. The geology of the monoliths appears to be similar in general terms to that of the region around Mawson station. The rocks consist dominantly of high grade granulite facies gneisses of metasedimentary origin, including some sapphirine bearing rocks. The metamorphism occurred in anhydrous conditions probably at about 1000Ma. An age range of between 1254Ma and as young as 625Ma have been documented for the gneisses from Scullin Monolith. Metamorphism involved sedimentary rocks initially of Proterozoic age. These metamorphic basement rocks were intruded at about 920-985Ma by the Mawson Charnockite a form of granite characterised by presence of orthopyroxene, and common in this region. It forms the faces of the monoliths. The recorded an age of 433 and 450Ma which may reflect a later influence of the '500 Ma or Pan-African event' recorded widely throughout Gondwana. The margins of the monoliths contain some sediment carried by the icesheet and deposited by melting ice. The source cannot be specified but it may contain recycled material from farther inland and could perhaps provide evidence of some of the geology beneath the ice.

#### *Environmental Domains and Antarctic Conservation Biogeographic Regions*

Based on the Environmental Domains Analysis for Antarctica (Resolution 3(2008)) Scullin and Murray Monoliths are located within Environments D *East Antarctic coastal geologic* and L *Continental coastal-zone ice sheet*. Based on the Antarctic Conservation Biogeographic Regions (Resolution 6 (2012)) the Area is not assigned to a Biogeographic Region.

#### *Vegetation*

The flora reported from Scullin Monolith is given in Appendix 3, based on visits in 1972 and 1987. All species of lichens and moss found on Scullin Monolith occur elsewhere in Mac.Robertson Land (Appendix 2). Vegetation on Scullin Monolith is restricted mainly to the western plateau and associated nunataks. The coastal slopes are generally void of vegetation due to high levels of seabird guano. The distribution of vegetation on the western plateau is influenced by microtopography that controls the extent of exposure and moisture availability. Although not recorded, it is likely that vegetation at Murray Monolith is similar to that found at Scullin Monolith.

#### *Other biota*

There have been no comprehensive invertebrate studies at Scullin or Murray Monoliths. A leopard seal *Hydrurga leptonyx* was sighted during a visit in 1936 and several Weddell seals *Leptonychotes weddellii* were observed during visits in 1997 and 1998; no further observations of biota have been reported.

#### **6(ii) Access to the Area**

Travel to the Area is possible by small boat, by over-snow/ice vehicles or by aircraft, in accordance with section 7(ii) of this plan.

#### **6(iii) Structures within and adjacent to the Area**

At the time of writing (March 2015), a fibreglass 'Apple' refuge is situated on the south western summit ridge of Scullin Monolith (approximately 67°47'24"S, 66°41'38"E) (Map B and Map D). There are four 200-litre drums of helicopter fuel and one empty 200-litre drum as well as the (reported) remains of a food cache (1985/86 vintage). It is intended that all of this material be removed from the Area at the first suitable opportunity.

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

There are two ASpas located to the west of Scullin and Murray; ASPA No. 102, Rookery Islands (67°36'36"S, 62°32'01"E), is approximately 180 km to the west (c.20 km west of Mawson), and ASPA No. 101, Taylor Rookery (67°27"S; 60°53'E), is located approximately 70 km further west of the ASPA No. 102.

#### **6(v) Special zones within the Area**

There are no special zones within the Area.

### **7. Permit conditions**

#### **7(i) General permit conditions**

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

- it is issued only for compelling scientific or management purposes that cannot be served elsewhere, in particular for scientific study of the avifauna and ecosystem of the Area, or for essential management purposes consistent with plan objectives, such as inspection, maintenance or review;
- the actions permitted are in accordance with this management plan and will not jeopardise the values of the Area;
- it is issued for a specified period;
- it will authorise the entry into the Area of no more than 10 people at any one time during the seabird breeding season, and no more than 15 people at any one time during the remainder of the year;
- the permit or an authorised copy shall be carried at all times when within the Area;
- a visit report shall be supplied to the appropriate national authority at the conclusion of the permitted activity; and
- the appropriate national authority shall 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**

- Travel to the Area is possible by small boat, by over-snow/ice vehicles or by aircraft.
- Any movement within and around the Area shall observe the minimum specified wildlife approach distances (Appendix 3); closer approach may be allowed specifically under permit.
- Movement by visitors within the Area shall be by foot only.
- Small boats used to approach the Area must be operated at or below five knots within 500 m of the shore.
- It is recommended that visitors not permitted to enter the Area do not approach within 50 m of the shoreline.

