Management Plan

for Antarctic Specially Protected Area (ASPA) No. 176 ROSENTHAL ISLANDS, ANVERS ISLAND, PALMER ARCHIPELAGO

Introduction

The Rosenthal Islands are located on the western coast of Anvers Island, in the Palmer Archipelago, Antarctic Peninsula, at 64°36'S 64°15'W. The Antarctic Specially Protected Area (ASPA) includes adjacent islands and peninsulas and has an approximate area of 111 km^2. The primary reasons for designation of the Area are its large and diverse colonies of breeding birds which are of exceptional ecological and scientific interest, its apparently extensive vegetation communities, its rarely visited and almost pristine condition, and its potential role as a reference area for comparisons with localities that have been affected by human activities. In recognition of these values, the Area was first designated as a Restricted Zone within Antarctic Specially Managed Area (ASMA) No.7 Southwest Anvers Island and Palmer Basin in 2008. Designation as an ASPA supersedes the Restricted Zone, and while the boundaries of the Area extend beyond the original Restricted Zone, the Area remains fully within ASMA No.7.

The Area contains at least eight species of breeding birds. There are at least seven colonies of three species of Pygoscelid penguins (Adélie (*Pygoscelis adeliae*), Chinstrap (*P. antarctica*) and Gentoo (*P. papua*)), with a total population of approximately 9000 pairs. In addition, there are breeding colonies of Southern Giant petrel (*Macronectes giganteus*), Antarctic tern (*Sterna vittata*), Imperial shag (*Leucocarbo atriceps bransfieldensis*), South Polar skua (*Stercorarius maccormicki*), and Kelp gulls (*Larus dominicanus*). Wilson's Storm petrels (*Oceanites oceanicus*) are common and also likely breed in the Area, along with Snowy sheathbills (*Chionis alba*) which are present in association with the penguin and shag colonies. The Imperial shag colony is unusual because it appears to have maintained a resident breeding population at a similar level since first surveyed in 1975, in contrast to a regional trend of population decline for this species.

Little is known of the terrestrial ecology of the Rosenthal Islands, although high resolution satellite remote sensing indicates extensive vegetation cover on some of the islands not occupied by breeding penguins. The vegetation includes numerous species of mosses and lichens, many of which remain undescribed, and is likely to include the flowering plant Antarctic hair grass (*Deschampsia antarctica*) and with lower probability the Antarctic pearlwort (*Colobanthus quitensis*), which are found in the Anvers Island region.

The Area was proposed by the United States because of its outstanding diversity and number of breeding birds which are representative of the region, its exceptional importance for ornithological and ecological research, its value as a reference site for comparative studies and long-term monitoring, because it has been rarely visited and is in an almost pristine condition, and for its exceptional aesthetic and wilderness values.

Antarctic Important Bird Area No. 088 is identified within the Area. The Area is situated within 'Environment B – Antarctic Peninsula mid-northern latitudes geologic' and 'Environment E – Antarctic Peninsula, Alexander and other islands' based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)). Areas of ice-free ground classified as 'Region 3 – Northwest Antarctic Peninsula' under the Antarctic Conservation Biogeographic Regions classification (Resolution 3 (2017)) lie within the Area.

1. Description of values to be protected

The Rosenthal Islands (64°36'S 64°15'W, 111 km^2), Anvers Island, Palmer Archipelago, Antarctic Peninsula, were designated on the basis that the Area contains large and diverse breeding seabird colonies, apparently extensive vegetation communities, and that it has been rarely visited and is in an almost pristine condition. The Area has exceptional ecological and scientific values and is valuable as reference site for comparative studies and long-term monitoring, in particular against more intensively studied sites close to Palmer Station, and in relation to the Palmer Long Term Ecological Research (PAL-LTER) site.

The Rosenthal Islands are particularly valuable for ornithological research, with at least eight species of birds breeding within the Area, making it also one of the most diverse and representative sites for breeding birds in the region. Research into seabird ecology and long-term monitoring studies are being conducted on Adélie (*Pygoscelis adeliae*), Chinstrap (*P. antarctica*) and Gentoo (*P. papua*) penguin colonies, as well as on Southern Giant petrels (*Macronectes giganteus*) (Fraser, pers. comm. 2018). The colonies at the Rosenthal Islands are of particular interest for comparisons to bird populations in the Arthur

Harbor area where detailed and long-term studies are conducted on changes in ecosystem structure, functioning and dynamics, many of which have been and continue to be undertaken as part of the PAL-LTER program. The Rosenthal Islands area has been isolated from significant human visitation, and is therefore of particular value for comparisons with sites subjected to higher levels of human influence (Fraser, pers. comm. 2018). Antarctic Important Bird Area (IBA) No. 088, identified for its large colony of Gentoo penguins, lies within the Area (Map 3).

The Imperial shag colony is unusual in that the resident breeding population in 2016 appears to have remained at a similar level since first surveyed in 1975, which is in contrast to the general regional trend of population decline for this species since the 1970s.

Observations of prolific wildlife and of foraging behaviour, including of marine mammals, in the relatively deep embayment immediately south of the Rosenthal Islands suggest this could be an area of comparatively high productivity supporting the rich and diverse marine ecosystem. While more research on this aspect is needed, this embayment has been included within the Area as a precautionary measure given its potentially important role in supporting the local ecosystem.

The Area encompasses the Rosenthal Islands group, including the adjacent Anvers Island coastline and a number of nearby coastal islands and ice-free peninsulas, extending from the northern boundary at 64°33'S southwards for approximately 16 km (Map 3). The boundary includes the lower icefields on Anvers Island within 1 km of the coastline, the marine area up to 1 km seaward from the outer shores of the Rosenthal Islands, and the embayment immediately south of the Rosenthal Islands. The area encompasses all of the islands within the Rosenthal group where prolific wildlife is concentrated. The Area is ~9 km across at its widest point, ~14.6 km from north to south, and encompasses a total area of 111 km^2.

The Area also appears to have important values related to a rich terrestrial and marine ecology, although these have yet to be studied and described in detail; they are noted in this Management Plan in order that a precautionary approach is taken to protect these potential values.

In summary, the Area at the Rosenthal Islands has high value for its outstanding:

- ornithological communities that are diverse and representative of the region, with several large colonies of breeding seabird species, and which are the subject of long-term comparative studies and monitoring;
- utility as a reference area where human activity has historically been exceptionally low and the local environment remains virtually undisturbed by direct human activity and in an almost-pristine condition, and where the effects of natural processes on ecology and demography can be studied with the potential for local human interference kept to an absolute minimum;
- aesthetic and wilderness values, which are characterized by remote and rugged islands in almost pristine condition.

In order to protect the values of the Area, it is important that visitation continues to remain low and is carefully managed by permits and by this Management Plan.

