Management Plan for
Antarctic Specially Protected Area No. 152
WESTERN BRANSFIELD STRAIT

Introduction

The Area is located off the western and southern coasts of Low Island, South Shetland Islands, lying between 63°15'S and 63°30'S; 62°00'W and 62°45'W, and is fully marine. Approximate area: 916 km^2. Designation is on the grounds that the shallow shelf in this region near Low Island is one of only two known sites in the vicinity of Palmer Station (USA) that are suitable for bottom trawling for fish and other benthic organisms (see also ASPA No. 153 Eastern Dallmann Bay). The site offers unique opportunities to study the composition, structure and dynamics of several accessible marine communities. Proposed by the United States of America: adopted by Recommendation XVI-3 (Bonn, 1991: SSSI No. 35); date of expiry extended by Measure 3 (2001); renamed and renumbered by Decision 1 (2002); revised management plans adopted by Measure 2 (2003) and by Measure 10 (2009). The Area is approved under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) in accordance with Decision 9 (2005).

The Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and Antarctic Conservation Biogeographic Regions (Resolution 6 (2012)) classifications are based on terrestrial criteria, and therefore have limited applicability in marine environments.

1. Description of values to be protected

Western Bransfield Strait (between latitudes 63°20'S and 63°35'S and longitudes 61°45'W and 62°30'W, approximately 916 km^2) was originally designated as a Site of Special Scientific Interest through Recommendation XVI-3 (1991, SSSI No. 35) after a proposal by the United States of America. It was designated on the grounds that "the shallow shelf south of Low Island is one of only two known sites in the vicinity of Palmer Station that are suitable for bottom trawling for fish and other benthic organisms. From an ecological standpoint, the Low Island site offers unique opportunities to study the composition, structure, and dynamics of several accessible marine communities. The Site, and in particular, its benthic fauna, is of exceptional scientific interest and requires long-term protection from potential harmful interference". Together with Eastern Dallmann Bay (ASPA No. 153), the Area is used in over 90 percent of specimen collections carried out by US researchers who are actively studying such fish communities within the region (Detrich pers. comms. 2009 and 2015).

The boundaries of the Area were revised by Measure 2 (2003) to include all of the shallow shelf down to 200 m depth to the west and south of Low Island, while the deeper water of Bransfield Strait to the east was excluded. The boundaries of the Area at Western Bransfield Strait are between latitudes 63°15'S and 63°30'S and longitudes 62°00'W and 62°45'W and are defined in the north-east by the shoreline of Low Island, encompassing an area of approximately 916 km^2 (Map 1).

The Area continues to be considered important for studies of the composition, structure and dynamics of the marine communities, and the original reasons for designation are reaffirmed in the current Management Plan. In addition, the Area is recognized as an important spawning ground for several fish species, including the rockcod *Notothenia coriiceps* and the icefish *Chaenocephalus aceratus*. Fish have been collected from the Area by scientists from Palmer Station since the early 1970s. The Area is within the research area of the Palmer Long Term Ecological Research (LTER) Program; fish collected from the Area are used in the study of biochemical and physiological adaptations to low temperatures. Some of the fish collected have been used for comparative studies with the more heavily impacted Arthur Harbor area. Scientific research is also being undertaken on the benthic faunal communities.

2. Aims and objectives

Management at Western Bransfield Strait aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance to the Area;
- allow scientific research on the marine environment while ensuring protection from over-sampling;
- allow other scientific research within the Area provided it will not compromise the values for which the Area is protected;
- 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 map showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently and copies of this Management Plan shall be made available at Palmer Station (USA).
- National programs shall ensure the boundaries of the Area and the restrictions that apply within are marked on relevant maps and marine charts for which they are responsible.
- Copies of this Management Plan shall be made available to vessels travelling in the vicinity of the Area.
- Buoys, or other markers or structures installed within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer needed.
- Visits shall be made as necessary to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: ASPA No. 152 Western Bransfield Strait bathymetric map. Coastline data are derived from the SCAR Antarctic Digital Database (ADD) Version 6.0 (2012). Bathymetry is derived from the International Bathymetric Chart of the Southern Ocean (IBCSO) v1.0 (2013). Bird data: ERA (2015). Important Bird Areas: BirdLife International / ERA (Harris *et al*. 2011).

Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 63° 15' S; 2nd 63° 30' S; Central Meridian: 62° 00' W; Latitude of Origin: 64° 00' S; Spheroid and horizontal datum: WGS84; Horizontal accuracy: maximum error of ±300 m. Isobath 200 m.

Inset: the location of Map 1, ASPA No. 152 Western Bransfield Strait, Antarctic Peninsula, showing the nearest protected area, ASPA No. 153, Eastern Dallmann Bay.

6. Description of the Area

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

General description

Bransfield Strait is a deep water passage approximately 220 km long and 120 km wide between the Antarctic Peninsula and the numerous islands that comprise the South Shetland Islands. The Drake Passage is to the north and to the west is the Bellingshausen Sea. The Area lies approximately 80 km west of the Antarctic Peninsula, mostly within the 200 m isobath directly south and west of Low Island (Map 1). Low Island is the southern-most of the South Shetland Islands, lying 60 km south-west of Deception Island and 25 km south-east of Smith Island. To the west and south of Low Island, and for approximately 20 km from the shore, the sea floor slopes gently from the intertidal zone to depths of approximately 200 m. The sea floor slopes steeply to the east of Low Island, reaching depths of up to 1200 m in this part of Bransfield Strait. Cores collected as part of the BENTART research programme during the austral summers of 2003 and 2006 indicate that the sea floor within the Area is generally composed of muddy sediments containing gravel or small stones, and of sessile epifaunal communities (Troncoso *et al.* 2008), which either remain firmly attached to substrates or move very slowly (Robinson *et al.* 1996).

Boundaries

The boundaries of the Area at Western Bransfield Strait are defined in the north as the line of latitude at 63°15'S and in the south at 63°30'S; in the east the boundary is defined as the line of longitude at 62°00'W and in the west 62°45'W (Map 1). The northeastern boundary is defined as the shoreline of Low Island, extending from 62°00'W, 63°20'S in the southeast (approximately two kilometers from Cape Hooker) to 62°13'30"W, 63°15'S in the northwest (Cape Wallace). The coastline boundary on the western and southern shores of Low Island is defined as the high tide level, and the intertidal zone is included within the Area. The Area extends a maximum of 27.6 km north-south and a maximum of 37.15 km east-west, encompassing an area of approximately 916 km^2. Boundary markers have not been installed because in the marine area this is impractical, while at Low Island the coast itself is a clearly defined and visually obvious boundary feature.

Oceanography, climate and marine geology

There is considerable year-to-year variation in sea ice within the Bransfield Strait region, although coverage appears to be less than 100 days per year (Parkinson 1998). Rates of sea ice advance and retreat along the northwestern Antarctic Peninsula are also variable. Sea ice advance is for approximately five months followed by approximately seven months of retreat. Ice growth is fastest in June and July and the fastest decay is in December and January (Stammerjohn and Smith 1996). Measurements made within the Bransfield Strait between 20th January and 9th February 2001 indicate that ocean temperatures in the Area averaged between 1.7 and 1.8 ºC at 5 m depth and 0.2 to 0.3ºC at the 150 m contour (Catalan *et al.* 2008). Water salinity within the Area ranged between 34.04 and 34.06 psu at 5 m, whilst at 150 m depth salinity reached 34.40 psu.

