

# Management Plan for Antarctic Specially Protected Area (ASPA) No. XYZ Cape Washington & Silverfish Bay Northern Terra Nova Bay Ross Sea

## ***Introduction***

Cape Washington and Silverfish Bay are located in northern Terra Nova Bay, Victoria Land, Ross Sea. Approximate area and coordinates: 286 km<sup>2</sup> (centered at 164° 57.6' E, 74° 37.1' S), of which 279.5 km<sup>2</sup> is marine (98 %) and 6.5 km<sup>2</sup> is terrestrial (2 %). The primary reasons for designation of the Area are the outstanding ecological and scientific values. One of the largest emperor penguin (*Aptenodytes forsteri*) colonies in Antarctica breeds on sea ice adjacent to Cape Washington, with around 20,000 breeding pairs comprising approximately eight percent of the global emperor population and ~21% of the population in the Ross Sea. Several factors, such as location, ice conditions, weather and accessibility provide relatively consistent and stable opportunities to observe emperor chick fledging reliably and the presence of a variety of other species make it an ideal place to study ecosystem interactions. The extended record of observations of the emperor colony at Cape Washington is of important scientific value. Approximately 20 km west of Cape Washington, the first documented 'nursery' and hatching area for Antarctic silverfish (*Pleuragramma antarcticum*) is located at Silverfish Bay. Recent research has shown that the concentration of spawning on occasions extends all the way across the embayment to Cape Washington. The first ground-breaking studies on the life-history of this species have been made at the site, and its relative accessibility to nearby research stations make the Area important for biological research. The Area also has important geoscientific values, as it features extensive volcanic rock exposures originating from the nearby active volcano Mount Melbourne.

The Area is situated in Environment U – North Victoria Land Geologic based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and in Region 8 – Northern Victoria Land based on the Antarctic Conservation Biogeographic Regions.

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

The Area at northern Terra Nova Bay comprising Cape Washington and Silverfish Bay (Map 1) was proposed by Italy and the United States on the grounds that it contains one of the largest emperor penguin (*Aptenodytes forsteri*) colonies known, and the colony and its associated ecosystem is the subject of ongoing scientific studies that began in 1986. Recently, large quantities of eggs of the Antarctic silverfish (*Pleuragramma antarcticum*) were discovered under sea ice in northern Terra Nova Bay, making it the first documented 'nursery' and hatching area for this species. This discovery has greatly expanded understanding of the life-history of this species, and the proximity of the site to nearby scientific stations makes it of outstanding scientific value for continuing study. The site of the original Antarctic silverfish egg discovery was named Silverfish Bay (Map 2), and more recent research has revealed the rich concentration of *P. antarcticum* eggs found there extends in some years across the embayment towards Cape Washington. The total area is 286 km<sup>2</sup>, of which the marine component is ~279.5 km<sup>2</sup> (98 %) and the terrestrial component is 6.5 km<sup>2</sup> (2 %).

The Cape Washington emperor colony, usually centered around one kilometer northwest of the cape (at 165°22' E, 74°38.8' S), was the largest known in Antarctica in the 1993 and 1994 seasons, with counts of around 24 000 chicks being slightly greater than that of nearby Coulman Island at the time. In other years

for which counts are available the Coulman Island colony was the slightly larger of the two. The colony appears to maintain a reasonably stable population, with ~17 000 chicks being counted in 2010. This relative stability makes the colony particularly suited to scientific study and monitoring, since long-term trends may be more readily studied and detected. Moreover, a relatively long time-series of scientific data exists for the Cape Washington emperor colony. Because of the location, ice conditions, weather and accessibility, Cape Washington is one of only two Ross Sea colonies where October through December studies can be conducted and emperor chick fledging can be observed reliably. All of these qualities make the Cape Washington emperor colony of outstanding ecological and scientific value.

The Area at Cape Washington and Silverfish Bay is also of considerable scientific interest because of the variety of other species that frequent the Area, making it an ideal location to study ecosystem interactions and predator / prey relationships. Cape Washington itself is a nesting area for south polar skuas (*Catharacta maccormicki*) and snow petrels (*Pagodroma nivea*). Adélie penguins (*Pygoscelis adeliae*) are present in the emperor colony and on the sea-ice edge daily from November to mid-January. Large groups of killer whales (*Orcinus orca*) and other cetaceans such as Antarctic minke whales (*Balaenoptera bonaerensis*) are regularly observed foraging in this area, as well as Weddell (*Leptonychotes weddellii*) and leopard (*Hydrurga leptonyx*) seals. The embayment is an important haul-out and breeding area for Weddell seals, with several hundred typically congregating along sea ice leads and near Markham Island throughout the season. Crabeater seals (*Lobodon carcinophagus*) and Arnoux's beaked whales (*Berardius arnuxii*) are occasionally seen at the sea ice edge in the region. Cape Washington is the only place known where the interaction between leopard seals and emperor penguins can be so reliably observed.

The Area has exceptional value for observations of the interactions and predator / prey relationships between many different members of the marine ecosystem within a relatively compact area that is accessible to scientists supported by nearby research stations. The boundaries are defined taking an integrated approach to inclusion of all components of the local ecosystem.

The Area has considerable geoscientific value because it features extensive volcanic rock exposures related to the nearby active volcano Mount Melbourne. The Area serves as a key marker region for evaluating the young, neotectonic evolution of the western Ross Sea. It borders the deepest waters of the Ross Sea and includes Markham Island, a volcanic outcrop that is located over a negative magnetic anomaly, the origin of which is not yet known.

