Management Plan for Antarctic Specially Protected Area No. 103

ARDERY ISLAND AND ODBERT ISLAND, BUDD COAST, WILKES LAND, EAST ANTARCTICA

Introduction

Ardery Island and Odbert Island (66°22'20"S; 110°29'10"E, Map A) were originally designated as Specially Protected Area No. 3, through Recommendation IV-III (1966), after a proposal by Australia. A management plan for the Area was adopted under Recommendation XVII-2 (1992). In accordance with Decision 1 (2002), the site was redesignated and renumbered as Antarctic Specially Protected Area (ASPA) No. 103. Revised management plans for the ASPA were adopted under Measure 2 (2005) and Measure 3 (2010). The Area is primarily designated to protect the unusual assemblage of breeding colonies of several species of petrel. The Antarctic petrel (*Thalassoica antarctic*a) and the southern fulmar (*Fulmarus glacialoides*) are of particular scientific interest.

1. Description of values to be protected

The Area is designated primarily to protect the assemblage of four fulmarine petrels at Ardery Island and Odbert Island (Map B and C). The four species of fulmarine petrels, all belonging to different genera, are Antarctic petrels, southern fulmars, Cape petrels (*Daption capense*), and snow petrels (*Pagodroma nivea*). All breed in the Area in sufficient numbers to allow comparative study. Study of these four genera at one location is of high ecological importance in understanding their responses to changes in the Southern Ocean ecosystem.

The Antarctic petrel is the only species in the genus *Thalassoica*; they occur most commonly in the Ross and Weddell seas and are much less abundant in East Antarctica. Similarly, the southern fulmar inhabits islands mainly near the Antarctic Peninsula and the islands of the Scotia Arc where about a quarter of its global population resides. Since southern fulmars require steeper slopes as breeding habitat (to allow falling away from the colony when becoming airborne) than Antarctic petrels, this species is more prone to suffer reductions in breeding success in poor weather conditions.

Both islands are also occupied by breeding populations of Wilson's storm petrels (*Oceanites oceanicus*) and Antarctic skuas (*Catharacta maccormicki*). Odbert Island also supports a breeding population of Adélie penguins (*Pygoscelis adeliae*).

2. Aims and Objectives

Management of Ardery Island and Odbert Island aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance;
- allow scientific research on the ecosystem and physical environment, particularly on the avifauna, provided it is for compelling reasons which cannot be served elsewhere;
- minimise the possibility of introduction of pathogens which may cause disease in bird populations within the Area;
- minimise the possibility of introduction of alien plants, animals and microbes to the Area;
- allow for the gathering of data on the population status of the bird species on a regular basis; and
- allow visits for management purposes in support of the aims of the management plan.

3. Management activities

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

- a copy of this Management Plan shall be made available at Casey station and to ships visiting the vicinity;
- the Area shall be visited as necessary, preferably no less than once every five years, to assess whether it continues to serve the purposes for which it was designated, and to ensure that management activities are adequate: and
- the Management Plan shall be reviewed at least every five years.

4. Period of designation

Designation is for an indefinite period.

5. Maps

- **Map A**: Antarctic Specially Protected Area No 103, Ardery Island and Odbert Island, Budd Coast, Wilkes Land, East Antarctica. The inset map indicates the location in relation to the Antarctic continent.
- **Map B**: Antarctic Specially Protected Area No 103, Ardery Island: Topography and Bird Distribution.
- **Map C**: Antarctic Specially Protected Area No 103, Odbert Island: Topography and Bird Distribution.
- **Map D**: Antarctic Specially Protected Area No 103: Ardery Island and Odbert Island: Helicopter approach and landing sites.

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

6. Description of the Area

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

Ardery Island (66°22’15”S, 110°27’0”E) and Odbert Island (66°22’24”S, 110°32’28”E) are among the southernmost of the Windmill Islands in the south of Vincennes Bay, off the Budd Coast of Wilkes Land, Eastern Antarctica. The Area comprises both islands down to low water mark.

Topography

Ardery Island and Odbert Island are located 5 km and 0.6 km, respectively, to the west of Robinson Ridge, south of Casey station.

Odbert Island is approximately 2.7 km long and 0.8 km wide. It has a rocky coast which rises steeply from the sea to a plateau. The highest point is 90 m altitude. The plateau is dissected by a series of valleys which run to the south from the high flat rim on the northern side. These valleys are snow covered in winter. The hill tops remain essentially ice and snow free. In some years, the island remains joined to Robinson Ridge on the mainland by sea ice.

Ardery Island is a steep, ice free island approximately 1.2 km long and 0.8 km wide, with an east-west orientation. The highest point is 117 m above sea level.

The terrain on both islands is rugged and dissected by fissures. The cliffs are fractured and have narrow exposed ledges which in summer are occupied by nesting sea birds. On the hillsides and plateau region, the exposed rock is ice-smoothed and the valley floors are covered with moraine. The islands have undergone isostatic rebound. Moraine and solifluction debris is abundant at heights in excess of 30 metres above mean sea level but considerably less at lower altitudes.

Geology

The Windmill Islands region represents one of the eastern most outcrops of a Mesoproterozoic low-pressure granulite facies terrain that extends west to the Bunger Hills and further to the Archaean complexes in Princess Elizabeth Land, to minor exposures in the east in the Dumont d'Urville area and in Commonwealth Bay. The total outcrop areas do not exceed more than a few square kilometres. The Mesoproterozoic outcrop of the Windmill Islands and the Archaean complexes of Princess Elizabeth Land are two of the few major areas in East Antarctica that can be directly correlated with an Australian equivalent in a Gondwana reconstruction. The Mesoproterozoic facies terrain comprise a series of migmatitic metapelites and metapsammites interlayered with mafic to ultramafic and felsic sequences with rare calc-silicates, large partial melt bodies (Windmill Island supacrustals), undeformed granite, charnockite, gabbro, pegmatite, aplites and cut by easterly-trending late dolerite dykes.

Ardery Island and Odbert Island are part of the southern gradation of a metamorphic grade transition which separates the northern part of the Windmill Islands region from the southern part. The metamorphic grade ranges from amphibolite facies, sillimanite-biotite orthoclase in the north at Clark Peninsula, through biotite-cordierite-almandine granulite, to hornblende-orthopyroxene granulite at Browning Peninsula in the south.