- To reduce disturbance to wildlife, noise levels including verbal communication are to be kept to a minimum. The use of motor-driven tools and any other activity likely to generate loud noise and thereby cause disturbance to nesting birds shall not be allowed within the Area during the summer seabird breeding season (1 October to 31 March).

Aircraft may be used to enter the Area subject to the following conditions:

- disturbance of the colonies by aircraft shall be avoided at all times;
  - during the breeding season (1 October to 31 March) there shall be no overflights of the Area below 1500 m (5000 ft) for twin-engine helicopters and below 930 m (3050 ft) for single-engine helicopters and fixed-wing aircraft;
  - landings within the Area shall only occur at the designated landing site at Scullin monolith (Map D) and only by single-engine helicopters;
  - single-engine helicopters shall approach the landing site from the south-west (as shown by the approved flight corridor in Map D);
  - during the breeding season, twin-engine helicopters shall not land, take off or fly within 1500 m of the Area;
  - during the breeding season, fixed wing aircraft shall not land or take off within 930 m or fly within 750 m (2500 ft) of the Area;
  - under no circumstances are aircraft to fly within the Scullin Monolith amphitheatre during the breeding season;
  - twin-engine helicopters may land at the designated landing site outside the breeding season (1 October - 31 March); and
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- refuelling of aircraft is not to take place within the Area.

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

The following activities may be conducted within the Area as authorised by permit:

- compelling scientific research that cannot be undertaken elsewhere, including the initiation or continuance of ongoing monitoring programmes; and
- other scientific research and essential management activities consistent with this Management Plan that will not affect the values of the Area or its ecosystem integrity.

#### **7(iv) Installation, modification or removal of structures**

No new temporary 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.

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 harm to fauna and flora or of contamination of the Area.

A condition of the permit shall be that equipment associated with the approved activity shall be removed on or before completion of the activity. Details of markers and equipment temporarily left in situ (GPS locations, description, tags, etc. and expected removal date) shall be reported to the permitting authority.

#### **7(v) Location of field camps**

Temporary camps for field parties are permitted within the Area, but must be placed as far from seabird colonies and nesting sites as is practicable without compromising visitor safety. Camps shall be established

for the minimum time necessary to undertake approved activities, and shall not be allowed to remain from one seabird breeding season to the next.

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

- A small amount of fuel is permitted within the Area for cooking purposes while field parties are present. Otherwise, fuel is not to be stored within the Area.
- No poultry products, including dried foods containing egg powder, are to be taken into the Area.
- No herbicides or pesticides are to be taken into the Area.
- All chemicals required for research purposes must be approved by permit, and shall be removed at or before the conclusion of the permitted activity to which they relate. The importation and use of radio-nucleides and stable isotopes within the Area is prohibited.
- Deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. The highest level precautions shall be taken to prevent the accidental introduction of animals, plant material, micro-organisms and non-sterile soil from other biologically distinct regions (within or beyond the Antarctic Treaty area) into the Area;
- To the maximum extent practicable, clothing, footwear and other equipment used or brought into the Area (including backpacks, carry-bags and other equipment) shall be thoroughly cleaned before entering and after leaving the Area.
- Boots and sampling/research equipment and markers that comes into contact with the ground shall be disinfected or cleaned with hot water and bleach before entering and after visiting the Area to help prevent accidental introductions of animals, plant material, micro-organisms and non-sterile soil into the Area. Cleaning should be undertaken at station.
- Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (CEP 2011), and in the Environmental Code of Conduct for terrestrial scientific field research in Antarctica (SCAR 2009);

**7(vii) 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*. Disturbance to wildlife should be avoided at all times.

**7(viii) Collection or removal of anything not brought into the Area by the permit holder**

Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or was otherwise authorised, may be removed unless the impact of the removal is likely to be greater than leaving the material in situ. If such material is found, the permit issuing authority shall be notified if possible while the field party is present within the Area.