Cape Washington is relatively accessible by sea-ice, sea and air from nearby research stations in Terra Nova Bay. Aircraft activity in the region is frequent throughout the summer season, with fixed-wing aircraft operating from the sea ice runway in Gerlache Inlet (Map 2), and helicopter movements within the region around Mount Melbourne on a regular basis.

The Area requires long-term special protection because of the outstanding ecological and scientific values and the potential vulnerability of the Area to disturbance from scientific, logistic and tourist activities in the region.

## **2. Aims and objectives**

Management at Cape Washington and Silverfish Bay 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 ecosystem, in particular on the emperor penguins and ecosystem interactions, while ensuring protection from oversampling or other possible scientific impacts;
- allow other scientific research, scientific support activities and visits for educational and outreach purposes (such as documentary reporting (visual, audio or written) or the production of educational

resources or services) provided that such activities are for compelling reasons that cannot be served elsewhere and that will not jeopardise the natural ecological system in that Area;

- prevent or minimize the introduction of alien plants, animals and microbes into the Area;
- minimise the possibility of the introduction of pathogens that may cause disease in faunal populations within the Area;
- 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:

- Signs showing the location of the Area (stating the special restrictions that apply) shall be displayed prominently, and a copy of this Management Plan shall be kept available, at all scientific stations located within 75 km of the Area;
- Copies of this Management Plan shall be made available to all vessels and aircraft visiting the Area and/or operating in the vicinity of the adjacent stations, and all pilots and ship captains operating in the region shall be informed 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 structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition, and removed when no longer required;
- Any abandoned equipment or materials shall be removed to the maximum extent possible provided doing so does not adversely impact on the environment and the values of the Area;
- Visits shall be made as necessary (no less than once every five years) to assess whether the Area continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate;
- National Antarctic Programs operating in the region shall consult together with a view to ensuring that the above provisions are implemented.

### **4. Period of designation**

Designated for an indefinite period.

### **5. Maps and photographs**

**Map 1:** ASPA No. XYZ: Cape Washington and Silverfish Bay – Regional map. Projection: Lambert Conformal Conic; Standard parallels: 1st 74° 20' S; 2nd 75° 20' S; Central Meridian: 164° 00' E; Latitude of Origin: 74° 00' S; Spheroid and horizontal datum: WGS84; Contour interval 200 m; Bathymetry 200 m at coast, then 500 m interval.

*Inset:* Location of Terra Nova Bay in the Ross Sea region.

**Map 2:** ASPA No. XYZ: Cape Washington and Silverfish Bay – topographic map. Projection: Lambert Conformal Conic; Standard parallels: 1st 74° 35' S; 2nd 74° 45' S; Central Meridian: 164° 42' E; Latitude of Origin: 74° 00' S; Spheroid and horizontal datum: WGS84; Contour interval 200 m; Bathymetry 100 m interval.

**Map 3:** ASPA No. XYZ: Cape Washington and Silverfish Bay – Access Guidance. Map details as per Map 2.

**Map 4:** ASPA No. XYZ: Cape Washington and Silverfish Bay – Restricted Zone. Map details as per Map 2 except Central Meridian: 165° 20' E. Satellite image Ikonos acquired 30 Dec 2011, © GeoEye (2011), courtesy of NGA Commercial Imagery Program.

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

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

#### *General description*

Cape Washington is situated in northern Terra Nova Bay, 40 km east of Mario Zucchelli Station (Italy) (Map 1). The Area is 286 km<sup>2</sup>, of which the marine component is 279.5 km<sup>2</sup> (98 %) and the terrestrial component is 6.5 km<sup>2</sup> (2 %).

Sea ice persists in Silverfish Bay and across Closs Bay to Cape Washington from March until January, providing a stable and reliable platform on which the emperors can breed and suitable conditions for the silverfish 'nursery'. The Cape Washington peninsula provides shelter to the emperor colony, which is relatively protected from the strong katabatic winds that descend into other parts of Terra Nova Bay. The eastern coast of the Cape Washington peninsula comprises precipitous cliffs of several hundred meters in height, while the west side comprises more gentle mixed snow and ice-free slopes with some rocky outcrops extending down to sea level. Closs Bay extends uninterrupted across to the Campbell Glacier Tongue, punctuated by the solitary and small Markham Island close to Oscar Point (Map 2).

#### *Boundaries and coordinates*

The eastern boundary of the Area at the NE corner extends from the coordinates 165° 27' E, 74° 37' S on the eastern coast of the Cape Washington peninsula due south for ~5.6 km to 165° 27' E, 74° 40' S (Map 2). The boundary thence extends due west across Closs Bay on latitude 74° 40' S for ~26.8 km to the Campbell Glacier Tongue. It then follows the eastern margin of the Campbell Glacier Tongue for ~11.2 km northwards to the coast at Shield Nunatak. The boundary thence follows the coastline eastwards, around the Vacchi Piedmont Glacier, to the western coast of the Cape Washington peninsula, ~23 km in a straight-line from Shield Nunatak. The boundary thence follows the coastline southward ~7.5 km towards the first prominent rock outcrop at latitude 74° 37.03' S on the western coast of the Cape Washington peninsula. The boundary extends eastwards from this coast along the line of latitude 74° 37' S ~ 2.8 km to the NE corner boundary point located on the eastern coast of the Cape Washington peninsula.