Ardery Island and Odbert Island together with Robinson Ridge, Holl Island, Peterson Island and the Browning Peninsula are similar geologically and are composed of Ardery charnockite. Charnockites are of granitic composition but were formed under anhydrous conditions. The Ardery Charnockite of Ardery Island and Odbert Island intrudes the Windmill metamorphics and consists of a modal assemblage of quartz + plagioclase + microcline + orthopyroxene + biotite + clinopyroxene hornblende with opaques and minor zircon and apatite. An isotopic age of about 1,200 million years for the Ardery charnockite has been established. The charnockite is prone to deep weathering and crumbles readily because of its mineral assemblage, whereas the metamorphic sequences of the northerly parts of the region have a much more stable mineral assemblage and crystalline structure. This difference has a significant influence on the distribution of vegetation in the Windmill Islands region with the northern rock types providing a more suitable substrate for slow growing lichens.

Soils on the islands are poorly developed and consist of little more than rock flour, moraine and eroded material. Some soils contain small amounts of organic matter derived from excreta and feathers from the seabirds.

Glaciation

The Windmill Islands region was glaciated during the Late Pleistocene. The southern region of the Windmill Islands was deglaciated by 8,000 corr. yr B.P., and the northern region, including the Bailey Peninsula deglaciated by 5,500 corr. yr B.P. Isostatic uplift has occurred at a rate of 0.5 to 0.6 m/100 yr, with the upper mean marine limit, featured as ice-pushed ridges, being observed at nearby Robinson Ridge at approximately 28.5 metres.

Climate

The climate of the Windmill Islands region is frigid-Antarctic. Conditions at Ardery Island and Odbert Island are probably similar to those of the Casey station area approximately 12 km to the north. Meteorological data for the period 1957 to 1983 from Casey station (altitude 32 m) on the Bailey Peninsula show mean temperatures for the warmest and coldest months of 0.3 and -14.9°C, respectively, with extreme temperatures ranging from 9.2 to -41°C. Mean annual temperature for the period was –9.3°C.

The climate is dry with a mean annual snowfall of 195 mm year^{-1} (rainfall equivalent) precipitation as rain has been recorded in summer. However, within the last 10 to 15 years the mean annual temperature has decreased to –9.1°C and the mean annual snowfall has increased to 230 mm year^{-1} (rainfall equivalent).

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

Environmental Domains and Antarctic Conservation Biogeographic Regions

Based on the Environmental Domains Analysis for Antarctica (Resolution 3(2008)) Ardery Island and Odbert Island are located within Environment L *Continental coastal-zone ice sheet*. Based on the Antarctic Conservation Biogeographic Regions (Resolution 6 (2012)) the Area is located within Biogeographic Region 7 *East Antarctica*.

Biological Features

Terrestrial

The flora of Odbert Island consists of three moss species, eleven lichen species (Table 1), and an unknown number of terrestrial and freshwater algae. The most extensive development of lichens is towards the highest elevations of the southern parts of the island in an area of ice-fractured bedrock. The algae occur in tarns, soil seepage areas and soil. Stands of *Prasiola* spp and other green algae and cyanobacteria occur below snow drifts down slope from penguin colonies towards the western part of the island.

The flora of Ardery Island comprises several species of lichen similar to those found on Odbert Island.

The only recorded invertebrates are ectoparasites of birds. Ardery Island is the type locality for the Antarctic flea *Glaciopsyllus antarcticus*, associated with southern fulmars.

MOSSES
Bryum pseudotriquetrum Hedw.) Gaertn., Meyer & Scherb.
Ceratodon purpureus (Hedw.) Brid.
Schistidium antarcticum (= Grimmia antarctici) (Card.) L.I.Savicz & Smirnova
LICHENS
Buellia frigida (Darb.)
Buellia soredians Filson
Buellia sp.
Caloplaca athallina Darb.
Caloplaca citrina (Hoffm.) Th. Fr.
Candelariella flava (C.W.Dodge & Baker) Castello & Nimis
Rhizoplaca melanophthalma (Ram.) Leuck. et Poelt
Rinodina olivaceobrunnea Dodge & Baker
Umbilicaria decussata (Vill.) Zahlbr.
Xanthoria mawsonii Dodge.
Usnea antarctica Du Rietz
ALGAE
Prasiola crispa (Lightfoot) Kützing
Prasiococcus sp.

Table 1. List of mosses, lichens and algae recorded from Odbert Island.

Lakes

Cold monomictic lakes and ponds occur throughout the Windmill Islands region in bedrock depressions, and are usually ice-free during January and February. Nutrient rich lakes are found near the coast in close proximity to extant or abandoned penguin colonies. Sterile lakes are located further inland and are fed by melt water and local precipitation. On Ardery Island and Odbert Island, there are a number of small tarns which are frozen in winter and filled with melt water in summer. Many of the tarns are ephemeral, drying out towards the end of summer. Other tarns located below snow banks are fed continuously by melt water.

Birds and seals

Odbert Island has breeding populations of Adélie penguins, Cape petrels, snow petrels, southern fulmars, Wilson's storm petrels, and south polar skuas. Ardery Island supports a similar species composition as well as Antarctic petrels, but does not have any breeding Adélie penguins. The southern giant petrel (*Macronectes giganteus*), which breeds on the Frazier Islands approximately 23 km to the north-west, is the only species breeding in the Windmill Islands that breeds neither at Ardery Island nor at Odbert Island.

No seals inhabit Ardery Island and Odbert Island although Weddell seals (*Leptonychotes weddellii*) are frequently observed on the sea ice around them. The main pupping area is about 3 km to the south-east between Herring Island and the Antarctic mainland. In this area, disturbance of the sea ice caused by movement of the Peterson Glacier ensures open water and easy access to food. About 100 pups are born annually in the region. Elephant seals (*Mirounga leonina*) haul out a little farther to the south on Petersen Island and on the Browning Peninsula. Up to 100 of these seals are seen annually; most are mature males and only a few females have also been observed.

Adélie penguin (Pygoscelis adeliae)

Adélie penguins breed on Odbert Island, and although they regularly come ashore on Ardery Island, none breed there. The most recent published estimate of the breeding population on Odbert Island is 11,000 pairs in 1989/90. Observations during a visit to the Area in 2012/13 indicated that the population had increased further, but no new estimate is yet available.