2. Aims and objectives

Management at the Rosenthal Islands and vicinity aims to:

- Avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human presence, disturbance and sampling in the Area;
- Allow scientific research on the ecosystem and physical environment in the Area provided it is for compelling reasons which cannot be served elsewhere and that will not compromise the values for which the Area is protected;
- Minimize the possibility of introduction of alien plants, animals and microbes into the Area;
- Minimize the possibility of the introduction of pathogens that may cause disease in faunal populations within the Area; 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:

- Notices showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently at Palmer Station (United States) on Anvers Island, at Yelcho Station (Chile) on Doumer Island and at 'Base A' at Port Lockroy on Goudier Island, where copies of this management plan and maps of the Area shall also be made available;
- Copies of this management plan shall be made available to all vessels and aircraft visiting the Area, and the appropriate national authority shall inform all personnel operating in the vicinity of, accessing or flying over the Area, of the location, boundaries and restrictions applying to entry and overflight within the Area;
- National programs shall take steps to ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and nautical / aeronautical charts;
- Markers, signs or other structures should not be installed within the Area except for essential scientific or management purposes. If installed, they shall be recorded, secured and maintained in good condition and removed when no longer required by the responsible National Antarctic program;
- The Area shall be visited as necessary to assess whether it continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate. These assessments shall be undertaken at least once every five years although, in view of the infrequent visits and difficulties of access, visits may be at longer intervals as appropriate.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA No. 176 Rosenthal Islands, Anvers Island – Location map.

Projection: Lambert Conformal Conic; Central Meridian: 64° 00′ W; Standard parallels: 64° 40′ S, 65° 00′ S; Latitude of Origin: 66° 00′ S; Spheroid and horizontal datum: WGS84; Contour interval: Land – 250 m, Marine – 200 m.

Data sources: coastline & topography SCAR Antarctic Digital Database v4.1 (2005); Bathymetry: IBCSO v.1 (2013); Protected areas: ERA (Aug 2018); Stations: COMNAP (Aug 2018).

Inset: the location of Anvers Island and the Palmer Archipelago on the Antarctic Peninsula.

Map 2: ASPA No. 176 Rosenthal Islands, Anvers Island – Regional map.

Projection: Lambert Conformal Conic: Central Meridian: 64° 25′ W; Standard parallels: 64° 38′ S; 64° 44′ S; Latitude of Origin: 63° 45′ S; Spheroid and horizontal datum: WGS84; Contour interval: 100 m. The coastline is derived from ERA (2014) near Palmer Station, and digitized from georeferenced satellite imagery (GeoEye 13 Mar 2013; WV3 25 Feb 2016; imagery © Digital Globe). Bird colonies and other features: from imagery, GPS survey (ERA 13 Dec 2016), and Fraser / Patterson-Fraser pers. comms. 2018.

Map 3: ASPA No. 176 Rosenthal Islands, Anvers Island – Topographic map.

Map specifications as for Map 2 except Central Meridian: 64° 15′ W; Standard parallels: 64° 34′ S; 64° 40′ S; Latitude of Origin: 64° 00′ S.

6. Description of the Area

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

Overview

The Rosenthal Islands (64°36′ S 64°15′ W) lie in the southerly part of the western coast of Anvers Island, in the Palmer Archipelago west of the Antarctic Peninsula (Map 1). They are located about 15 km north of Cape Monaco and about 22 km from Palmer Station (United States) (Map 2). The Rosenthal group

comprises approximately 80 small islands, the largest of which is Gerlache Island, which rises to ~100 m in height and is approximately 2.5 km by 1.2 km in size (Map 3). The smaller islands are all less than 100 m in height, and generally less than 500 m across. Gerlache Island is almost completely covered by a permanent ice cap, while the smaller islands are generally ice-free. A number of promontories extend from the adjacent Anvers Island coastline, and many of these are also partly ice-free. Anvers Island itself is covered by the thick permanent ice cap known as the Marr Ice Piedmont that extends, in the vicinity of the Rosenthal Islands, to an elevation of about 500 m within ~7 km of the coast (Map 2). Many more small islands and peninsulas fringe the Anvers Island coast, both to the north and southwards to Cape Monaco (Map 2).

An embayment of relatively deep water separates the Rosenthal Islands from a smaller group of about 35 islands and peninsulas lying approximately six km to the south on the Anvers Island coast, all of which are included within the Area (Map 3). These more southerly islands and peninsulas provide habitat for a diversity of breeding birds. The precise physical characteristics of the embayment have not yet been described, although the deeper channel is likely to have been formed by a glacier draining the adjacent catchment on Anvers Island at a time when ice was more extensive. Observations of the relatively prolific wildlife breeding on adjacent islands and of foraging behaviour in this embayment in particular, including of marine mammals, suggest that this could be an area of deep water upwelling enabling relatively high levels of productivity near the surface, which in turn is supporting the nearby rich and diverse avian and marine mammal ecosystem (Fraser pers. comm. 2018).

The islands and peninsulas within the Area are generally rocky, rugged and exposed, with the more seaward islands tending to be steeper and with shorelines that are inaccessible to all but flying birds. The coastlines are irregular, with numerous offshore islets and rocks, most of which are uncharted. A number of islands and peninsulas close to Anvers Island are of more gentle topography and have more accessible coastlines, making them suitable for penguins to establish colonies, some with beaches where mammals, such as Elephant (*Mirounga leonina*), Weddell (*Leptonychotes weddellii*) and Antarctic Fur (*Arctocephalus gazella*) seals, may haul out.

The Rosenthal Islands were first charted by the German Antarctic Expedition of 1873/74 led by Dallmann and named after the then Director of the German Society for Polar Navigation. They were charted in more detail by Charcot's French Antarctic Expedition of 1903-05, which mapped and named Pointe de Gerlache as part of Anvers Island, as then it may have been; today this is Gerlache Island. The first people recorded to set foot in the Rosenthal Islands were members of a British geological party surveying the western coast of Anvers Island in May 1956.

An unofficial numbering system is in use to aid practical identification of the main islands and peninsulas within the Area (Fraser and Patterson-Fraser, pers. comms. 2018) (Map 3). The numbering system has been designed to meet survey needs for on-going ornithological and ecological research, and has been used to assist identification of particular sites as necessary in this Management Plan. This numbering system is not officially adopted, and may be subject to change as research needs evolve.

Boundaries and coordinates

The Area extends ~14 km north to south and ~9 km east to west, and encompasses a total area of 111 km^2. The boundary of the Area was designed to include all of the islands within the Rosenthal group, the embayment immediately to the south, the cluster of islands fringing the southern side of this embayment, and also the associated marine environment (Map 3). As a precautionary measure to protect features within the Area, the boundary is defined as a buffer extending outwards for around one km from the coastlines.