#### *Climate*

Four meteorological stations are located in Terra Nova Bay, of which 'Eneide', located at Mario Zucchelli Station (164° 05.533' E, 74° 41.750' S) and ~ 25 km from the center of the Area, has the longest time series of data. The mean annual air temperature at Mario Zucchelli Station was -14.1° C during the period 1987–2009, with the coldest month being July with an average minimum temperature of -28.2 °C and the warmest month is December with an average maximum temperature of 0° C. The mean annual wind speed at Mario Zucchelli Station was 6.56 m/s (23.6 km/h; 1987–2009) with an average maximum of 11.6 m/s (41.8 km/h) in June and an average minimum of 2.6 m/s (9.4 km/h) in December.

The strongest mean annual wind speed in the Terra Nova Bay area has been recorded near Inexpressible Island, measured at 12.3 m/s (44.3 km/h) between Feb 1988 – 1989 (Bromwich *et al.* 1990). This is significantly stronger than ordinary katabatic winds (< 10 m/s), as local topographic features channel the air into the 'confluence zones' of the Reeves and the Priestley glaciers (Bromwich *et al.* 1990; Parish & Bromwich 1991). These offshore katabatic winds play a significant role in the formation of the Terra Nova Bay polynya.

## *Oceanography*

Terra Nova Bay is a deep basin that reaches a maximum depth of ~1100 m, which is the deepest water in the Ross Sea (Buffoni *et al* 2002) (Map 1). Ocean circulation in the bay is characterized in summer by a prevailing northward movement in the upper layer, parallel to the coast, and a clockwise rotation with depth (Vacchi *et al.* 2012 in press). Warmer and more saline waters are observed near the coast, while cooler waters are found in the central part of the bay, and local eddies and upwelling processes are strongly influenced by katabatic winds (Budillon & Spezie 2000; Buffoni *et al.* 2002).

A perennial winter polynya forms in the bay through a combination of persistent katabatic winds driving newly formed ice offshore and the Drygalski Ice Tongue acting as a barrier to the northward drift of pack ice (Bromwich & Kurtz 1984; Van Woert 1999) (Map 1). The polynya generally forms with a maximum east-west extent that appears to be closely related to the length of the Drygalski Ice Tongue (Kurtz & Bromwich 1983). The polynya has been observed to cover a mean area of roughly 1300 km<sup>2</sup> (65 km N/S by 20 km E/W), although in some years it may not exist at all, while in others it can reach a maximum of ~ 5000 km<sup>2</sup> (65 km N/S by 75 km E/W ) (Kurtz & Bromwich 1983).

This polynya plays an important role in the formation of High Salinity Shelf Waters (HSSW) in Terra Nova Bay (Buffoni *et al* 2002). The brine rejected during the ice formation process increases the salt content and density of the water, which consequently causes a thermohaline circulation and convective movements. The HSSW found in this area have the highest salinity content in Antarctica reaching up to 34.87 and a potential temperature near the sea surface freezing point of -1.9 °C.

## *Marine biology*

The silverfish (*Pleuragramma antarcticum*) is the dominant pelagic fish in waters of the continental shelf in the Ross Sea and is considered a keystone species providing one of the major links between lower and higher trophic levels (Bottaro *et al.* 2009; La Mesa *et al.* 2010; Vacchi *et al.* 2012). Silverfish represent the primary food item for most marine vertebrates, such as marine mammals, birds, and other fishes (La Mesa *et al.* 2004), and are the primary fish prey for both emperor penguins and Weddell seals (Burns & Kooyman 2001).

Until recently little was known of the early life history of silverfish (Guglielmo *et al.* 1998; Vacchi *et al.* 2004). Marine surveys in Terra Nova Bay in the late 1980s yielded samples that suggested the northern part of the bay may represent a nursery ground for early stages of *P. antarcticum* (Guglielmo *et al.* 1998). From late October to early December 2002 large quantities of embryonated eggs of *P. antarcticum* were found floating among platelet ice under sea ice in northern Terra Nova Bay (Vacchi *et al.* 2004). This was the first documented nursery and hatching area of the Antarctic silverfish. Research conducted over subsequent years showed higher egg concentrations were consistently found within the embayment east of the Campbell Glacier Tongue (which led to naming this area Silverfish Bay), with greatest abundances in areas where the sea was at least 300 m in depth (Vacchi *et al.* 2012 in press) (Maps 1 & 2). Recent observations have revealed an abundance of *Pleuragramma* eggs beneath sea ice between Oscar Point and Cape Washington, indicating annual fluctuations in the abundance and spatial distribution of fish eggs in the Area (Vacchi pers. comm. 2012).

This and other research has indicated that habitats with particular combinations of geographic and oceanographic features and conditions (e.g. close ice shelf or glacier tongues, canyons, water mass stratification, polynyas, katabatic winds, and sea ice cover) are favorable for the early life history of the silverfish (Vacchi *et al.* 2012 in press, and references therein).

## *Birds*

The emperor penguin colony at Cape Washington is one of the two largest known; the other is the Coulman Island colony 200 km to the north. While in some years the Cape Washington population has exceeded that at Coulman Island, available data suggests that usually the latter is the slightly larger of the two (Barber-Meyer *et al.* 2008). The population generally ranges between approximately 13,000 and

25,000 breeding pairs (Table 1; Barber-Meyer *et al.* 2008). Data from earlier years indicate that live chick numbers have consistently remained around these levels since studies were initiated in 1986 (Kooyman *et al.* 1990).

Table 1. Cape Washington emperor penguin population 2000-05 and 2010.