Egg laying usually commences before the middle of November, the first chicks hatch around mid-December, and juveniles start leaving the colony in early February. Southern fulmar (Fulmarus glacialoides)

The total population of southern fulmars in the Area is about 5,000 breeding pairs. There are approximately 3,000 occupied southern fulmar sites on Ardery Island; the largest colonies are located on the northern cliffs and around the eastern tip of the island. At Odbert Island, most of the 2,000 sites are concentrated in two large colonies on Haun Bluff and in the central north.

Southern fulmars breed colonially on or near the cliffs and ravines. Nests are situated on small cliff ledges but also on large nearly flat terraces, some birds nest in the open, others in deep crevices or between loose rocks. First eggs appear in early December and most are laid within 10 days. Hatching commences in the third week of January and chicks fledge by mid-March.

Antarctic petrel (Thalassoica antarctica)

The total population of Antarctic petrels in the Area has been estimated at just over 300 breeding pairs. The largest colony, on the Northern Plateau at Ardery Island, contains at least 150 sites in the main area and some 25 sites in smaller groups nearby. At Odbert Island, some 30 nests are located in a small area off the central northern cliffs

Most nests of Antarctic petrels are situated on plateau-like areas or gently sloping sections of steep cliffs on the Northern Plateau, and smaller colonies around Soucek Ravine. Nests are very close together; isolated nesting on small ledges appears to be avoided. In late November, the first Antarctic petrels return from their pre-laying exodus and a week later most birds have returned to lay their eggs. First hatchlings appear in the second week of January, fledging commences in late February to early March, and all chicks have left before the middle of March.

Cape petrel (Daption capense)

Approximately 750 breeding pairs of Cape petrel utilise the Area, with most breeding at Ardery Island in small colonies on the northern cliffs. Scattered nests are present on both sides of Snowie Mountain. There are approximately 100 to 200 nesting sites on Odbert Island, mostly located around the fulmar colonies.

Cape petrels prefer nesting sites sheltered by slightly overhanging rocks and substantial cover from the back and if possible the sides. Most nests are in less steep parts of cliffs or along the top edges of cliffs both in colonies and small scattered groups. After returning from the pre-laying exodus, eggs are laid in late November, and hatching commences in the second week of January. Most chicks have fledged by the first week of March.

Snow petrel (Pagodroma nivea)

The number of snow petrels in the Area is estimated at over 1,100 breeding pairs. Approximately 1,000 snow petrel nesting sites were located on Ardery Island in 1990, mostly on the slopes of Snowie Mountain. Snow

petrels appear to be less abundant on Odbert Island than on Ardery with 100 – 1000 nesting sites. In 2003, 752 active nests were found on Ardery Island and 824 on Odbert Island.

The snow petrels breed in crevices or in holes between loose rocks in loose, low density aggregations. Isolated nests are common, as are nests within colonies of other species. Suitable snow petrel habitat also harbours Wilson's storm petrels. The onset of egg laying varies between concentrations of nests, with laying occurring within the first three weeks of December, and chicks hatching from the middle of January onwards. All are fledged in the first two weeks of March.

Wilson's storm petrel (Oceanites oceanicus)

Wilson's storm petrels are widely distributed, and nest in all suitable rocky areas within the Area. Approximately 1,000 nesting sites have been documented for Ardery Island. Odbert Island has 1,000 – 2,000 nesting sites, at a lower density than that of Ardery Island because of the general spread of suitable rock areas. Wilson's storm petrels breed in deep, narrow holes. As the nests can be extremely difficult to detect the population estimates are likely to be considerable under-estimates.

South polar skua (Catharacta maccormicki)

In 1984/85, ten pairs of south polar skua bred on Ardery Island, and another three more pairs may have held territories. A similar number was present in 1986/87, although only seven pairs produced eggs. Odbert Island had 10 - 20 pairs. The distribution of south polar skua nests on Ardery Island reflects their dependence on petrels. Most pairs have observation points close to petrel nests, from which they can observe their food territory on the bird cliffs. At Odbert Island, most nests were near the penguin colonies.

Nests are shallow hollows in gravel, either fully in the open on flat ground or slightly protected by surrounding rocks. Territories and nest locations appear to be stable from year to year; near a nest there are usually several depressions of previous nests. Egg laying dates vary considerably, though most are concentrated around late November to early December. The first chicks are observed in the last days of December, and juveniles begin to fly by mid February.

Non-breeding bird species

Emperor penguins (*Aptenodytes forsteri*) do not breed in the immediate Casey area but individual birds have been observed near Casey station and even far inland. A chinstrap penguin (*Pygoscelis antarctica*) was observed in January 1987 in the Adélie penguin colony on Whitney Point, north of Casey. Southern giant petrels, both adults and immatures, are regular visitors to Ardery Island. In favourable winds they fly along the bird cliffs in search of food. An emaciated juvenile blue petrel (*Halobaena caerulea)* arrived at Casey in March 1987. In November 1984, an adult Dominican gull (*Larus dominicanus*) was sighted in the Casey area. Groups of terns, possibly Arctic tern (*Sterna paradisea)*, were observed in the Casey area in 1984/ 85 and in 1986/87, when a few groups of up to 100 birds were seen and heard high in the air in March.

6(ii) Access to the Area

Travel to the Area may be by vehicle over sea ice, by boat or by aircraft, in accordance with section 7(ii) of this plan.

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

Four remotely operating time lapse cameras are located on Ardery Island and one on Odbert Island (locations 66°22'6.3"S, 110°26'42.9"E; 66°22'13.4"S, 110°27'46.2"E; 66°22'6.2"S, 110°26'56.3"E; 66°22'7.7"S, 110°26'57.7"E (Map B) and 66°22'37.8"S, 110°33'55.3"E (Map C)). Deployed in 2010/11, the cameras have been located for long term monitoring of **s**outhern Fulmar, Cape petrel and Adélie penguin breeding success and phenology with minimal disturbance**.** While the cameras are not permanent, they are expected to remain in place beyond the term of this plan.

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

The following Protected Areas are located in the vicinity of Ardery Island and Odbert Island (see Map A):

- North-east Bailey Peninsula (66°17'S, 110°32'E) (ASPA No 135) approximately 12 km north of Ardery Island and Odbert Island;
- Clark Peninsula (66°15'S, 110°36'E) (ASPA No 136), approximately 16 km north of Ardery Island and Odbert Island;
- Frazier Islands (66°13’S 110°11’E) (ASPA No 160), approximately 23 km north-east of Ardery Island and Odbert Island.