Specimens of natural materials may only be collected or removed from the Area as authorised in a permit and should be limited to the minimum necessary to meet scientific or management needs.

**7(ix) Disposal of waste**

All wastes, including human wastes, shall be removed from the Area. Wastes from field parties shall be stored in such a manner to prevent scavenging by wildlife (e.g. skuas) until such time as the wastes can be disposed or removed. Wastes are to be removed no later than the departure of the field party. Human wastes and grey water may be disposed into the sea well outside the Area.

**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 biological monitoring and Area inspection activities, which may involve the collection of samples for analysis or review.
- Ornithological surveys, including aerial photographs for the purposes of population census, shall have a high priority.
- All GPS, survey and census data collected by field parties visiting the Area shall be made available to the permit issuing authority and the Party responsible for developing the management plan (if different).
- These data shall be lodged in the Antarctic Master Data Directory.
- Visitors shall take special precautions against the introduction of alien organisms to the Area. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora or fauna at other Antarctic sites, including research stations, or from regions outside Antarctica. To minimise the risk of introductions, before entering the Area, visitors shall thoroughly clean footwear and any equipment to be used in the Area, particularly sampling equipment and markers.

**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 visit reports should include, as applicable, 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. Parties should, wherever possible, deposit originals or copies of such 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.

A copy of the report should be forwarded to the Party responsible for development of the Management Plan (Australia) to assist in management of the Area, and the monitoring of bird populations.

## **8. Supporting documentation**

**Alonso J.C., Johnstone G.W., Hindell M., Osborne P. & Guard R. (1987):** Las aves del Monolito Scullin, Antártida oriental (67° 47'S, 66° 42'E). In: Castellvi J (ed) *Actas del Segundo symposium Espanol de estudios antarcticos*, pp. 375-386, Madrid.

**Bergstrom, D.M., Seppelt, R.D. (1990):** The lichen and bryophyte flora of Scullin Monolith Mac.Robertson Land. *Polar Record* 26, 44

**Christensen L. (1938):** My last expedition to the Antarctic 1936 - 1937. JG Tanum, Oslo. Christensen L 1939. Charting the Antarctic. *Polar Times* 8, 7-10.

**Filson R.B. (1966):** The lichens and mosses of Mac.Robertson Land. *ANARE Scientific Reports* B(II) Botany.

**Funaki, M., Saito, K. (1992):** Paleomagnetic and Ar-40/Ar-39 dating studies of the Mawson charnockite and some rocks from the Christensen Coast., In Y. Yoshida (ed) *Recent progress in Antarctic earth science*. pp191-201, Terra Scientific Publishing Company, Tokyo.

**Lee J.E, Chown S.L. 2009:** Breaching the dispersal barrier to invasion: quantification and management. *Ecological Applications* 19: 1944-1959.

**Johnstone, G. (1987):** Visit to Scullin Monolith. *ANARE News*, June 1987, 3.

**Klages, N. T.W., Gales, R., Pemberton, D. (1990):** The stomach contents of Antarctic petrels *Thalassoica antarctica* feeding young chicks at Scullin Monolith, Mawson Coast, Antarctica. *Polar Biology* 10, 545-547

**Rayner, G.W. & Tilley C.E. (1940):** Rocks from Mac Robertson Land and Kemp Land, Antarctica. *Discovery Reports*, XIX, 165-184.

**Southwell, C.J. & Emmerson, L.M. (2013)** New counts of Adélie penguin populations at Scullin and Murray monoliths, Mac. Robertson Land, East Antarctica. *Antarctic Science* 25: 381-384.