The northern boundary shares the 64°33′ S parallel that also defines the northern extent of ASMA No. 7 SW Anvers Island and Palmer Basin. The eastern boundary also shares the ASMA boundary, which extends southward from 64°06′ W, 64°33′ S for three km, before extending south parallel to the Anvers Island coastline for ~13 km, buffered one km inland from the shore. The southern boundary extends approximately 3 km across a small bay, before extending NW for 7 km across the main embayment south of the Rosenthal Islands. The western boundary follows the 1 km buffer line parallel to the coastlines of the outer islands in the Rosenthal group.

Climate

No meteorological data are available for the Rosenthal Islands, although long-term data are available for nearby Palmer Station, where conditions are expected to be similar although perhaps less extreme.

Regional temperatures near Palmer Station are relatively mild because of local oceanographic conditions and because of the frequent and persistent cloud cover in the Arthur Harbor region (Lowry 1975). Annual average air temperatures recorded at Palmer Station during the period 1974 to 2012 show a distinct warming trend, although also demonstrate significant inter-annual variability. Between 2010-17 the mean annual temperature at Palmer Station was –1.8° C, with an average monthly air temperature in August of –5.94° C, and in January 1.72° C. The maximum temperature recorded April 1989 through October 2018 was +11.6° C on 08 March 2010, while the minimum was -26.0° C on 24 August 1995. Storms and precipitation at Palmer Station are frequent, with winds being persistent but generally light to moderate in strength, prevailing from the north-east, although local wind conditions may be at variance from Palmer Station. Cloud cover is frequent and extensive, often with a ceiling of less than 300 m. Between 1989 and 2018 the average annual precipitation was 636 mm of water equivalent, with an average annual snowfall depth of 344 cm.

The Rosenthal Islands will have minor climatic differences as a result of local geography, in particular because of their more exposed position to westerly winds and ocean swells. There is some anecdotal evidence that snowcover may be more persistent in the Rosenthal Islands than at Arthur Harbor (Gantz *et al.* 2018).

Geology, geomorphology and soils

Three main rock groups have been described in the Rosenthal Islands area (Hooper 1962). Rock outcrops on Anvers Island opposite Gerlache Island are composed of the Cape Monaco Granite, while the islands in the Rosenthal group comprise Upper Jurassic Volcanics. The Cape Monaco Granite occupies a narrow, possibly intermittent, belt ~8 km wide and ~60 km long extending along the western margin of Anvers Island from the Joubin Islands, which Hooper (1962: 50) suggested may have developed along a fault running parallel to the NW Anvers Island coastline. Within the Area south of the Rosenthal Islands embayment, outcrops on peninsulas and nearby islands are composed of unaltered tonalite of the Andean Intrusive Suite. The geomorphology and soil characteristics of the Rosenthal Islands have yet to be described.

Terrestrial ecology

The freshwater environment within the Area has yet to be described. Given the limited extent of available ice-free ground, streams and ponds are likely to be relatively few, small and seasonal. For example, several small ponds are evident in satellite imagery (10 Mar 2013) on Islands 201 and 202, which are likely to be enriched by nutrients from local breeding penguins. Inspection of high resolution satellite imagery (25 Feb 2016) revealed only a small number of freshwater bodies or streams on ice-free ground elsewhere within the Area.

The vegetation of the Rosenthal Islands has yet to be described in detail, although several species have been identified from Islands 202 and 205 (Appendix One, Table 1). These observations are from islands that are intensively colonised by breeding penguins, where habitat suitable for vegetation is relatively scarce. Moreover, the observations made were opportunistic at several sites, rather than made as part of a systematic survey, and therefore these records represent the absolute minimum of species likely to be present.

Preliminary observations using high resolution satellite remote sensing indicates more widespread vegetation cover on some of the other islands and peninsulas, particularly those not colonised by breeding penguins. Island 206 appears to host more extensive vegetation cover than some other islands, particularly on its northeastern slopes. The flowering plants *Deschampsia antarctica* and *Colobanthus quitensis* are relatively common on ice-free ground along the southern Anvers Island coast (Greene & Holtom 1971), with the former observed approximately five km to the south of the Area on Cape Monaco and Dream Island (Komárková *et al.* 1985).While it has not yet been possible to visit and verify species or abundance within the Area, it is anticipated that many of the species present are likely to be similar to those at sites where vegetation is present at nearby sites on southern Anvers Island and offshore islands.

A preliminary survey of terrestrial arthropods in the Area was conducted on 13 Dec 2016 (Gantz *et al.*, 2018). The survey was limited to Islands 201, 202, and 205, all of which are intensively occupied by breeding penguins. Sampling was conducted along the edge of seabird colonies (where special attention was paid to ornithogenic soil under rocks), and at sites with moss and *P. crispa* that were unused by, or inaccessible to, nesting seabirds. Other ice-free islands and peninsulas within the Area, many of which support vegetation cover and which are likely to provide habitat suitable for invertebrate populations, have yet to be surveyed.

This study identified two species of Collembola (*Cryptopygus antarcticus* and *Friesea grisea*), four species of mites (*Alaskozetes antarcticus*, *Hydrogamasellus racovitzai*, *Tectopenthalodes villosus* and *Rhagidia sp.*), and the chironomid midge *Belgica antarctica*. The mite *A. antarcticus* and the collembolan springtail *C. antarcticus* were common in large aggregations at collection sites, and were occasionally observed on the surface of penguin guano without vegetative cover. Although the collembolan *C. antarcticus* and the mite *A. antarcticus* were abundant, their distribution was patchy. *Belgica antarctica* was less common and found only in vegetated areas in one location on each of Islands 201 and 202. The preliminary results from Gantz *et al.* (2018) show that the arthropod diversity of the Rosenthal Islands is similar to that of Palmer Station. No further information is available on the invertebrate assemblages in the Area. There is no information available on local bacterial or fungal communities.

Breeding birds and mammals

At least eight species of birds breed in the Rosenthal Islands: Adélie penguin (*Pygoscelis adeliae*), Chinstrap penguin (*Pygoscelis antarctica)*, Gentoo penguin (*Pygoscelis papua*), Southern Giant petrel (*Macronectes giganteus*), Antarctic tern (*Sterna vittata*), Imperial shag (*Leucocarbo atriceps bransfieldensis*), Kelp gull (*Larus dominicanus*) and South Polar skua (*Stercorarius maccormicki*) (Appendix One, Table 2). Wilson's Storm petrels (*Oceanites oceanicus*) are common and probable breeders. Snowy sheathbills (*Chionis alba)* are present in small numbers at penguin and shag colonies, and although nesting has not been observed may also breed in the Area. Snow petrels (*Pagodroma nivea*) are commonly seen although are not known to breed in the area. Some breeding birds have been observed within the Area that were originally banded near Palmer Station (Fraser pers. comm. 2018). Available data on seabird population numbers are summarised in Appendix One, Table 2.