6(v) Special zones within the Area

There are no special zones within the Area.

7. Terms and conditions for entry permits

7(i) General 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 only for compelling scientific reasons 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 will not jeopardise the values of the Area;
- the actions permitted are in accordance with the management plan;
- the permit, or an authorised 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;
- 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

Vehicles and boats used to visit the islands must be left at the shoreline. Movement within the Area is by foot only.

Defined landing sites for access by sea and helicopter to Ardery Island and Odbert Island are shown on Map D. At Ardery Island, the preferred boat landing site is at Robertson Landing where there are three rock anchors to tie down a boat or other equipment. The boat landing site marked for Ardery Island on Map D is within 200 metres of seabird colonies. However, it represents the preferred safe landing site on the island. All landings must be undertaken carefully to avoid disturbance to the birds. There are no defined pedestrian routes within the Area, however, pedestrians should keep their distance from and avoid disturbance of the birds at all times.

If access to the islands is not possible by boat or by vehicle over sea ice, then fixed wing aircraft or helicopters may be used subject to the following conditions:

- disturbance of the colonies by aircraft shall be avoided at all times;
- sea ice landings shall be encouraged (where practicable);
- overflight of the islands should be avoided at all times, except where it is considered essential for scientific or management purposes as authorised in a permit. In these instances, overflight must be at a vertical or horizontal distance of no less than 930 metres (3050 feet) for single-engine aircraft and 1500 metres (5000 feet) for twin-engine aircraft;
- during the breeding season of penguins and petrels, defined here as the period from 1 November to 1 April, helicopter movement to the islands should be kept to the minimum;

- the use of twin-engine helicopters to land on Ardery Island or Odbert Island is prohibited;
- the single-engine helicopter approach to Ardery Island should be at a high altitude and from a southern direction as the lowest densities of birds are on the southern cliffs (see Maps B and D);
- the single-engine helicopter approach to Odbert Island should preferably be from the south, avoiding cliff areas because of the nesting petrels (see Maps C and D);
- single-engine helicopter landing sites marked on Map D are approximate and pilots shall ensure that disturbance of breeding colonies is avoided.
- only personnel who are required to carry out work in the Area should leave the helicopter;
- refuelling of aircraft is prohibited within the Area.

7(iii) **Activities which are, or may be conducted within the Area**

The following activities may be conducted within the Area as authorised in a permit;

- compelling scientific research consistent with the Management Plan for the Area which cannot be undertaken elsewhere and will not jeopardise the values for which the Area has been designated or the ecosystems of the Area;
- essential management activities, including monitoring; and
- sampling, which should be the minimum required for approved research programs.

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

- No permanent structures are to be erected in the Area.
- Any structures erected or installed within the Area are to be specified in a permit.
- Scientific markers and equipment must be secured and maintained in good condition, clearly identifying the permitting country, name of principal investigator and year of installation. All such items should be made of materials that pose minimum risk of contamination of the Area.
- A condition of the permit shall be the removal of equipment associated with scientific research before the permit for that research expires. 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.
- When permitted, the installation of a field hut on Ardery Island must take place before 1 November when the breeding season commences, and removal after 1 April when fledglings have departed. Installation and removal should be supported by vehicle over sea ice unless sea ice conditions prevent this.

7(v) Location of field camps

- Camping is prohibited on Odbert Island except in emergency.
- If required for field work, a hut may be erected on Ardery Island at the point specified on Map D. There are eight solid rock anchors available at this location. There is a refuge hut “Robinson Ridge Hut”, on the mainland, located on Robinson Ridge (66°22.4’S 110°35.2’E), approximately 800 m west of Odbert Island (see Map A).

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

- No poultry products, including dried food containing egg powder, are to be taken into the Area.
- No depots of food or other supplies are to be left within the Area beyond the season for which they are required.
- 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 either at the refuge hut or 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);
- No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in a permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted.
- Fuel is not to be stored in the Area unless required for essential purposes connected with the activity for which the permit has been granted. Permanent fuel depots are not permitted.
- All material introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so as to minimise the risk of environmental impact.

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.*
- Ornithological research on the breeding birds present within the Area shall be limited to activities that are non-invasive and non-disruptive. Surveys shall have a high priority. If the capture of individuals is required, capture should occur at nests on the periphery of the Area if at all possible to reduce disturbance.

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

- Material 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.
- 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 unless the impact of the removal is likely to be greater than leaving the material *in situ*. If such material is found, the appropriate Authority must be notified and approval obtained prior to removal.

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 outside the Area.

7(x) Measures that may be necessary to continue to meet the aims of the management plan

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;
- erect or maintain scientific equipment, structures, and signposts; or
- carry out other protective measures.

Any specific sites of long-term monitoring shall be appropriately marked and a GPS position obtained for lodgement with the Antarctic Data Directory System through the appropriate National Authority.

To help maintain the ecological and scientific values of the Area, visitors shall take special precautions against introductions. Of particular concern are pathogenic, microbial or vegetation introductions sourced from soils, flora and 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, particularly sampling equipment and markers to be used in the Area.

7(xi) Requirement 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 monitoring of bird populations. Additionally visit reports should provide detailed information on census data, locations of any new colonies or nests not previously recorded, a brief summary of research findings and copies of photographs taken of the Area.

8. Supporting documentation

Australian Antarctic Division. 2013. *Environmental Code of Conduct for participants in the Australian Antarctic program*, Australian Antarctic Division.

Baker, S.C. & Barbraud, C. 2000. Foods of the south polar skua Catharacta maccormicki at Ardery Island, Windmill Islands, Antarctica. *Polar Biology* 24: 59-61.

Blight, D.F. & Oliver, R.L. 1977. The metamorphic geology of the Windmill Islands, Antarctica, a preliminary account. *Journal of the Geological Society ofAustralia*22: 145-158.

Blight, D.F. & Oliver, R.L. 1982. Aspects of the history of the geological history of the Windmill Islands, Antarctica. In: *Antarctic Geoscience* (ed. C.C. Craddock), University of Wisconsin Press, Madison, pp. 445-454,: .

Cowan, A.N. 1979. Ornithological studies at Casey, Antarctica, 1977-1978. *Australian Bird Watcher*, 8:69.

Cowan, A.N. 1981. Size variation in the snow petrel. *Notornis* 28: 169-188.