Wind is predominantly from the NNW direction, resulting in a southward flowing coastal current along the western Antarctic Peninsula (Hofman *et al.* 1996). Coupled with the northward flow of the Antarctic Circumpolar Current, this results in a predominantly clockwise circulation in Bransfield Strait (Dinniman and Klinck 2004; Ducklow *et al.* 2007), dominated by the Gerlache Strait Current and the Bransfield Strait Current (Zhou *et al.* 2002 and 2006). Drifters deployed as part of RACER (Research on Antarctic Coastal Ecosystems and Rates) between 1988 and 1990 indicate that eddie formation within the Area is minimal and that a strong north-easterly flow originates to the south of Low Island (Zhou *et al.* 2002). The current bifurcates to the west of Low Island, with water flowing to the north-east to merge with the Bransfield Strait Current and to the north-west, towards Smith Island. Local circulation is also influenced by tides, with tide records obtained at Low Island during a six-week period in December 1992 to January 1993 recording a maximum level variation of 1.70 m (López *et al.* 1994).

Seismic measurements from the Seismic Experiment in Patagonia and Antarctica (SEPA) monitoring station, located on the north-eastern coast of Low Island, have detected significant earthquake activity within the

Area, which is thought to result from the intersection of the Hero Fracture Zone with the South Shetland Platform at Smith Island (Maurice *et al.* 2003). During the Spanish Antarctic campaign of 2006/07, an additional seismic monitoring station was installed on the southern coast of Low Island, in order to extend geodetic monitoring within the Bransfield Strait area (Berrocoso *et al*. 2007).

Marine biology

The predominantly soft sand / mud / cobbled-rock substrate of the Area supports a rich benthos with numerous fish species, invertebrates (sponges, anemones, annelids, molluscs, crustaceans, asteroids, ophiuroids, echinoids, holothurioids, brachiopods, tunicates), and marine plants, in several distinct communities.

Fish species commonly collected near Low Island at depths of 80 to 200m include *Chaenocephalus aceratus, Harpagifer bispinis, Notothenia coriiceps, Gobionotothen gibberifrons (formerly N. gibberifrons), Parachaenichthys charcoti* and *Trematomus newnesi* (Grove and Sidell 2004; Lau *et al.* 2001). Species rarely found at Low Island include *Champsocephalus gunnari, Chionodraco rastrospinosus* and *Pseudochaenichthys georgianus*. In addition, the Low Island shelf appears to be a spawning ground for several fish species, for example the ice fish *Chaenocephalus aceratus* and *N. coriiceps*, with the family Nototheniidae, representing the bulk of fish larvae and juveniles captured in the area (Catalan *et al.* 2008). Other juvenile fish species collected close to Low Island include *Trematomus lepidorhynus and Notothenia kempi*. The Area is a mating ground for yellowbelly rockcod (*Notothenia coriiceps*) (indicated by eggs) (Kellermann 1996). The fish spawn in May / June. The large eggs, around 4.5 mm in diameter, are pelagic after fertilization and ascend to the surface waters where they incubate during the winter. Larval species recorded in the Area include *Bathylagus antarcticus, Electrona antarctica, Gymnodraco acuticeps, Nototheniops larseni, Notothenia kempi* and *Pleuragramma antarcticum* (Sinque *et al.* 1986; Loeb *et al.* 1993; Morales-Nin *et al.* 1995).

Specimens collected during April-June 2008 and 2010 were used to investigate protein folding in *Gobionotothen gibberifrons* in relation to warming oceans (Cuellar *et al*. 2014).

The following benthic amphipod species have been recorded within the Area: *Ampelisca barnardi, A. bouvieri, Byblis subantarctica, Epimeria inermis, E. oxicarinata, E. walkeri, Eusirus antarcticus, E. perdentatus, Gitanopsis squamosa, Gnathiphimedia sexdentata, Jassa* spp., *Leucothoe spinicarpa, Liljeborgia georgiana, Melphidippa antarctica, Oediceroides calmani, O. lahillei, Orchomenella zschaui, Parharpinia obliqua, Parepimeria bidentata, Podocerus septemcarinatus, Prostebbingia longicornis, Shackeltonia robusta, Torometopa perlata, Uristes georgianus* and *Waldeckia obesa* (Wakabara *et al.* 1995).