<b>Year</b>	<b>Live chick count</b> <sup>1</sup>	<b>Estimated breeding pairs (approx.)</b>
2000	17397	20000
2001	18734	20000
2002	11093	13000
2003	13163	15000
2004	16700	20000
2005	23021	25000
2010	17000 <sup>2</sup>	20000

1. Barber-Meyer *et al.* 2008.

2. Kooyman pers. comm. 2012.

The emperor penguin colony breeds on sea ice that extends from Cape Washington to the Campbell Glacier Tongue in the northern part of Terra Nova Bay. Sea ice formation begins in March and the bay is generally covered by sea ice until ice break-up around mid-January. The Terra Nova Bay polynya generally offers the colony access to open sea throughout the breeding cycle.

The sea ice in the vicinity of the emperor breeding site may be covered with up to 25 cm of snow near the ice edge, with up to about 1 m of snow accumulating on the SW shoreline of the Cape Washington peninsula (Kooyman *et al.* 1990). This area is relatively sheltered from both SW and NW winds. The locality has been observed to enjoy relatively cloud-free conditions from October to January, resulting in elevated levels of direct solar irradiance. This causes the dirty guano-covered snow and ice to soften and melt, forming pools that are difficult or impossible for penguins, and humans, to walk through. As a result the birds need to shift their breeding sites regularly throughout the summer period. The incubating birds generally cluster adjacent to the SW coast of Cape Washington until September, before spreading away from the Cape in an expanding semi-circle.

The center of the incubation area in 1996 was approximately 165°22.0' E, 74°38.8' S. Observations in 1986-87 found the colony dispersed into several groups by the end of October, each containing 1000 to 2000 chicks with attendant adults (Kooyman *et al.* 1990). From the cape northward along the western coast of the peninsula, there was found to be a gradient in chick development, with the largest chicks in groups closest to the ice-edge near the cape. By the time of fledging some groups of chicks had moved 5 to 6 km away from the original breeding locality. In 1986-87 fledging occurred abruptly over a ten-day period at the end of December and the beginning of January.

There is evidence that the Cape Washington colony is comparatively stable in population and that it appears to enjoy relatively high levels of breeding success, averaging almost 95% of chicks successfully fledged over a six-year study period (Barber-Mayer *et al.* 2008). This compares with breeding successes of only around 60-70 % at the Point Geologie, Taylor Glacier and Auster colonies in the East Antarctic. The Cape Washington colony is particularly valuable for scientific study because of its comparative low variability in breeding success, which may be in part a function of its large size, with smaller colonies exhibiting greater population fluctuations (Barber-Mayer *et al.* 2008). Moreover, the colony is relatively accessible to nearby scientific stations, making research more practical.

A south polar skua (*Catharacta maccormicki*) colony comprising approximately 50 pairs is located on the ice-free slopes of Cape Washington, overlooking the emperor colony. Snow petrels (*Pagodroma nivea*) have been recorded as breeding in niches in the Cape Washington cliffs (Greenfield & Smellie 1992), feeding along the ice edge, and have been noted as the most abundant flying bird in the vicinity over the summer months (Kooyman *et al.* 1990). Adélie penguins (*Pygoscelis adeliae*) are observed along the ice

edge and within the emperor colony during summer months, while Wilson's storm petrels (*Oceanites oceanicus*) are frequently observed along the ice edge from mid- to late-November. Southern giant petrels (*Macronectes giganteus*) have been observed overflying and landing within the Area (Kooyman *et al.* 1990).

### *Mammals (seals, whales)*

Large groups of killer whales (*Orcinus orca*), with groups of up to 100 individuals, are regularly observed foraging in this area (Kooyman *et al.* 1990; Lauriano *et al.* 2010). Ecotype 'C' which typically forages on fish (e.g. Antarctic toothfish (*Dissostichus mawsoni*) and possibly Antarctic silverfish (*Pleuragramma antarcticum*) was the most common killer whale ecotype observed. A range of other cetaceans have also been observed, including minke whales (*Balaenoptera bonaerensis*), other *Balaenoptera* species, Arnoux's beaked whale (*Berardius arnuxii*) and other undetermined species (Lauriano *et al.* 2010). The Lauriano *et al.* (2010) study, carried out in January 2004, most frequently encountered killer whales, followed by minke whales. Significantly higher cetacean encounter rates were observed in the region between Edmonson Point and the Campbell Glacier Tongue than in the region further south from Mario Zucchelli Station to the Drygalski Ice Tongue, which emphasises the importance of northern Terra Nova Bay for these species.

Three species of seal – Weddell (*Leptonychotes weddellii*), leopard (*Hydrurga leptonyx*) and crabeater (*Lobodon carcinophagus*) – are common in the Area. The embayment is an important haul-out and breeding area for Weddell seals, which typically congregate along sea ice leads and openings that dynamically form throughout the season. At least 200 Weddell seals were recorded in the bay west of Cape Washington in 1986-87, with 31 pups counted near Markham Island (Kooyman *et al.* 1990), and a similar number of adults was counted in the same region from satellite imagery acquired in November 2011 (La Rue pers. comm. 2012).

Leopard seals (*Hydrurga leptonyx*) were recorded within the Area from mid-November through December in 1986-87, and were observed to prey on emperor penguins around the ice edge. Kooyman *et al.* (1990) estimated that the three individuals they monitored over this period would have taken approximately 150 – 200 adult birds, or about 0.5 % of breeding emperor adults at the colony. Crabeater seals were recorded on occasion at the ice edge or on nearby ice flows in the same season (Kooyman *et al.* 1990).