Creuwels, J.C.S & van Frenker, J.A. 2001. Do two closely related petrel species have a different breeding strategy in Antarctica. *Proceedings of the VIIIth SCA International Biology Symposium*, 27 August-1 September 2001, Vrije Univesiteit, Amsterdam.

Creuwels, J.C.S., Poncet S., Hodum, P.J, & van Frenker, J.A. 2007. Distribution and abundance of the southern fulmars *Fulmarus glacialoides*, *Polar Biology* 30: 1083-1097.

Creuwels, J.C.S., van Frenenker, J.a., Doust, S.J., Beinssen A., Harding, B. & Hentschel, O. 2008. Breeding strategies of Antarctic petrels *Thalassoica antarctica* and southern fulmars *Fulmarus glacialoides* in the high Antarctic and implications for reproductive success, *Ibis* 150: 160-171

Croxall, J.P., Steele, W.K., McInnes, S.J. & Prince, P.A. 1995. Breeding distribution of the snow petrel *Pagodroma nivea*. *Marine Ornithology* 23: 69-99.

Filson, R.B. 1974. Studies on Antarctic lichens II: Lichens from the Windmill Islands, Wilkes Land. *Muelleria*, 3:9-36.

Goodwin, I.D. 1993. Holocene deglaciation, sea-level change, and the emergence of the Windmill Islands, Budd Coast, Antarctica. *Quaternary Research* 40: 70-80.

Horne, R. 1983. The distribution of penguin breeding colonies on the Australian Antarctic Territory, Heard Island, the McDonald Islands and Macquarie Island. *ANARE Research Notes* No. 9.

Jouventin, P., & Weimerskirch, H. 1991. Changes in the population size and demography of southern seabirds: management implications. In: *Bird population studies*: *Relevance to conservation and management*. (eds. C.M. Perrins, J.-D. Lebreton, and G.J.M Hirons) Oxford University Press: pp. 297-314.

Keage, P. 1982. Location of Adélie penguin colonies, Windmill Islands. *Notornis*, 29: 340-341.

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

Luders, D.J. 1977. Behaviour of Antarctic petrels and Antarctic fulmars before laying. *Emu* 77: 208-214.

McLeod, I.R. & Gregory, C.M. 1967. Geological investigations for along the Antarctic coast between longitudes 108°E and 166°E. Report of the Bureau for Mineral Resources, Geology and. Geophysics. Australia No. 78, pp. 30-31.

Melick, D.R., Hovenden. M.J., & Seppelt, R.D. 1994. Phytogeography of bryophyte and lichen vegetation in the Windmill Islands, Wilkes Land, Continental Antarctica. *Vegetatio* 111: 71-87.

Murray, M.D., Orton, M.N. & Penny, R.L. 1972. Recoveries of silver-grey petrels banded on Ardery Island, Windmill Islands, Antarctica. *Australian Bird Bander* 10, 49-51

Murray M.D. & Luders D.J. 1990. Faunistic studies at the Windmill Islands, Wilkes Land, East Antarctica, 1959-80. *ANARE Research Notes* 73: 1-45.

Orton, M. R. 1963. A brief survey of the fauna of the Windmill Islands, Wilkes Land, Antarctica. *Emu* 63, 14-22.

Paul, E., Stüwe, K., Teasdale, J. & Worley, B. 1995. Structural and metamorphic geology of the Windmill Islands, east Antarctica: field evidence for repeated tectonothermal activity. *Australian Journal of Earth Sciences* 42: 453-469.

Phillpot, H.R. 1967. Selected surface climate data for Antarctic stations. Commonwealth of Australia: Bureau of Meteorology.

Robertson, R. 1961. Geology of the Windmill Islands, Antarctica. *IGY Bulletin* 43: 5-8.

Robertson , R. 1961. Preliminary report on the bedrock geology of the Windmill Islands. In: Reports on the Geological Observations 1956-60. IEY Glaciology Report No. 4, (IEY World Data Centre 4: Glaciology). American Geographical Society, New York.

Schwerdtfeger, W. 1970. The climate of the Antarctic. In: *Climate of polar regions* (ed. S. Orvig), Elsevier pp. 253-355, Amsterdam.

Schwerdtfeger, W. 1984. Weather and climate of the Antarctic, Amsterdam: Elsevier.

Smit, F.G.A.M. & Dunnet, G.M. 1962. A new genus and species of flea from Antarctica, (Siphonaptera: Ceratophyllidae). Pacific Insect4: 895-903.

van Franeker, J.A, Creuwels, J.C.S., van der Veer, W., Cleland, S. & Robertson, G. 2001. Unexpected effects of climate change on the predation of Antarctic petrels. *Antarctic Science* 13: 430-439.

van Franeker, J.A., Bell, P.J., & Montague, T.L. 1990. Birds of Ardery and Odbert islands, Windmill Islands, Antarctica. Emu 90: 74-80.