Molluscan assemblages have been analysed at four sample sites within the Area as part of an integrated study of the benthic ecosystem of Bransfield Strait, which was carried out between 24 January and 3 March 2003 (BENTART 03) and from 2 January to 17 February 2006 (BENTART 06) (Troncoso *et al*. 2008). The most abundant species in the Area was the bivalve *Lissarca notorcadensis*, distantly followed by *Pseudamauropsis aureolutea*, which was the most widely distributed. Other species collected included *Marseniopsis conica, Onoba gelida, Yoldiella profundorum, Anatoma euglypta, Chlanidota signeyana* and *Thyasira debilis*.

No information is available on the zooplankton or marine flora within the Area.

Marine mammals

Satellite tracking studies carried out between January 2004 and 2006 suggest that humpback whales (*Megaptera novaeangliae*) pass close to the Area and may enter it during foraging (Dalla Rosa *et al.* 2008). Southern elephant seals (*Mirounga leonina*) were tracked within the Area using satellite transmitters between December 1996 and February 1997 (Bornemann *et al.* 2000).

Birds

Approximately 325 000 pairs of chinstrap penguins (*Pygoscelis antarctica*) were breeding at ~13 locations on and near to the shore of Low Island in 1987 (Shuford & Spear 1988), most of which are in colonies located along or near the northeastern boundary of the Area. The largest colonies are immediately to the north of the

Area at and near Cape Wallace (129 000 – 229 000 pairs) and at and near Cape Garry (approximately 104 375 pairs) and Jameson Point (20 000 – 35 000) (Map 1). These breeding sites, as well as nearby Cape Hooker, have been identified by BirdLife International as Important Bird Areas because of their large chinstrap penguin colonies (Harris *et al*. 2011). It is expected that the large colonies of chinstrap penguin influence the Area. Small colonies of Antarctic shags (*Phalacrocorax* [atriceps] *bransfieldensis*) have been observed at Cape Garry, on an island within the Area between Cape Garry and Jameson Point, and on an island several kilometers NE of Cape Wallace (Poncet and Poncet, unpublished data Feb 1987, in Harris 2006) (Map 1).

Human activities / impacts

Fish collected within the Area have been used for a variety of biochemical, genetic and physiological research, including: studies of the adaptations in fish that enable proteins to function at low temperatures (Detrich *et al*. 2000; Cheng and Detrich 2007); the adaptations of muscle and energy metabolism, including the processing of fatty acids to low temperatures (Hazel and Sidell 2003; Grove and Sidell 2004); efficient genome transcription in cold water (Lau *et al*. 2001; Magnoni *et al*. 1998); the influence of hydrostatic pressure on enzyme function within fish livers (Ciardiello *et al*. 1999); and the cardiovascular adaptations of icefishes, in compensation for their complete lack of haemoglobin (Sidell and O'Brien 2006).

Specimens collected during trawls in March and April 1991, 1992, and 1993 were used in comparative studies of Polynuclear Aromatic Hydrocarbon (PAH) contamination in fish with those collected from Arthur Harbor and the effects of Diesel Fuel Arctic (DFA) on *Notothenia gibberifrons* (now *Gobionotothen gibberifrons*) (McDonald *et al*. 1995; Yu *et al*. 1995). The former study found levels of contamination in fish sampled from the Area were considerably lower than those sampled from the vicinity of the 1989 *Bahia Paraiso* wreck in Arthur Harbor and that fish captured near US scientific stations are exposed to PAH, albeit low levels (McDonald *et al*. 1992 and 1995). However, concentrations of PAH were higher than had been expected in fish collected from within the Area, with levels found to be similar to those in fish sampled from near Old Palmer Station.

6(ii) Access to the Area

Access into the Area is generally by ship from Bransfield Strait, or from the direction of Drake Passage, or Boyd Strait which lies to the north between Smith and Snow islands. Vessels may transit through the Area, although anchoring shall be avoided except in compelling circumstances. Access into the Area may be made by air or over sea ice when conditions allow. Access routes into or within the Area have not been defined.

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

There are no structures known to be within or near the Area. The nearest scientific stations are Decepción (Argentina) and Gabriel de Castilla (Spain), both approximately 70 km to the northeast on Deception Island.