### *Human activities / impacts*

Two permanent scientific stations and one under construction are located at nearby Gerlache Inlet. Mario Zucchelli (164° 06.917' E, 74° 41.650' S; Italy), established in 1987, operates summer only with a complement of up to 90 personnel, which may sometimes be expanded when the support ship *Italica* is present in the region. Gondwana (164° 13.317' E, 74° 38.133' S; Germany), established in 1983, operates on occasional summers with capacity for approximately 25 personnel. Jang Bogo (164° 11.950' E, 74° 37.250' S; Republic of Korea) will be a new permanent station, designed to operate year-round with a complement of 15 winter personnel in the and up to 60 in summer when construction is completed in 2014. China recently announced plans to establish a new station at approximately 163° 42' E, 74° 55' S on nearby Inexpressible Island (China Daily USA 2013).

The Cape Washington emperor colony has been of interest for tourism for around 20 years, with an average of ~200 tourists visiting C. Washington per annum over the last decade. The colony has also been of interest for recreational visits by station personnel from nearby Mario Zucchelli Station since it was established. An area frequented by emperor penguins lies immediately south of the southern boundary of the Area at 74° 40' S (Maps 3 & 4). This region lies within the approximate 6 km buffer from the nominal centroid of the breeding colony within which the birds have been consistently observed when sea ice is present. This region outside of the protected area allows continued opportunities for tourism or recreational visits to view emperor penguins in the Cape Washington vicinity, and other opportunities exist at colonies elsewhere in the Ross Sea and Antarctica more generally.

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

The Area may be accessed by traversing over land or sea ice, by sea or by air. Particular access routes have not been designated over land or sea ice or for vessels entering the Area by sea. Access to Cape Washington by helicopter should follow the designated access route over the northern part of the Cape Washington peninsula. Overflight, aircraft landing and ship access restrictions apply within the Area, the specific conditions for which are set out in Section 7(ii) below.

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

There are no structures within the Area. Several geodetic reference markers have been established by the Italian Antarctic program at Markham Island and at Cape Washington on ice-free ground, and these are the only known permanent markers in the Area. Mario Zucchelli Station (164° 06.917' E, 74° 41.650' S; Italy) is situated ~13 km southwest of the western boundary of the Area on the southern shore of Gerlache Inlet (Map 2). Gondwana Station (164° 13.317' E, 74° 38.133' S; Germany) is located 8.7 km west of the western boundary of the Area, also in Gerlache Inlet and 7.2 km north of Mario Zucchelli Station. Jang Bogo Station (164° 11.95' E, 74° 37.25' S; South Korea, under construction) is planned to be located ~9 km west of the western boundary of the Area, ~1.8 km NW of Gondwana Station. A number of structures associated with national program operations are located nearby, such as a communications facility near the summit of Mount Melbourne, and several radar and non-directional beacons to assist summer air operations, although these are all outside of the Area.

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

The nearest protected areas to Cape Washington are Mount Melbourne (ASPA No.118) 23 km north of the northern boundary of the Area, Edmonson Point (ASPA No.165) 24 km north of the northern boundary of the Area, and Terra Nova Bay (ASPA No.161) 13 km from the western boundary of the Area.

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

This Management Plan establishes a Restricted Zone within the Area which applies during the period from 01 April through to 01 January inclusive.

#### *Restricted Zone*

The Restricted Zone is designated east of the line of longitude 165° 10' E and south of the line of latitude 74° 35.5' S (Map 3), which encompasses the primary emperor breeding area and is considered the most ecologically sensitive part of the Area. The Restricted Zone has an area of 62.5 km<sup>2</sup>. Access to the Restricted Zone should be for compelling reasons that cannot be served elsewhere within the Area and detailed conditions for access are described in Section 7(ii) below.

## **7. Permit conditions**

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

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

- it is issued only for scientific study of the ecosystem, or for compelling scientific or educational (such as documentary reporting or the production of educational resources or services) reasons that cannot be served elsewhere, 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, ecological and scientific values of the Area;

- access to the Restricted Zone is allowed only for compelling reasons that cannot be served elsewhere within 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 is permitted on foot or by vehicle, by ship or small boat, or by fixed-wing or rotor-wing aircraft.

*Access on foot or by vehicle*

No special access routes are designated for access to the Area on foot or by vehicle over sea ice or by land. Vehicles may be used over sea ice and glaciers although are prohibited from ice-free ground within the Area. Pedestrian and vehicular traffic should be kept to the minimum necessary consistent with the objectives of any permitted activities and every reasonable effort should be made to minimize disturbance. Vehicle use should be avoided within 100 m of concentrations of emperor penguins or Weddell seals, and permitted visitors should avoid entering penguin sub-groups or approaching seals except as required for essential scientific, educational or management purposes.

*Access by aircraft*

Resolution 2 (2004), the Guidelines for the Operation of Aircraft near Concentrations of Birds in Antarctica, should be followed at all times. Restrictions on aircraft operations apply during the period from 01 April through to 01 January inclusive, when aircraft shall operate and land within the Area according to strict observance of the following conditions:

- Aircraft landings within the Area are prohibited unless authorized by permit for purposes allowed for by the Management Plan;
- Overflight of the Restricted Zone below 2000 feet (~610 m) is prohibited, unless authorized by permit for purposes allowed for by the Management Plan;
- Aircraft landings on sea ice within ½ nautical mile (~930 m) of the emperor colony are prohibited. Pilots should note that the emperor colony may move throughout the breeding season up to six kilometers from the nominal center coordinate of the colony at 165°22' E, 74°38.8' S (Map 3), and the colony may break up into a number of smaller units within the Area;
- Aircraft landings on sea ice within ½ nautical mile (~930 m) of concentrations of Weddell seals are prohibited. Pilots should note that Weddell seals may be present throughout the Area, although tend to congregate along sea ice leads and around Markham Island (Map 3). In the context of management of the Area, a concentration is defined as five or more animals within 300 m of each other;
- Pilots shall ensure the aircraft maintains the minimum separation distance from any part of the emperor colony and / or any concentration of seals when operating over sea ice at all times, excepting when this is impractical because the animals have voluntarily moved closer to the aircraft after it has landed;
- Pilots making authorized landings beyond ½ nautical mile (~930 m) of the emperor colony and / or concentrations of seals may select landing sites according to visit needs, local conditions and safety considerations. Pilots should make a reconnaissance of suitable landing sites from above 2000 feet (~610 m) before descending to land;
- Landings by helicopter may be made on land within the Restricted Zone at Cape Washington. The preferred helicopter approach route to the cape is from the north over the Cape Washington peninsula, avoiding overflight of the emperor colony, breeding skua territories situated immediately west of the access route, and seabird breeding sites along the cliffs of the Cape Washington peninsula (Map 3). Pilots flying to the cape should follow the designated approach route to the maximum extent

practicable and abort the journey should it be likely that conditions would force a route that might lead to overflight of the emperor colony;

- Approaches by fixed wing aircraft to sea ice landing sites in Terra Nova Bay adjacent to Mario Zucchelli Station (Italy) (Map 2) should maintain designated approach paths and elevations as defined in the most recent edition of the Antarctic Flight Information Manual (AFIM). Should visibility or other conditions be prohibitive of maintaining these paths and / or elevations, pilots should ensure that alternative approaches adopted avoid exceeding the minimum overflight heights that apply within the Restricted Zone.

#### *Access by ship or small boat*

Restrictions on ship and / or small boat operations apply during the period from 01 April through to 01 January inclusive, when ships and / or small boats shall operate within the Area according to strict observance of the following conditions:

- Ships and / or small boats are prohibited from the Area, including entering sea ice within the Area, unless authorized by permit for purposes allowed for by this Management Plan;
- Ships are prohibited within the Restricted Zone;
- There are no special restrictions on where access can be gained to the Area by small boat, although small boat landings should avoid areas where penguins are accessing the sea unless this is necessary for purposes for which the permit was granted.

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

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

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

- No structures are to be erected within the Area except as specified in a permit and, with the exception of permanent survey markers and signs, permanent structures or installations are prohibited;
- All structures, scientific equipment or markers installed in the Area shall 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 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 the values of the Area;
- 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*

Permanent field camps are prohibited within the Area. Temporary camp sites are permitted within the Area. There are no specific restrictions on the precise locality for temporary camp sites within the Area, although it is recommended that initial sites selected should be more than 1000 m from concentrations of breeding emperor penguins. It is recognized that the birds move from their original breeding locations throughout the season. As the birds will subsequently set their own distance limits from any camp established, it is not considered necessary to keep moving the camp in response to the shifting positions of the emperor colony. It is recommended that camp sites be located approximately 500 m offshore from

the western coast of the Cape Washington peninsula because the near-shore area is subject to snow overburden and subsequent meltwater flooding. Camping within the terrestrial part of the Area is not restricted to a particular location, but where possible camp sites should be located on snow covered ground.

#### *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, footwear and other equipment used or brought into the area (including backpacks, carry-bags and tents) 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), and in the *Environmental Code of Conduct for terrestrial scientific field research in Antarctica* (SCAR 2009);
- Dressed poultry should be free of disease or infection before shipment to the Area and, if introduced to the Area for food, all parts and wastes of poultry shall be completely removed from the Area or incinerated or boiled long enough to kill any potentially infective bacteria or viruses;
- No herbicides or 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 minimises the risk of their accidental introduction into the environment;
- All materials introduced shall be for a stated period only and shall be removed by the end 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 and fauna is prohibited, except in accordance with a permit issued in accordance with 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 anything 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, and which was not brought into the Area by the permit holder or otherwise authorized, may be removed from 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, except human wastes, shall be removed from the Area. Small quantities of human wastes, such as arising from groups of no more than 10 people within a given season, may be disposed of onto annual sea ice or directly into the sea within the Area, or otherwise 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;
- install or maintain signposts, markers, structures or scientific equipment;
- carry out protective measures.