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

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

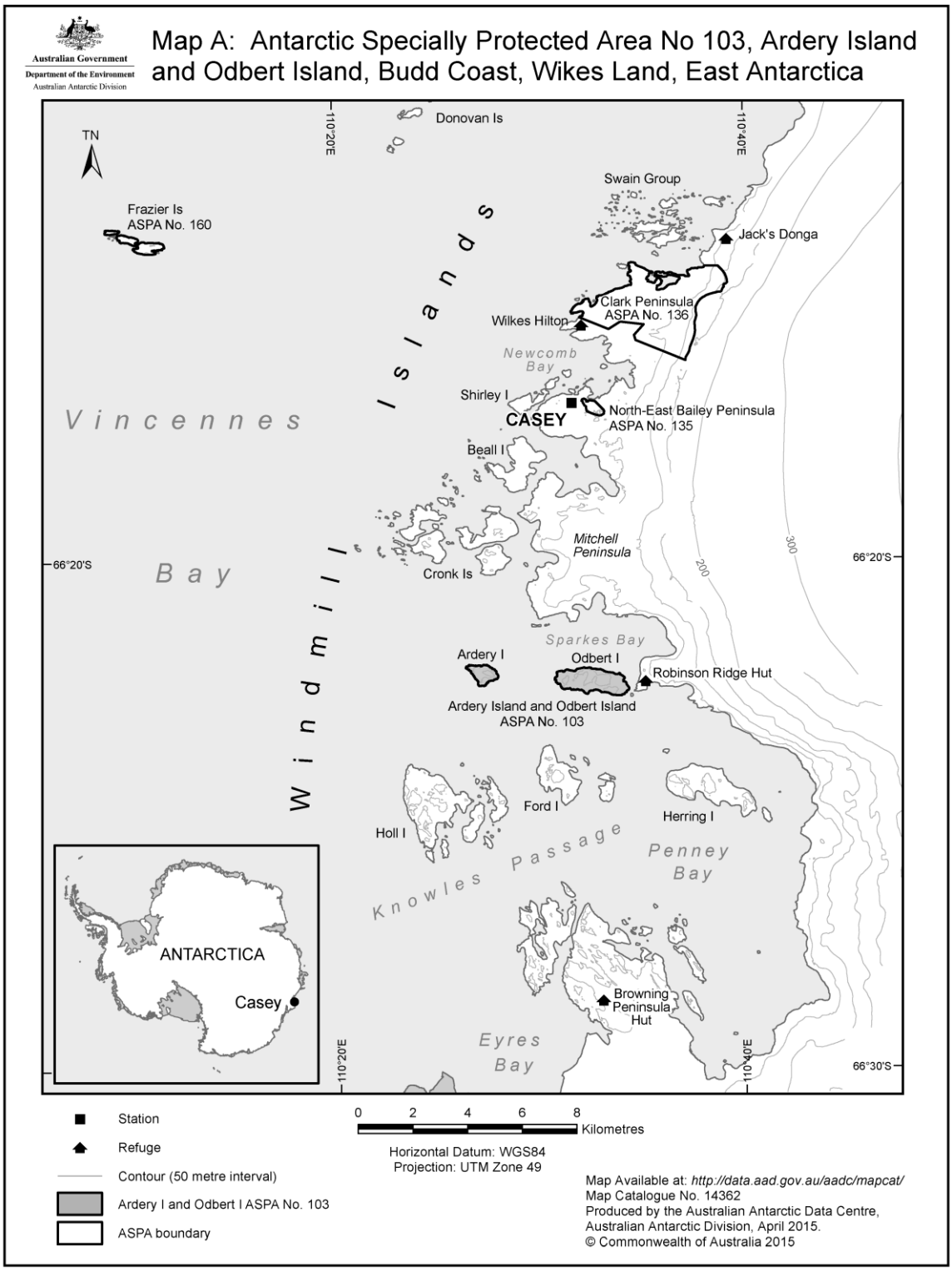
Williams, I.S., Compston W., Collerson K.D., Arriens, P.A. & Lovering J.F. 1983. A Reassessment of the age of the Windmill metamorphics, Casey area. In: Antarctic Earth Science (ed. R.L. Oliver, P.R. James & J.B. Jago), Australian Academy of Sciences, Canberra, pp. 73-76.

Woehler E.J. & Croxall J.P. 1997. The status and trends of Antarctic and subantarctic seabirds. *Marine Ornithology* 25: 43-66.

Woehler, E.J. & Johnstone, G.W. 1991. Status and conservation of the seabirds of the Australian Antarctic Territory. In Seabird status and conservation: A Supplement. (ed. J.P. Croxall) ICBP Technical Publication No. 11: 279-308.

Woehler, E.J., Slip, D.J., Robertson, L.M., Fullagar, P.J. & Burton, H.R. 1991. The distribution, abundance and status of Adélie penguins *Pygoscelis adeliae* at the Windmill Islands, Wilkes Land, Antarctica. *Marine Ornithology* 19: 1-17.

Woehler, E.J., Cooper, J., Croxall, J.P., Fraser, W.R., Kooyman, G.L., Miller, G.D., Nel, D.C., Patterson, D.L., Peter, H-U, Ribic, C.A., Salwicka, K., Trivelpiece, W.Z. & Weimerskirch, H. 2001. *A Statistical Assessment of the Status and Trends of Antarctic and Subantarctic Seabirds*. SCAR/CCAMLR/NSF.