**Takigami, Y., Funaki M. & Tokieda K. (1992):** 40Ar-39Ar geochronological studies on some paleomagnetic samples of East Antarctica. in Y. Yoshida et al. (editors) *Recent Progress in Antarctic Earth Science*, pp 61-66, Tokyo, Terra Scientific Publishing Co.

**Tingey R.J. (1991):** The regional geology of Archaean and Proterozoic rocks in Antarctica. In Tingey R.J. (ed) *The Geology of Antarctic*, pp 1-73, Oxford, Oxford Science Publications.

**Whinam J, Chilcott N, Bergstrom D.M. 2005:** Subantarctic hitchhikers: expeditioners as vectors for the introduction of alien organisms. *Biological Conservation* 121: 207-219.

**van Franeker J.A., Gavrilov M., Mehlum F., Veit R.R. & Woehler E.J. (1999):** Distribution and abundance of the Antarctic Petrel. *Waterbirds* 22, 14-28.

**Appendix 1: Estimates of breeding populations (pairs) of seabirds at Scullin and Murray Monoliths**

<b>Species</b>	<b>Scullin Monolith</b>	<b>Murray Monolith</b>
Adélie penguin <i>Pygoscelis adeliae</i>	43,000	8,000
Southern fulmar <i>Fulmarus glacialisoides</i>	1,350	150
Antarctic petrel <i>Thalassoica antarctica</i>	157,000	3,500
Cape petrel <i>Daption capense</i>	14	ND
Snow petrel <i>Pagodroma nivea</i>	1,200	ND
Wilson's storm petrel <i>Oceanites oceanicus</i>	ND	ND
South polar skua <i>Catharacta maccormicki</i>	30	ND

Note: ND indicates no census data are available

**Appendix 2: Flora recorded at Scullin Monolith**

The following taxa were collected at Scullin Monolith in 1972 (R Seppelt) and in 1987 (D Bergstrom), and were published in Bergstrom & Seppelt 1990).