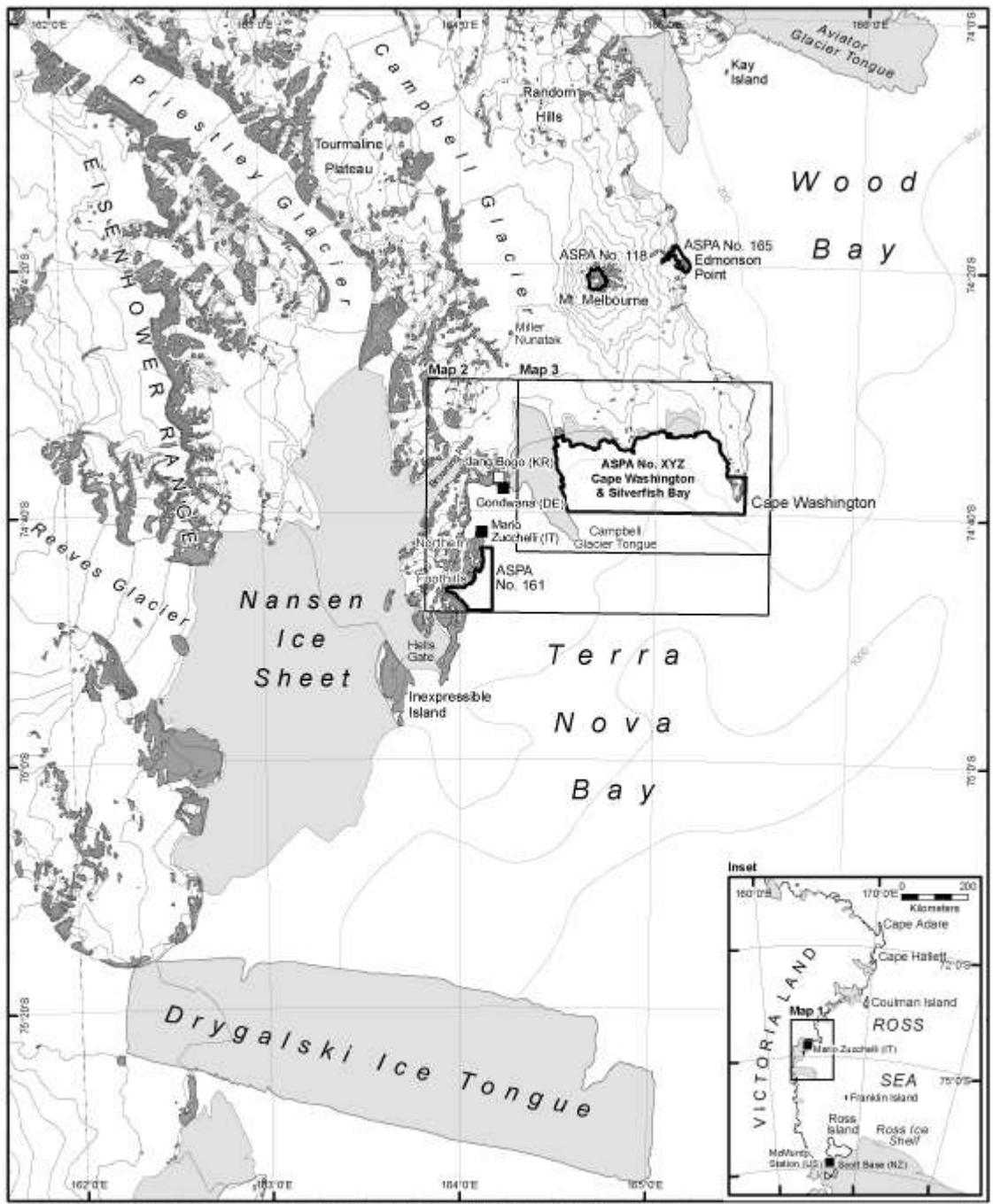
*7(xi) Requirements for reports*

- The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and no later than six months after the visit has been completed.
- Such reports should include, as appropriate, the information identified in the visit report form contained in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas. If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.
- 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 undertaken, and / or of any materials released and not removed, that were not included in the authorized permit.

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**Map 1: ASPA No. XYZ - Cape Washington & Silverfish Bay - Regional Map**

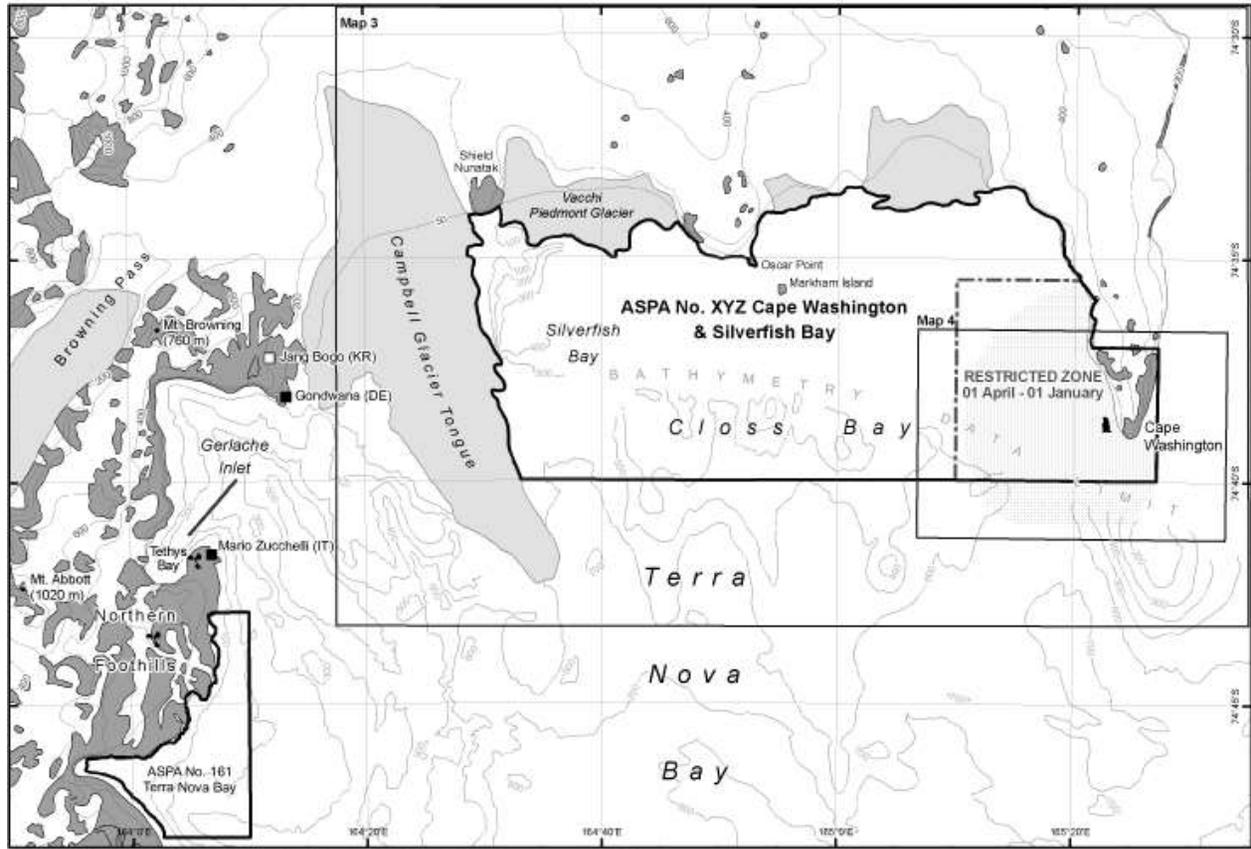
22 Mar 2013  
 United States Antarctic Program  
 Environmental Research & Assessment