Australian Government
Department of the Environment
Australian Antarctic Division
Map A: Antarctic Specially Protected Area No 103, Ardery Island and Odbert Island, Budd Coast, Wikes Land, East Antarctica
TN
110°20'E
110°40'E
Donovan Is
Swain Group
Frazier Is
ASPA No. 160
Jack's Donga
Clark Peninsula
ASPA No. 136
Wilkes Hilton
Newcomb Bay
Shirley I
CASEY
North-East Bailey Peninsula
ASPA No. 135
Beall I
Vincennes Bay
Windmill Islands
Mitchell Peninsula
Cronk Is
66°20'S
200
300
Sparkes Bay
Ardery I
Odbert I
Robinson Ridge Hut
Ardery Island and Odbert Island
ASPA No. 103
Ford I
Herring I
Holl I
Knowles Passage
Penney Bay
ANTARCTICA
Casey
Browning Peninsula Hut
Eyres Bay
66°30'S
Station
Refuge
Contour (50 metre interval)
Ardery I and Odbert I ASPA No. 103
ASPA boundary
0 2 4 6 8
Kilometres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 14362
Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division, April 2015.
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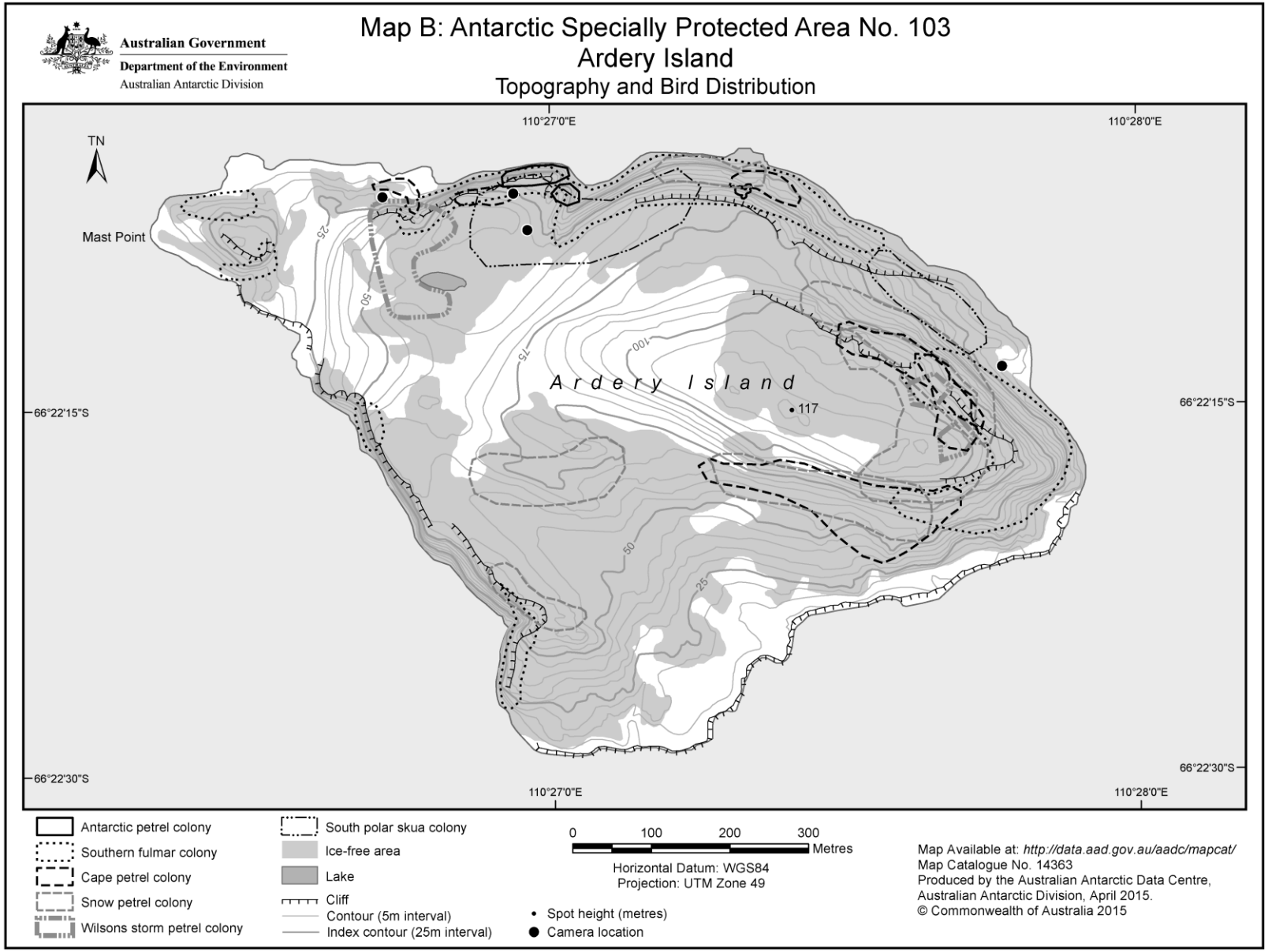
Australian Government
Department of the Environment
Australian Antarctic Division
Map B: Antarctic Specially Protected Area No. 103
Ardery Island
Topography and Bird Distribution
110°27'0"E
110°28'0"E
TN
Mast Point
Ardery Island
117
25
50
75
100
66°22'15"S
66°22'30"S
Antarctic petrel colony
Southern fulmar colony
Cape petrel colony
Snow petrel colony
Wilsons storm petrel colony
South polar skua colony
Ice-free area
Lake
Cliff
Contour (5m interval)
Index contour (25m interval)
0 100 200 300 Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Spot height (metres)
Camera location