Breeding seabirds are present on almost all of the larger ice-free islands and peninsulas in the Area, although tend to be concentrated on the more sheltered localities close to Anvers Island, with the more seaward islands tending to be occupied in low densities by only South Polar skuas, Kelp gulls and Antarctic terns (Fraser *et al.* 2016). Islands and peninsulas with the most substantial numbers of seabirds are 201, 202, 203, 204, 205, 303, 306, and 307. There is some evidence in high resolution satellite imagery that colonies may exist on other islands within the Area, for example on several islands at the northeastern extremity, although the presence of breeding seabirds here has yet to be verified and there is no record of these islands ever having been visited by humans.

The Imperial shag colony is highly unusual in that the resident breeding population of 65 pairs at Island 205 in 2016 appears to have changed little from the 70 observed when first surveyed in 1975 (Appendix One, Table 2). This is in sharp contrast to a general trend of population decline for this species elsewhere on the western Antarctic Peninsula since the 1970s (Fraser *et al*. 2016). There is evidence that at least some of the birds winter in the Area (Vicknair *et al.* 2015) (Appendix One, Table 2). Similarly, the numbers of Adélie penguins breeding on Island 202 have declined relatively less than elsewhere in the region, with a 40% drop from 153 pairs in 1975 to 92 pairs in 2016 being about half of the percentage decline seen in this species near Palmer Station (Fraser *et al*. 2016). The reasons underlying the comparative breeding continuity in the Rosenthal Islands are not yet understood, although may be related to factors such as local sea ice conditions and prey availability, and this is a subject of on-going research.

Chinstrap and Gentoo penguins, on the other hand, appear to have experienced significant expansion in breeding numbers in the Rosenthal Islands since 1975, which may in part be attributable to the emergence of suitable habitat as a result of glacial retreat (Fraser *et al.* 2016). Chinstrap penguins now total ~4000 to 5000 breeding pairs throughout the Area, which is similar to the numbers reported in 1979, 1985 and 1987, although considerably more than the 1140 pairs recorded in 1975 (Fraser *et al*. 2016 and pers. comm. 2018). Gentoo penguins appear to have increased more substantially, with ~7324 pairs recorded in 2012/13, compared with only 811 pairs in 1975 (Fraser *et al.* 2016 and pers. comm. 2018) (Appendix One, Table 2). The trend of decline in Adélie penguin numbers breeding at the Rosenthal Islands and the increasing Gentoo penguin breeding population is consistent with observations of colonies at nearby Palmer Station (Ducklow *et al.* 2013) and elsewhere in the Antarctic Peninsula region (Hinke *et al.* 2007). Long-term research on seabird ecology has been carried out close to Palmer Station as part of the PAL-LTER grid, and observations at the Rosenthal Islands form an important comparison and reference area for those studies.

Southern Giant petrel numbers have also grown substantially, with the Feb 2016 survey estimating ~320 – 350 individuals spread throughout the Area, with Island 303 now a significant breeding location for this species; only ~35 individuals were present throughout the Area in 1975 (Fraser *et al*. 2016).

Antarctic terns also breed within the Area, and opportunistic observations on 13 Dec 2016 identified ~24 individuals perched on a steep rocky ridge of a small island ~50 m east of Island 205, some of which appeared to be nesting, with a further ~25 individuals perched on nearby rocks near the waterline.

A solitary transient Emperor penguin (*Aptenodytes forsteri*) was observed on 11 Feb 2016 (Fraser pers. comm. 2018; misidentified as a King penguin in Pickett 2016). Further information on transients is not available.

Antarctic Important Bird Area (IBA) No. 088 was identified for a large colony of Gentoo penguins that is located in the south of the Area (Harris *et al.* 2015) (Map 3). Updated and improved mapping data show that this site lies not on Island 303 but on Peninsula 306. Within the management unit defined by the protected area boundary the number of breeding pairs of Gentoo penguins present in 2012/13 (7324; Appendix One, Table 2) qualifies the Area as an IBA (IBA Criteria A4: The site is known or thought to hold congregations of ≥1% of the global population of one or more species on a regular or predictable basis). Data gathered in February 2016 for individual islands (Appendix One, Table 2) show a substantial number of Gentoo penguins continue to breed, although the total for the Area cannot be given because the count in that year was incomplete. For this reason the IBA status of the Area is affirmed based on the 2012/13 data. Revisions to the boundary of the original IBA have been made to be consistent with the boundary of the Area, and these have been submitted to Birdlife International for incorporation into the global IBA database.

Small numbers of Southern Elephant seals (*Mirounga leonina*), Weddell seals (*Leptonychotes weddellii*), and non-breeding Antarctic Fur seals (*Arctocephalus gazella*) have been observed on beaches within the Area in summer, with numbers tending to be greater nearer to Anvers Island (Fraser *et al.* 2016). Further information on numbers and breeding status, or on other seal species, is not available. Whales of two species (Minke (*Balaenoptera bonaerensis*) and Humpback (*Megaptera novaeangliae*)) have been observed in the vicinity of the Area. No information is available on the local marine environment.

Human activities and impact

Human activity within the Area has been minimal. Members of a British geological party surveying the western coast of Anvers Island were first to set foot in the Rosenthal Islands in May 1956 (Hooper 1956, 1962). This party travelled overland by dog sledge from Base 'N' at Arthur Harbor to visit 'Gerlache Point' (now Gerlache Island) and a peninsula 'four miles from Cape Monaco' (i.e. Peninsula 306) where they carried out geological observations, surveyed the coastline, and observed a 'considerable number of Gentoo penguins and Giant petrels' (Hooper 1956).

The next reported visits to the Rosenthal Islands were made in summer 1974/75 (Fraser pers. comm 2018), and then on 03 Feb 1979, on 08 Dec 1984 (by helicopter, no landings) and on 02 Jan 1985 (Parmelee *et al.* 1987), supported by R/V *Hero* and the U.S. Coastguard survey boat *Glacier* and helicopter. A yacht visit was made on 08 Feb 1987 (Poncet & Poncet 1987). In the 32-year period 1956–88 it is estimated that fewer than ~20 people visited the Rosenthal Islands.

Over the thirty-year period since 1988 there is one record of a tourist vessel visiting the Rosenthal Islands in the 2010/11 season by 6 people on the yacht *Golden Fleece* (IAATO Tourism Statistics, 2010/11), and several other yacht visits have been made since the 1980s for filming, around February (J. Poncet pers. comm. 2018). Brief ornithological surveys by research teams from Palmer Station have been conducted in the summer of 2012/13, on 11 Feb 2016 and on 13 Dec 2016. On this latter visit a large fishing float (~1 m diameter) was found embedded in ice on the eastern shore of Island 201, which was removed from the Area. It is estimated that fewer than an additional 40 people have visited the Area in this more recent period.