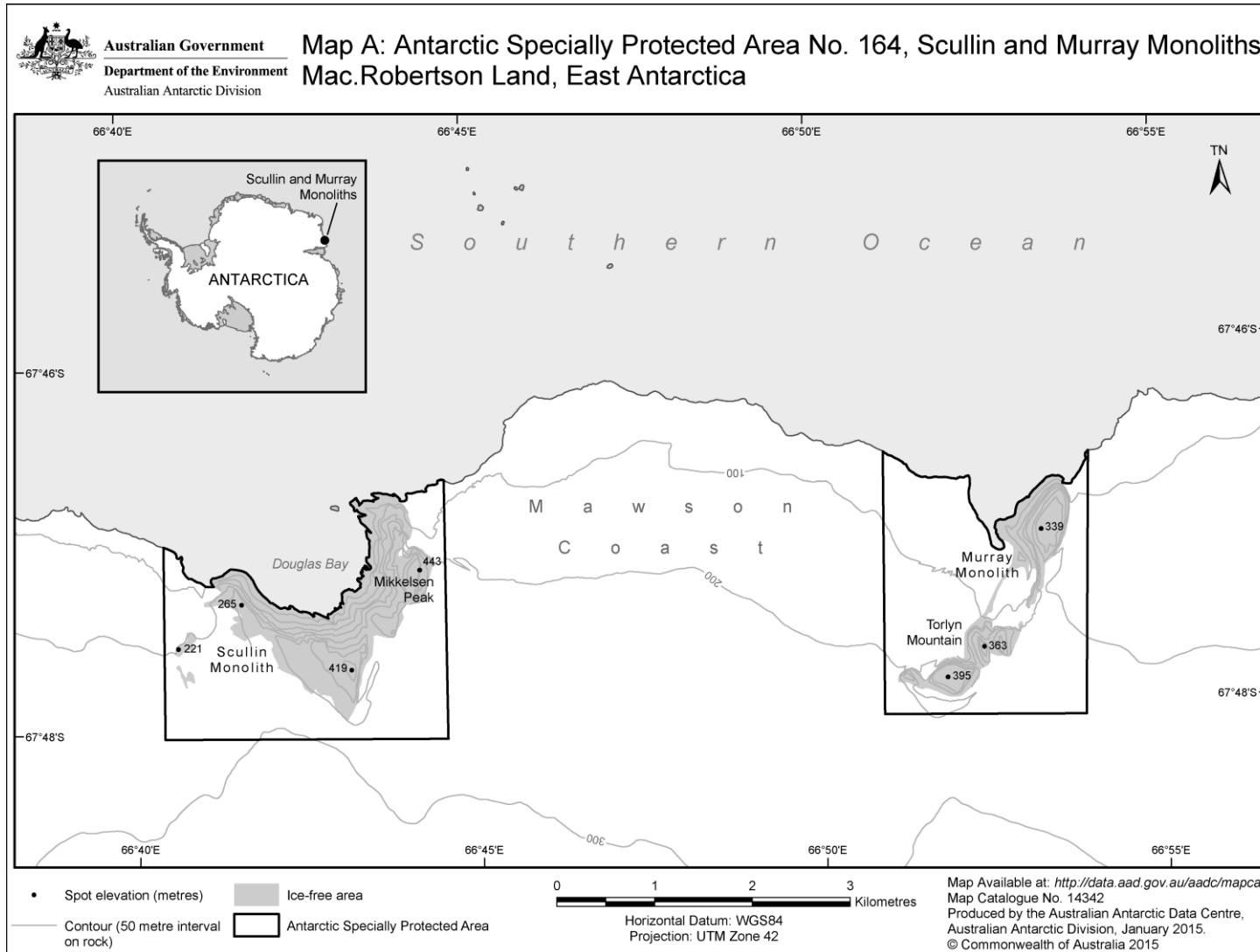
LICHENS	<b>Teloschistaceae</b>
<b>Acarosporaceae</b>	
<i>Biatorella cerebriformis</i> (Dodge) Filson	<i>Caloplaca citrina</i> (Hoffm.) Th. Fr.
<i>Acarosporagwynii</i> Dodge&Rudolph	<i>Xanthoria elegans</i> (Link.)Th.Fr.
<b>Lecanoraceae</b>	<i>Xanthoria mawsonii</i> Dodge
<i>Lecanora expectans</i> Darb	<b>Candelariaceae</b>
<i>Rhizoplaca melanophthalma</i> (Ram.) Leuck.	<i>Candellariella hallettensis</i> Murray
<b>Lecideaceae</b>	<b>Umbilicariaceae</b>
<i>Lecidea phillipsiana</i> Filson	<i>Umbilicaria decussata</i> (Vill.) Zahlbr.
<i>Lecidea woodberryi</i> Filson	<b>Usneaceae</b>
<b>Physciaceae</b>	<i>Usnea antarctica</i> Du Rietz
<i>Physcia caesia</i> (Hoffm.) Hampe	<i>Pseudophebe miniscula</i> (Nyl. Ex Arnold) Brodo et Hawksw.
<i>Buellia frigida</i> Darb	
<i>Buellia grimmiae</i> Filson	<b>BRYOPHYTES</b>
<i>Buellia lignoides</i> Filson	
<i>Rinodina olivaceobrunnea</i> Dodge & Baker	<b>Grimmiaceae</b> <i>Grimmia lawiana</i> Willis
	<b>Pottiaceae</b> <i>Sarconeurum glaciale</i> ( <i>C.</i> Muell.) Card. Et Bryhn