Map Available at: http://data.aad.gov.au/aadc/mapcat/
Map Catalogue No. 14363
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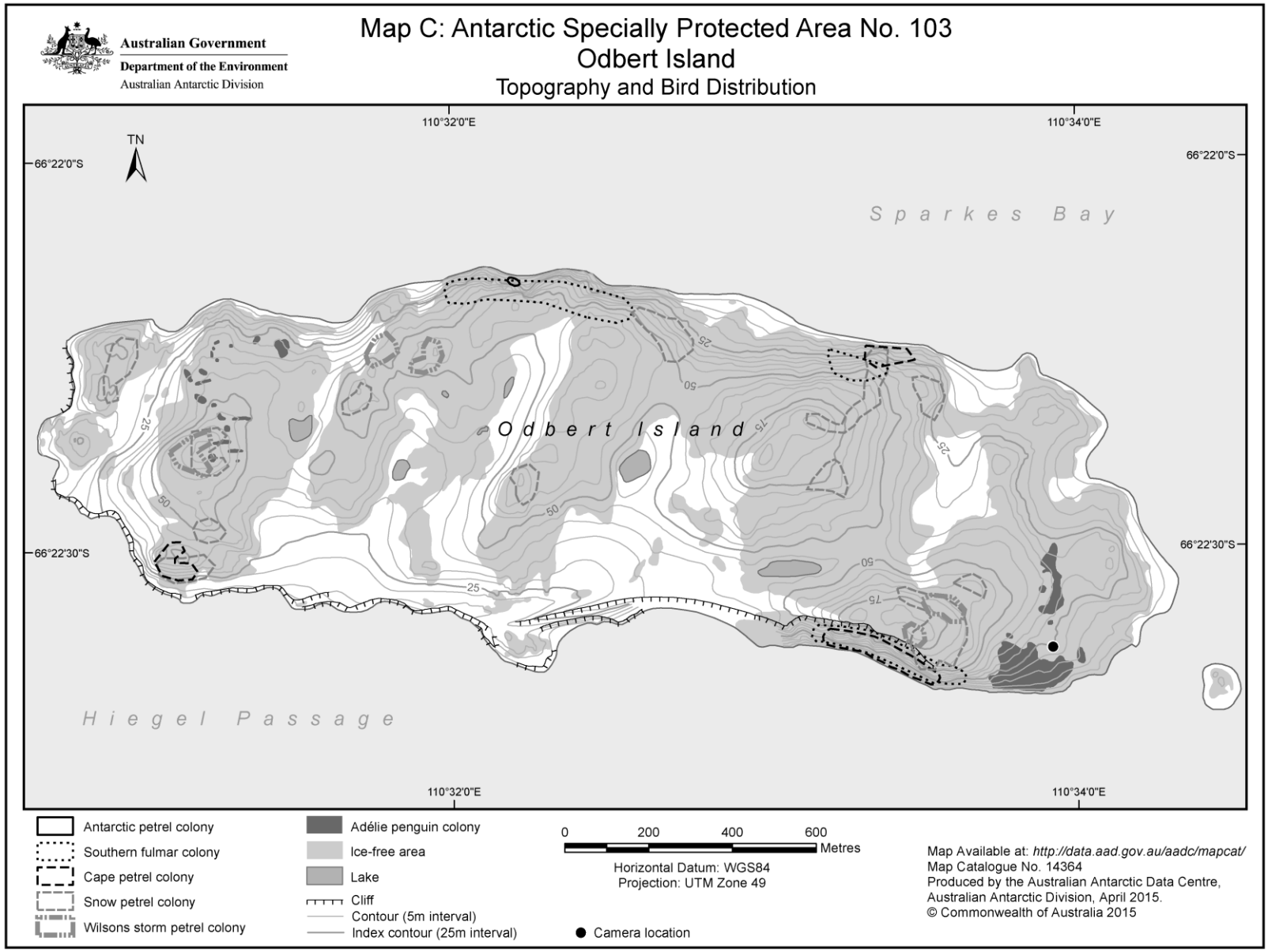
Australian Government
Department of the Environment
Australian Antarctic Division
Map C: Antarctic Specially Protected Area No. 103
Odbert Island
Topography and Bird Distribution
110°32'0"E
110°34'0"E
66°22'0"S
66°22'30"S
TN
Sparkes Bay
Odbert Island
Hiegel Passage
25
50
75
Antarctic petrel colony
Southern fulmar colony
Cape petrel colony
Snow petrel colony
Wilsons storm petrel colony
Adélie penguin colony
Ice-free area
Lake
Cliff
Contour (5m interval)
Index contour (25m interval)
0 200 400 600 Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Camera location
Map Available at: http://data.aad.gov.au/aadc/mapcat/
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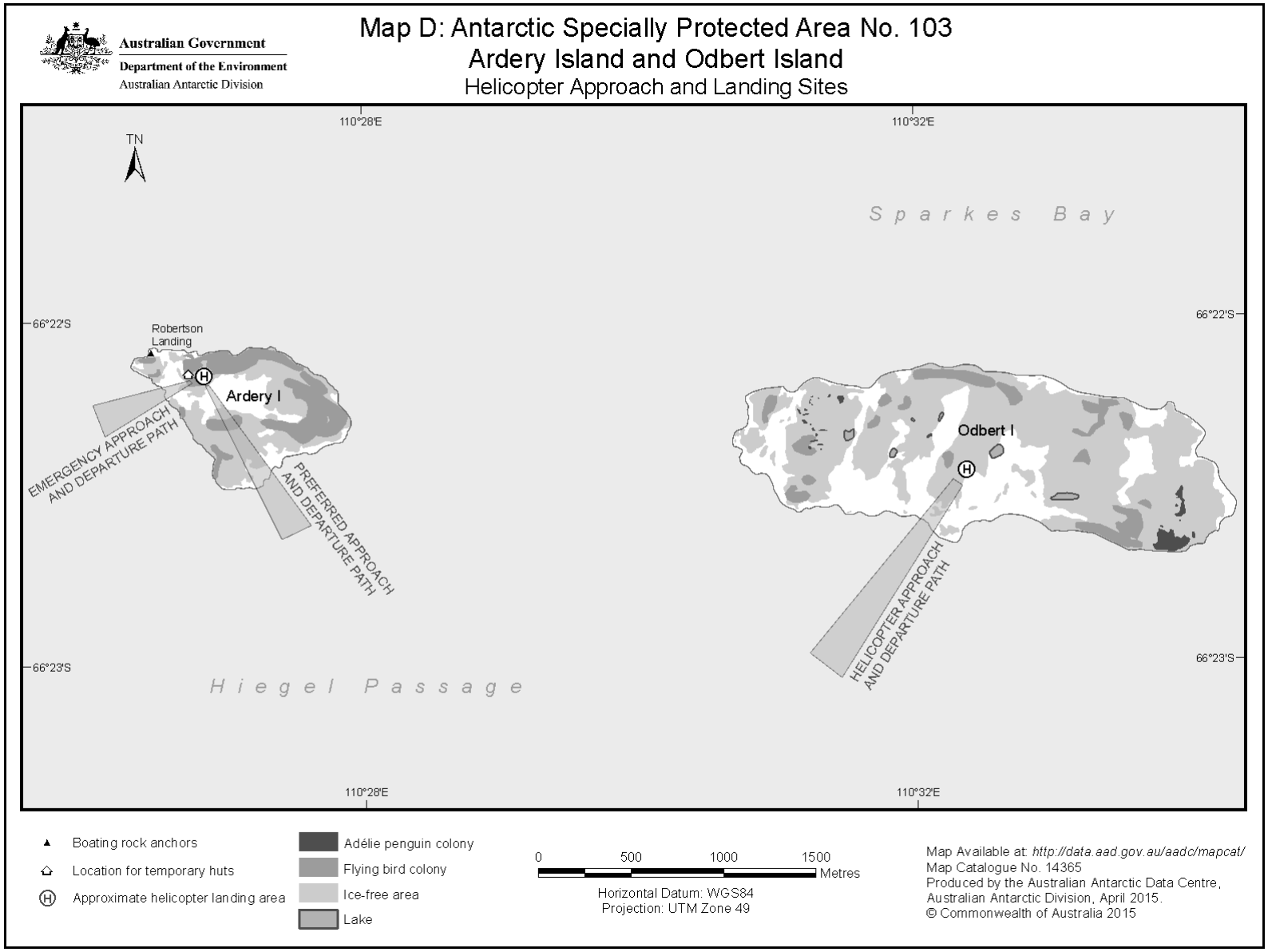
Australian Government
Department of the Environment
Australian Antarctic Division
Map D: Antarctic Specially Protected Area No. 103
Ardery Island and Odbert Island
Helicopter Approach and Landing Sites
110°28'E
110°32'E
TN
Sparkes Bay
66°22'S
66°23'S
Robertson Landing
Ardery I
EMERGENCY APPROACH AND DEPARTURE PATH
PREFERRED APPROACH AND DEPARTURE PATH
Odbert I
HELICOPTER APPROACH AND DEPARTURE PATH
Hiegel Passage
Boating rock anchors
Location for temporary huts
Approximate helicopter landing area
Adélie penguin colony
Flying bird colony
Ice-free area
Lake
0
500
1000
1500
Metres
Horizontal Datum: WGS84
Projection: UTM Zone 49
Map Available at: http://data.aad.gov.au/aadc/mapcat/
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