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

The nearest protected areas to Western Bransfield Strait are Eastern Dallmann Bay (ASPA No. 153), which lies about 45 km to the SSE, and Port Foster and other parts of Deception Island (ASPAs No. 140 and No. 145 respectively), which are approximately 70 km to the northeast (Map 1, Inset).

6(v) Special zones within the Area

None.

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 scientific purposes, or for educational purposes that cannot be served elsewhere, or for reasons essential to the management of the Area;
- the actions permitted are in accordance with the 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;
- the Permit shall be issued for a finite period;
- the Permit, or a copy, shall be carried when in the Area.

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

Access into the Area shall be by sea, over sea ice or by air. There are no specific restrictions on routes of access to, or movement within, the Area, although movements should be kept to the minimum necessary consistent with the objectives of any permitted activity. Every reasonable effort should be made to minimize disturbance. Vessels may transit through the Area, although anchoring shall be avoided except in compelling circumstances. There are no special overflight restrictions within the Area, and aircraft may land by Permit when sea ice conditions allow, although pilots should take into account the large penguin colonies present near the northeastern boundary of the Area on the Low Island coast (Map 1).

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

- Scientific research that will not jeopardize the values of the Area;
- Essential operational activities of vessels that will not jeopardize the values of the Area, such as transit through, or stationing within, the Area in order to facilitate science or other activities, including tourism, or for access to sites outside of the Area;
- Essential management activities, including monitoring.

7(iv) Installation, modification or removal of structures

- No structures are to be erected within the Area except as specified in a permit and 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 and year of installation. All such items should be made of materials that pose minimal risk of contamination of the Area;
- Installation (including site selection), maintenance, modification or removal of structures shall be undertaken in a manner that minimizes disturbance to flora and fauna.
- Removal of specific equipment for which the permit has expired shall be the responsibility of the authority which granted the original Permit, and shall be a condition of the permit.

7(v) Location of field camps

None.

7(vi) Restrictions on materials and organisms which 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 which 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 markers brought into the Area are clean. To the maximum extent practicable, equipment to be used within the area shall be thoroughly cleaned before entering the Area. Visitors should also consult and follow as appropriate recommendations contained in the Committee for Environmental Protection Non-native Species Manual (CEP 2011);
- No pesticides shall be brought into the Area;
- Fuel, food, chemicals and other materials shall not be stored in the Area, unless specifically authorized by permit, and shall be stored and handled in a way that minimizes the risk of their accidental introduction into the environment;
- All materials introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period; and
- 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 of, or harmful interference with, native flora or fauna is prohibited, except in accordance with a permit issued under Article 3 of Annex II to 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.
- 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 must be notified and approval obtained.

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:

- carry out monitoring and Area inspection activities, which may involve the collection of a small number of samples or data for analysis or review;
- Erect, install or maintain structures or scientific equipment;
- Carry out protective measures.

7(xi) Requirements for reports

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and where possible within six months after the visit has been completed.
- Such reports should include, as appropriate, the information identified in the Visit Report form contained in Appendix 2 of 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 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 reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the Management Plan and in organizing the scientific use of the Area.
- The appropriate authority should be notified of any activities/measures undertaken, anything removed and/or of any materials released and not removed, that were not included in the authorized permit.