Given the extremely low number and brief duration of human visits, with fewer than ~60 people estimated to have ever visited, it is assumed that human impacts in the Area derived from local sources are very low. The Area is therefore considered almost pristine, and this low level of human impact is an important value of the Area to be maintained.

6(ii) Access to the Area

Access to the Area may be made by small boat, by piloted or remotely piloted aircraft, or on foot. Piloted aircraft landings are prohibited and overflight restrictions apply to aircraft operating within the Area. The specific conditions for access are set out in Section 7(ii) below.

Access to the Rosenthal Islands prior to 2016 was usually by deployment of rubber inflatable small boats (up to ~6 m (~20 ft) in length) from a nearby ship, with rare visits made by inflatables from Palmer Station. Rigid Hulled Inflatable Boats (RHIBs), which are ~10 m (33.5 ft) in length, have operated out of Palmer Station since 2016, and with a range of up to ~32 km (~20 miles) these small boats have made the Rosenthal Islands more accessible to Palmer Station than was previously the case.

Seasonal sea ice in the SW Anvers Island area is variable, formation usually beginning between March and May and, for the period 1979 to 2004, persisting between five and 12 months (Stammerjohn *et al.*, 2008). Dense brash ice is frequently found close to shore, which may impede small boat access.

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

No structures, instruments, caches or markers are known to be present within or adjacent to the Area.

6(iv) Location of other protected areas in the vicinity

The nearest protected areas to the Rosenthal Islands are: Litchfield Island (ASPA No. 113) which is ~12 km southeast in Arthur Harbor; Biscoe Point (ASPA No.139) which is ~26 km to the southeast at southern Anvers Island; and South Bay (ASPA No. 146) which is approximately 37 km to the southeast at Doumer Island (Map 1).

6(v) Special zones within the Area

There are no special Zones within the Area. The nearest Restricted Zones within ASMA No. 7 Southwest Anvers Island and Palmer Basin are the Joubin Islands (~10 km south) and Dream Island (~5 km south) (Map 2).

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 for compelling scientific research that cannot be served elsewhere, and in particular for research on the marine or terrestrial ecosystem and fauna in the Area or for reasons essential to the management of the Area;
- the actions permitted are in accordance with this Management Plan;
- the activities permitted will give due consideration via the environmental impact assessment process to the continued protection of the environmental and scientific values of the Area;
- It is issued for compelling educational or outreach purposes that cannot be served elsewhere, and which do not conflict with the objectives of this Management Plan;
- the permit shall be issued for a finite period;
- the permit, or a copy, shall be carried within the Area.

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

Access to the Area shall be by small boat, by aircraft, or on foot. Access by vehicles is prohibited.

Foot access and movement within the Area

All movement on land within the Area shall be on foot. All people in boats are prohibited from moving on foot beyond the immediate vicinity of their landing or access site unless specifically authorised by permit.

Pedestrians should maintain the following minimum approach distances from wildlife, unless it is necessary to approach closer for purposes allowed for by the permit:

- Southern Giant petrels (*Macronectes giganteus*) – 50 m
- Antarctic Fur seals – 15 m
- other birds and seals – 5 m.

Visitors should move carefully so as to minimize disturbance to flora, fauna, soils, and water bodies. Pedestrians should walk on snow or rocky terrain if practical, but taking care not to damage lichens. Pedestrians should walk around the penguin colonies and should not enter sub-groups of nesting penguins unless required for research or management purposes. Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize effects.

Small boat access

Particular routes have not been designated for small boat access to the Area, and in view of the very low levels of visitation and variable conditions, there are no restrictions on small boat access routes or landing sites. However, the best small boat travel is usually found parallel to and ~800 m to 1 km from the Anvers Island coastline, dependent on ice and wind conditions (Map 3). A number of relatively sheltered small embayments offering some protection for small boats may be found near Islands 201-203 and 303-309, as well as outside of the Area in the Gossler Islands and near Cape Monaco (Map 2).

A large number of uncharted islands and submerged, or partially submerged, rocks and shoals exist within the Area, which may represent a hazard to boating operations. Available bathymetric information for the Area and the surrounding region is poor and unreliable. Ice conditions, frequent and often considerable ocean swell, and exposure to westerly and / or katabatic winds descending from Anvers Island may also affect boat operations within the Area.

Aircraft access and overflight

Restrictions on aircraft operations apply year-round, when pilots shall operate aircraft over the Area according to strict observance of the following conditions:

1) Piloted aircraft landings, including by helicopters, are prohibited within the Area.

2) Overflight of the Area by piloted aircraft below 2000 ft (~610 m) is prohibited, except in accordance with a permit issued by an appropriate national authority. Pilots operating within the Area should follow the Guidelines for the Operation of Aircraft near Concentrations of Birds (Resolution 2 (2004)).

3) Overflight below 2000 ft (610 m) and landings within the Area by Remotely Piloted Aircraft Systems (RPAS) are prohibited except in accordance with a permit issued by an appropriate national authority. RPAS use within the Area should follow the Environmental Guidelines for Operation of Remotely Piloted Aircraft Systems (RPAS) in Antarctica (Resolution 4 (2018)).

7(iii) Activities that may be conducted within the Area

- Scientific research that will not jeopardize the ecosystem or values of the Area;
- Activities with educational and / or outreach purposes (such as documentary reporting (e.g. visual, audio or written) or the production of educational resources or services) that are for compelling reasons that cannot be served elsewhere. Activities for educational and / or outreach purposes do not include tourism;
- Essential management activities, including monitoring and inspection.

7(iv) Installation, modification or removal of structures

- No structures are to be erected within the Area except as specified in a permit and, with the exception of survey markers, permanent structures or installations are prohibited;
- All structures, scientific equipment or markers installed in the Area must be authorized by permit and clearly identified by country, name of the principal investigator, year of installation and date of expected removal. 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 or damage to the values of the Area;
- Installation (including site selection), maintenance, modification or removal of structures or equipment shall be undertaken in a manner that minimizes disturbance to flora and fauna, preferably avoiding the main breeding season (01 Oct – 31 Mar);
- Removal of specific structures / equipment for which the permit has expired shall be the responsibility of the authority which granted the original permit, and shall be a condition of the permit.

7(v) Location of field camps

Temporary camping is allowed within the Area. Specific camp sites have yet to be identified or designated, although any camp sites should by preference be located on beach gravels, snow surfaces or rocky ground. Camping on surfaces with significant vegetation cover is prohibited.