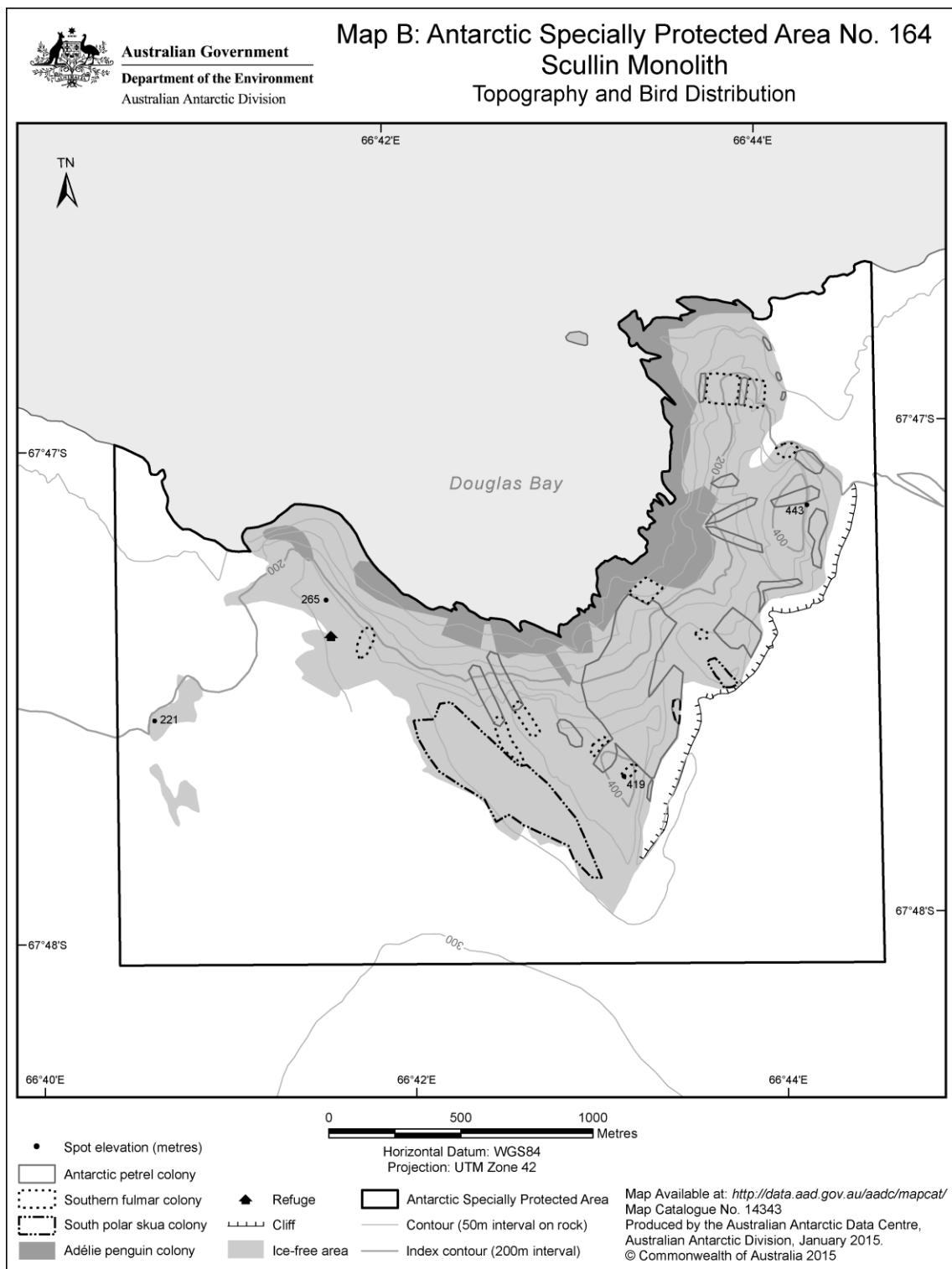
**Appendix 3: Approach distances guide: minimum distances (m) to maintain when approaching wildlife without permit.**