8. Supporting documentation

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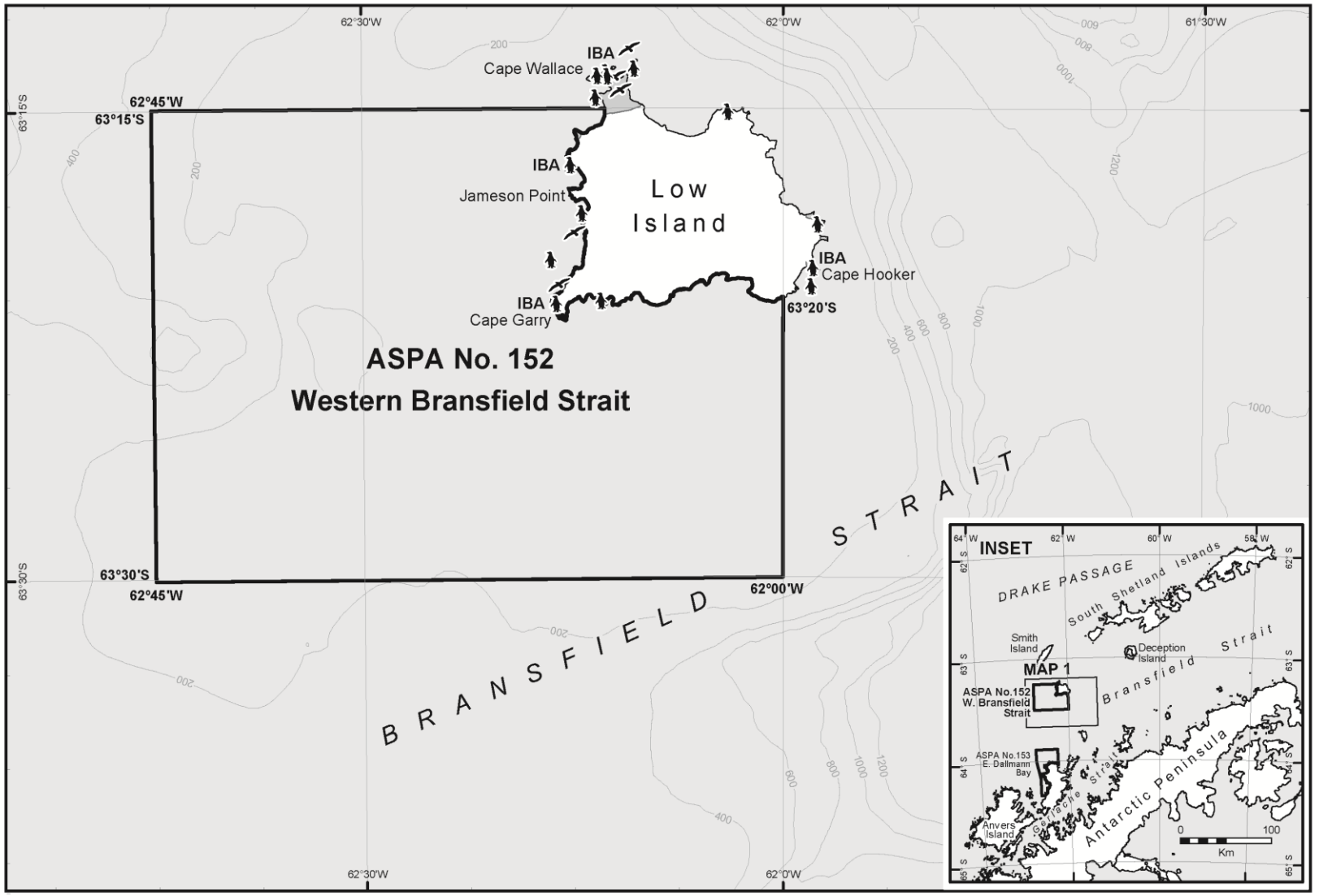

Map 1: ASPA No. 152 - Western Bransfield Strait

31 Mar 2015 (Map ID: 10068.0003.02)
United States Antarctic Program
Environmental Research & Assessment

Coastline
Isobath (200 m)
Ice free ground
Permanent ice
Ocean
Antarctic Specially Protected Area (ASPA) boundary

IBA Important Bird Area
Flying bird colony
Penguin colony

0 5 10
Kilometers

N

Projection: Lambert Conic Conformal
Spheroid and horizontal datum: WGS84
Data sources: Coast & topography: SCAR ADD (v6, 2012), updated by ERA (Mar 2015); Bathymetry: IBCSO (v1, 2013); Bird data: ERA (Mar 2015); IBA: BirdLife Int./ERA (2011); Protected areas: ERA Antarctic Protected Areas v3.0 (Jun 2014).