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

In addition to the requirements of the Protocol on Environmental Protection to the Antarctic Treaty, restrictions on materials and organisms that may be brought into the Area are:

- Deliberate introduction of animals, plant material, micro-organisms and non-sterile soil into the Area is prohibited. 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);
- Visitors shall ensure that sampling equipment and / or markers are clean. To the maximum extent practicable, clothing, footwear and other equipment (including e.g. backpacks, carry-bags, tents, walking poles, tripods etc) shall be thoroughly cleaned prior to entry. Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (Resolution 4 (2016); CEP 2019), and in the Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica (Resolution 5 (2018));
- Poultry and all poultry products are prohibited from the Area;
- Herbicides or pesticides are prohibited from the Area;

- Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the permit, shall be removed from the Area at or before the conclusion of the activity for which the permit was granted;
- Fuel, food, and other materials shall not be stored in the Area, unless required for essential purposes connected with the activity for which the permit has been granted. In general, all materials introduced shall be for a stated period only and shall be removed at or before the conclusion of that stated period;
- All materials shall be stored and handled so that risk of their introduction into the environment is minimized;
- If release occurs which is likely to compromise the values of the Area, removal is encouraged only where the impact of removal is not likely to be greater than that of leaving the material *in situ*.

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

Taking or harmful interference with native flora and fauna is prohibited, except in accordance with a permit issued under Article 3 of Annex II of the Protocol on Environmental Protection to the Antarctic Treaty. Where animal taking or harmful interference 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.

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

- Material may be collected or removed from the Area only in accordance with a permit and should be limited to the minimum necessary to meet scientific or management needs. This includes biological samples and rock or soil specimens.
- Material of human origin likely to compromise the values of the Area, which was not brought into the Area by the permit holder or otherwise authorized, may be removed from any part of the Area, unless the impact of removal is likely to be greater than leaving the material in situ. If this is the case the appropriate authority should be notified and approval obtained.
- The appropriate national authority should be notified of any items removed from the Area that were not introduced by the permit holder.

7(ix) Disposal of waste

All wastes, including human wastes, shall be removed from 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:

1) carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;

2) install or maintain signposts, markers, structures or scientific equipment;

3) carry out protective measures;

4) carry out research or management in a manner that avoids interference with long-term research and monitoring activities or possible duplication of effort. Persons planning new projects within the Area should consult with established programs working within the Area, such as those of the United States, before initiating the work.

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 after the visit has been completed in accordance with national procedures.
- 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 (Resolution 2 (2011)). If appropriate, the national authority should also forward a copy of the visit report to the Parties 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.
- The appropriate authority should be notified of any activities/measures that might have exceptionally been undertaken, and / or of any materials released and not removed, that were not included in the authorized permit.

8. Supporting documentation

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List of boundary coordinates

Northwestern corner: 64°33'S 64°15'W.

Northeastern corner: 64°33'S 64°06'W.

Maximum northern extent: 64° 33'S.

Maximum southern extent: 64° 40' 54"S.

Maximum eastern extent: 64° 06'W.

Maximum western extent: 64° 21' 24"W.

Northern boundary: coincident with the boundary of ASMA No. 7 SW Anvers Island and Palmer Basin.

Eastern boundary: 1 km buffer inland from the western coast of Anvers Island, coincident with the boundary of ASMA No. 7 SW Anvers Island and Palmer Basin.

Western and southern boundaries: 1 km buffer from the western coastlines of islands within and to the south of the Rosenthal Islands group.

Appendix 1: Species Records

Table 1. Vegetation species identified in the Rosenthal Islands[1].

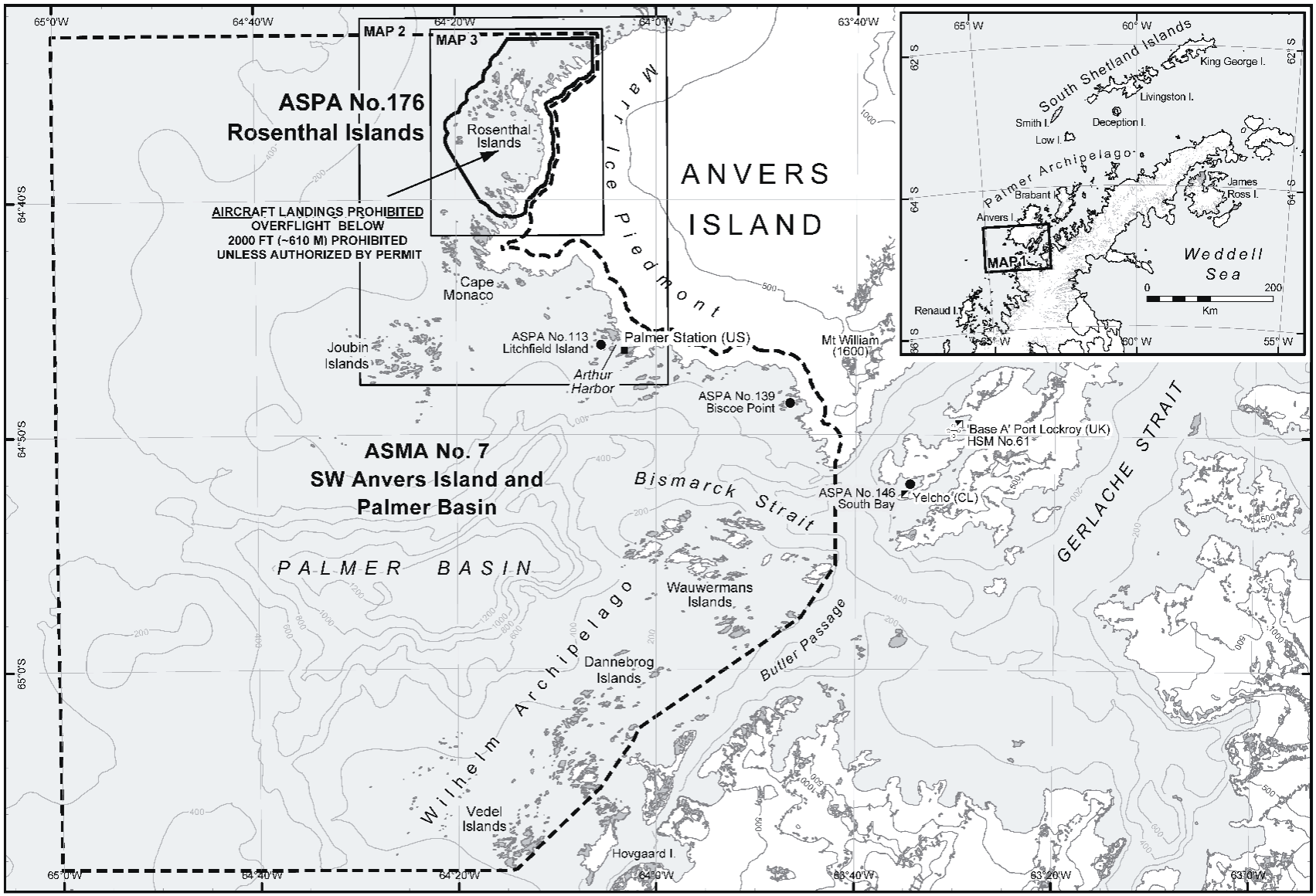
Location	Species	Description
Island 202	*Sanionia uncinata*	Moss. On rocky ledge on steep slope, at south of island adjacent to breeding penguins.
	Prasiola crispa	Algae. As above.
	Staurothele gelida (?)	Lichen. As above, on rock adjacent to moss / algae. ID uncertain.
	Caloplaca cirrochrooides	Lichen. As above, less extensive.
	Turgidosculum complictulum	Lichen. As above, in patches.
	Xanthoria elegans	Lichen. Extensive cover of bright orange on cliffs at south of island.
Island 205	*Turgidosculum complictulum*	Lichen. On rock in northern part of penguin colony.
	Xanthoria candelaria	Lichen. As above, on rock crevice associated with T. complictulum
	Acarospora macrocyclos	Lichen. As above.
	Staurothele gelida (?)	Lichen. As above. ID uncertain.