- Contour (200 m)
- Bathymetry
- Ice free ground
- Permanent ice
- Ice shelf / Ice tongue
- Antarctic Specially Protected Area (ASPA) boundary
- Station
- Station under construction



Projection: Lambert Conic Conformal  
 Spheroid and Datum: WGS84  
 Data source: Data source  
 Topography: ACD + 5, Bathymetry: GEBCO (1997),  
 Stations: PNRA (2012)



**Map 2: ASPA No. XYZ - Cape Washington & Silverfish Bay - topographic map**

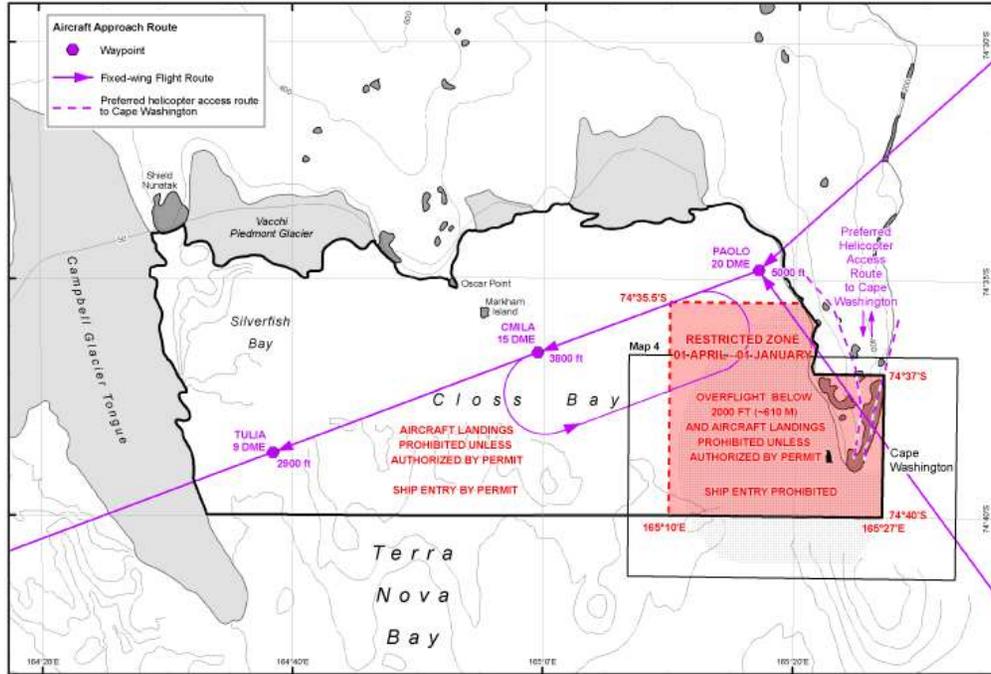
30 Mar 2013  
 United States Antarctic Program  
 Environmental Research & Assessment



- Risk
- Contour (200 m)
- Bathymetry (100 m)
- Ice free area
- Permanent ice
- Ice shelf / ice tongue
- Sea ice runway
- Antarctic Specially Protected Area (ASPA) boundary
- Restricted Zone
- Automatic weather station (AWS)
- Station
- Station (under construction)
- Usual Emperor penguin colony centroid
- Emperor breeding area (approx.)



Projection: Lambert Conic Conformal, Spheroid and Datum: WGS84  
 Data sources: Topography: ADD v 5; Bathymetry: PHRA (2000); Stations, AWS: PHRA (2012)



**Map 3: ASPA No. XYZ - Cape Washington & Silverfish Bay - Access guidance**

22 May 2012  
 Outer Outer Islands Program  
 Environmental Research & Assessment

- Peak
- Contour (300 m)
- Bathymetry (100 m)
- Ice-free area
- Permanent ice
- Ice shelf / ice tongue
- ▭ Antarctic Specially Protected Area (ASPA) boundary
- ▭ Restricted Zone
- ▭ Usual Emperor penguin colony centroid
- ▭ Emperor breeding area (approx.)

0 5 10 Kilometers

Projection: Lambert Conformal  
 Spheroid and Datum: WGS84  
 Data Source: SRTM30 PLUS  
 Topography: ADD v.5, Bathymetry: PHRA (2008)  
 Aircraft Approach: PHRA (2008)