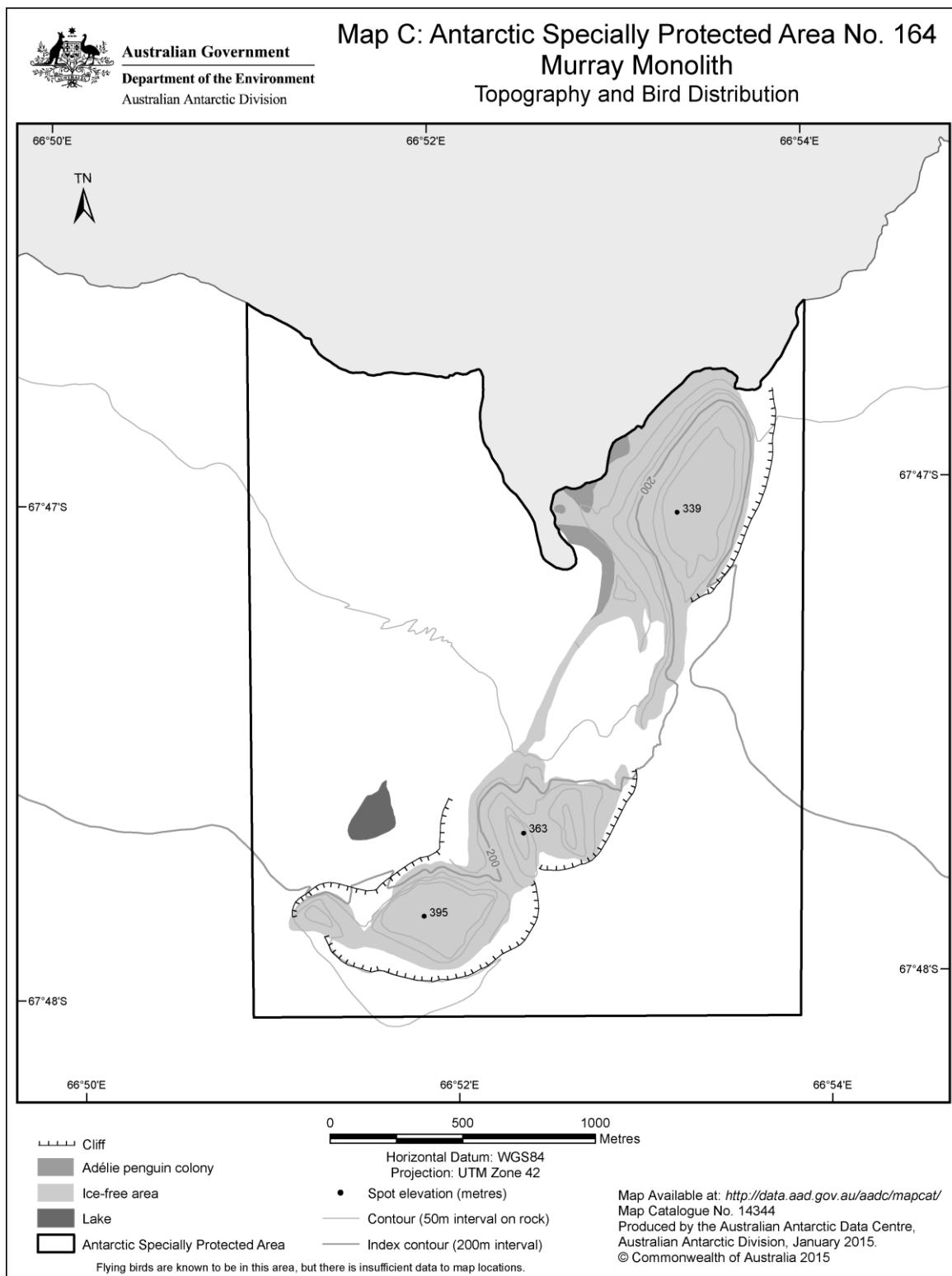
Species	People on foot/ski	Quad/skidoo	Hagglunds
Southern Giant Petrel	100	150	250
Emperor penguins in colonies	30		
Other penguins in colonies Moulting penguins Seals with pups Seal pups on their own Prions and petrels on nest South Polar Skua on nest	15		
Penguins on sea ice Non-breeding adult seals	5		

Notes:

1. These distances are a guide, and should you find that your activity is disturbing wildlife, a greater distance is to be maintained.
2. 'Prions and petrels' comprises Cape petrels, Antarctic petrels, Wilson's storm petrels, snow petrels and southern fulmars.







## Map D: Antarctic Specially Protected Area No. 164

### Scullin Monolith

#### Helicopter approach and landing site