[1] Identifications R.I. Lewis Smith, pers. comm. 2018, from photographs by C. Harris (13 Dec 2016).

Table 2. Numbers of breeding penguins, Imperial shags and Southern Giant petrels in the Rosenthal Islands & vicinity 1975-2017.

Location		Adélie penguin *Pygoscelis adeliae*			Chinstrap penguin *Pygoscelis antarctica*			Gentoo penguin *Pygoscelis papua*			Imperial shag *Leucocarbo atriceps bransfieldensis*			Southern Giant petrel *Macronectes giganteus*		
Date	Site	Pairs	Type[1]	Source[2]	Pairs	Type[1]	Source[2]	Pairs	Type[1]	Source[2]	Pairs	Type[1]	Source[2]	Pairs	Type[1]	Source[2]
1974-75	202	153	N1	4												
	205										70	N1	4			
	Total[3]				1140	N1	4	811	N1	4				35	A	4
03-Feb-79	201/202				4000	A5	1	2000	A5	1						
	306							950	C1	1						
02-Jan-85	201	1	N1	1	1500	N5	1	873	N1	1						
	202	170	N1	1	1000	N5	1	150	N1	1						
	203				500	N5	1									
08-Feb-87	205				4000		3									
	306				2		3	3000	C3	3						
2012-13	Total	124	C1	4	5163	C1	4	7324	C1	4						
05-Jun-15											10[4]	A1	5			
11-Feb-16	201				1005	C1	4	1123	C1	4						
	202	92	C1	4	2005	C1	4	471	C1	4						
	203				62	C1	4									
	205				1410	C1	4				64		4			
	306							2442	C1	4						
	307							483	C1	4						
	Total													350	A	4
13-Dec-16	201			6	437	N1		1329	N1							
	202	76	N1		1848	N1		677	N1							
	203				17	N1										
	205				1388	N1										
	306															

1. N = Nest, C = Chick, A = Adults; 1 = < ± 5%, 2 = ± 5-10%, 3 = ± 10-15%, 4 = ± 25-50% (classification after Woehler, 1993)
2. Source: 1. Parmelee and Parmelee 1987; 2. Parmelee, Fraser & Neilson 1987; 3. Poncet and Poncet 1987; 4. Fraser et al 2016; 5. Vicknair et al 2015. 6. Fraser pers. comm. 2018.
3. 'Total' given where location of birds counted within the Area was indeterminate from the data source.
4. 10 Imperial shags (breeding adults) in flight as a group at SW edge of Rosenthal Islands.



Map 1. ASPA No.176 Rosenthal Islands, Anvers Island: location.

09 Sep 2021
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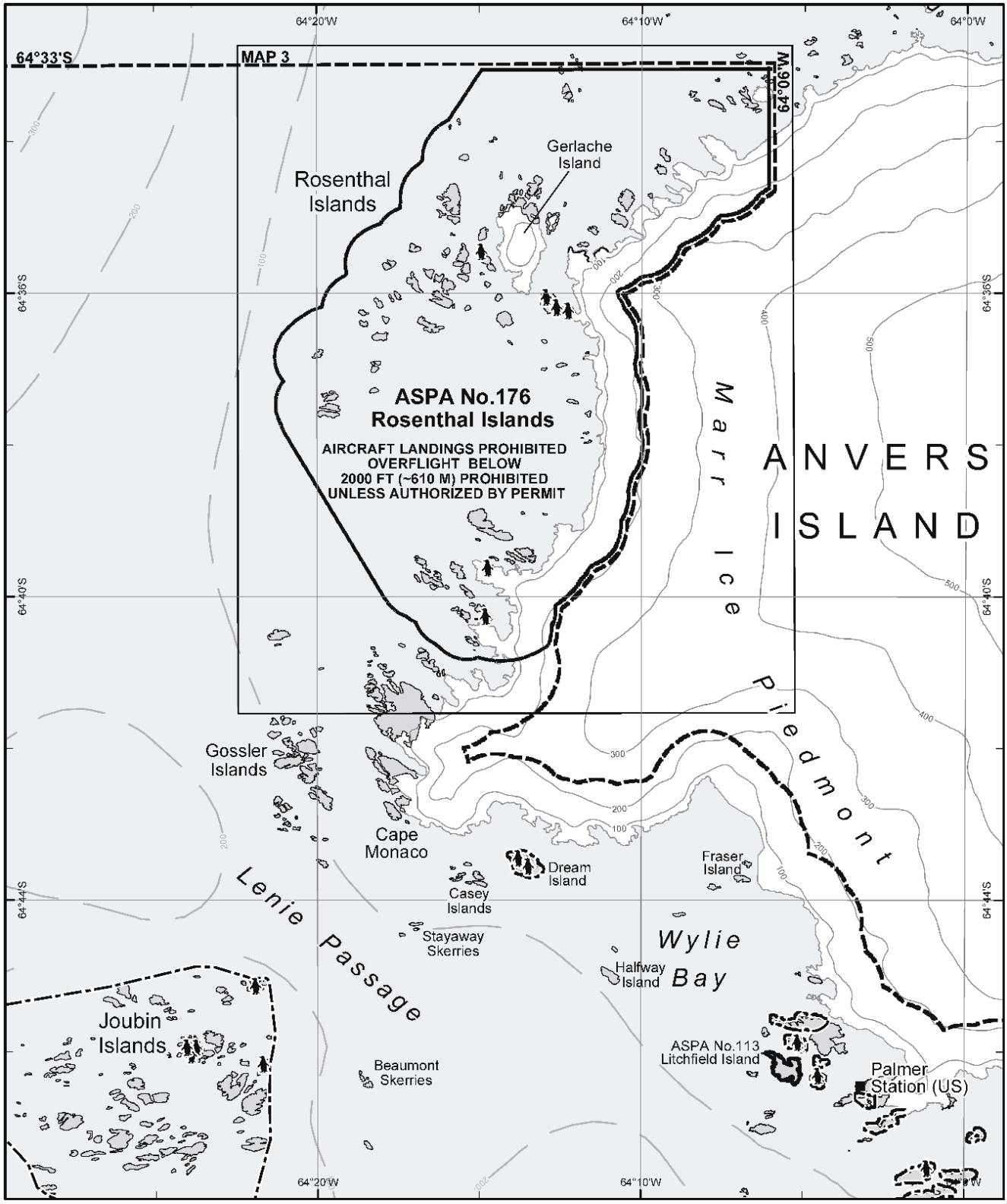
Permanent ice
Ice-free ground
Ocean
Contours (500 m)
Isobath (200 m)
Antarctic Specially Managed Area (ASMA) boundary
Antarctic Specially Protected Area (ASPA) boundary
Antarctic Specially Protected Area (ASPA)
Station, Year-Round
Station, Seasonal
Historic Site & Monument (HSM)

0 5 10 Kilometers
N

Projection: Lambert Conic Conformal
Spheroid and horizontal datum: WGS 84
Data sources: Bathymetry: IBCSO v.1 (2013)
Topography: SCAR ADD v7.2 (2021)
Protected areas: ERA (2021); Stations: COMNAP (2021)



Map 2. ASPA No.176 Rosenthal Islands, Anvers Island: local region

0 1 2 3 4 5
Kilometers

N

09 Sep 2021
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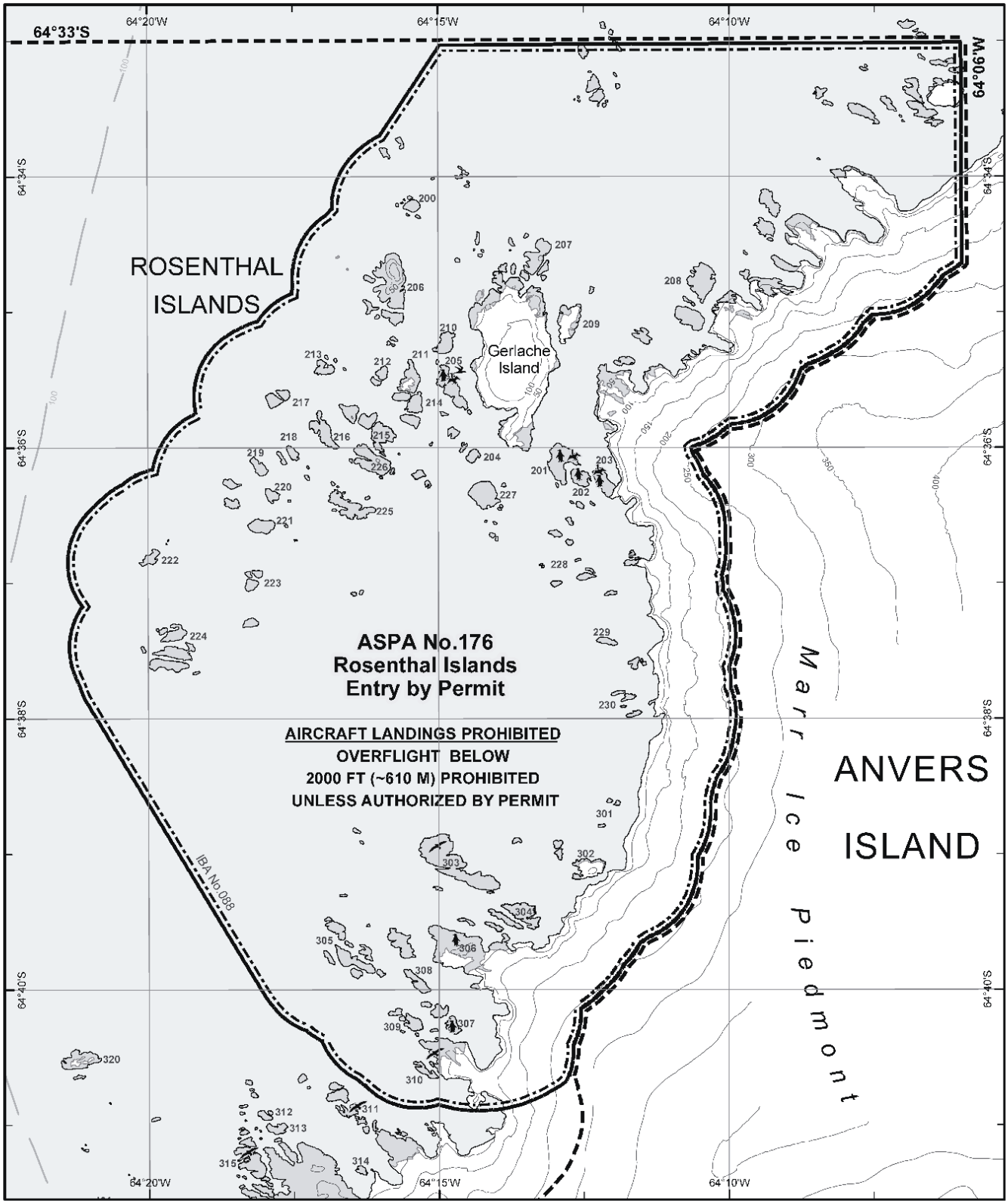
Environmental Research & Assessment

Permanent ice
Ice-free ground
Ocean
Contours (100 m)
Isobath (100 m) (approx)
ASMA boundary
ASPA boundary
Restricted Zone
Station, Year-Round
Penguin colony

Projection: Lambert Conformal Conic
Spheroid & horizontal datum: WGS84
Data sources: Topography SCAR ADD v7.2 (2021)
Contours: SCAR ADD 7.3 (2021) derived from REMA v1.1
Bathymetry: IBCSO v.1 (2013)
Protected areas: ERA (2021); Stations: COMNAP (Aug 2021)
Wildlife - Polar Oceans Research Group / ERA (Aug 2018)



Map 3. ASPA No.176 Rosenthal Islands: topography.

09 Sep 2021
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Environmental Research & Assessment

Coastline
Contour (50 m)
Isobath (100 m)
Ocean
Permanent ice
Ice free ground
Palmer ASMA boundary
Protected area boundary
Important Bird Area (IBA)
Penguin colony
Imperial shag colony
Southern Giant petrel colony
Antarctic tern colony

0 1 2 3 4 Kilometers

N

Projection: Lambert Conformal Conic
Spheroid & horizontal datum: WGS84
Data sources: Coastline & ice free ground: digitised from orthorectified aerial imagery acquired 02 Feb 2009 and satellite imagery by ERA & PGC;
Contours: derived from DEM created by PGC (2017);
Bathymetry: IBCSO v.1 (2013);
Wildlife - Polar Oceans Research Group/ ERA (2018).