Management Plan for Antarctic Specially Protected Area No. 165

EDMONSON POINT, WOOD BAY, VICTORIA LAND, ROSS SEA

1. Description of values to be protected

Edmonson Point (74°20' S, 165°08' E, 5.49 km^2), Wood Bay, Victoria Land, Ross Sea, is proposed as an Antarctic Specially Protected Area (ASPA) by Italy on the grounds that it has outstanding ecological and scientific values which require protection from possible interference that might arise from unregulated access. The Area includes ice-free ground and a small area of adjacent sea at the foot of the eastern slopes of Mount Melbourne (2732 m), which is of limited extent and is the subject of ongoing and long-term scientific research.

The terrestrial and freshwater ecosystem at Edmonson Point is one of the most outstanding in northern Victoria Land. An exceptional diversity of freshwater habitats is present, with numerous streams, lakes, ponds and seepage areas, exhibiting nutrient conditions ranging from eutrophic to oligotrophic. Such a range of freshwater habitats is rare in Victoria Land. Consequently, these habitats support a high diversity of algal and cyanobacterial species, with over 120 species so far recorded, and the stream network is the most extensive and substantial in northern Victoria Land. The volcanic lithology and locally nutrient-enriched (by birds) substrata, together with a localised abundance of water, provides a habitat for relatively extensive bryophyte development. Plant communities are highly sensitive to changes in the hydrological regime, and environmental gradients produce sharply defined community boundaries. Thus, the range of vegetation is diverse, and includes epilithic lichen communities, some of which are dependent on high nitrogen input from birds, communities associated with late-lying snow patches, and moss-dominated communities that favour continually moist or wet habitats. The site represents one of the best examples of the latter community-type in Victoria Land. Invertebrates are unusually abundant and extensively distributed for this part of Antarctica.

The nature and diversity of the terrestrial and freshwater habitats offer outstanding scientific opportunities, especially for studies of biological variation and processes along moisture and nutrient gradients. The site is considered one of the best in Antarctica for studies of algal ecology. These features were among those that led to the selection of Edmonson Point as a key site in the Scientific Committee on Antarctic Research's Biological Investigations of Terrestrial Antarctic Systems (BIOTAS) programme in 1995-96. A coordinated multinational research programme, known as BIOTEX-1, established study sites and made extensive collections of soil, rock, water, snow, guano, bacteria, vegetation (cyanobacterial mats, fungi, algae, lichens, bryophytes) and of terrestrial invertebrates.

The scientific value of Edmonson Point is also considered exceptional for studies on the impact of climate change on terrestrial ecosystems. Its location at approximately the mid-point in a north- south latitudinal gradient extending along Victoria Land is complementary to other sites protected for their important terrestrial ecological values, such as Cape Hallett (ASPA No. 106) and Botany Bay, Cape Geology (ASPA No. 154), which are about 300 km to the north and south respectively. This geographical position is recognised as important in a continent-wide ecological research network (e.g. the Scientific Committee on Antarctic Research 'RiSCC' programme). In addition, the lakes are among the best in northern Victoria Land for studies of biogeochemical processes with short- and long-term variations. Together with the unique properties of the permafrost active layer, which is unusually thick in this location, these features are considered particularly useful as sensitive indicators of ecological change in response to levels of UV radiation and in shifting climate.

A colony of approximately 2000 pairs of Adélie penguins (*Pygoscelis adeliae*) has been a focus of ongoing research since 1994-95 together with a colony of approximately 120 pairs of south polar skuas (*Catharacta maccormicki*). The Edmonson Point Adélie penguin colony is included in the ecosystem monitoring network of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). The site is considered a good example of this species assemblage, which is representative of those found elsewhere. It is unusual, however, for the diverse range of breeding habitat available for south polar skuas, and also because of the unusually high skua to penguin ratio (1:20). The geographical position, the size of the colonies, the terrain and habitat features of the site, the natural protection given by the summer fast ice extension and the distance from Mario Zucchelli Station at Terra Nova Bay (which isolates the colony from research station disturbance but allows for logistic support) make Edmonson Point particularly suitable for the research being undertaken on these birds. The research contributes to the CCAMLR Ecosystem Monitoring Programme (CEMP), focusing on population monitoring, reproductive success, feeding and foraging strategies, migration, and behaviour. This research is important to broader studies of how natural and human-induced variations in the Antarctic ecosystem may affect the breeding success of Adélie penguins, and to understand the potential impact of harvesting of Antarctic krill (*Euphausia superba*).

The near-shore marine environment is a good and representative example of the sea-ice habitat used by breeding Weddell seals to give birth and wean pups early in the summer season. Only one other ASPA in the Ross Sea region has been designated to protect Weddell seals (ASPA No. 137 Northwest White Island, McMurdo Sound), although this site is designated because the small breeding group of seals in that locality is highly unusual; in contrast, inclusion here is as a representative example similar to breeding sites throughout the region.

In addition to the outstanding biological values, a diversity of geomorphic features is present, including a series of ice-cored moraines incorporating marine deposits, raised beaches, patterned ground, a cuspate foreland, and fossil penguin colonies. The cuspate foreland at Edmonson Point is a rare feature in Victoria Land, and is one of the best examples of its kind. It is unusual in that it is not occupied by a breeding colony of penguins, as is the case at Cape Hallett and Cape Adare. The glacial moraines that incorporate marine deposits, including seal bones and shells of the bivalves *Laternula elliptica* and *Adamussium colbecki*, are particularly valuable for dating regional glacier fluctuations. Sedimentary sequences in the north-west of Edmonson Point contain fossils from former penguin colonies. These are useful for dating the persistence of bird breeding at the site, which contributes to reconstructions of Holocene glacial phases and palaeoclimate.

The wide representation and the quality of phenomena at Edmonson Point have attracted interest from a variety of disciplines and research has been carried out at the site for more than 20 years. Over this period, substantial scientific databases have been established, which adds to the value of Edmonson Point for current, on-going and future research. It is important that pressures from human activities in the Area are managed so that the investments made in these long-term data sets are not inadvertently compromised. These factors also make the site of exceptional scientific value for multi-disciplinary studies.

Given the duration and range of past activities, Edmonson Point cannot be considered pristine. Some environmental impacts have been observed, such as occasional damage to soils and moss communities by trampling, dispersal of materials from scientific equipment by wind, and alteration of habitat by construction of facilities. In contrast, the ice-free area at Colline Ippolito (Ippolito Hills) (1.67 km^2) approximately 1.5 km to the north-west, has received relatively little visitation and human disturbance at this site is believed to be minimal. As such, Colline Ippolito is considered particularly valuable as a potential reference area for comparative studies to the main Edmonson Point, and it is important that this potential scientific value is maintained. While the precise effects of scientific research and human presence at both sites are uncertain, because detailed studies on human impact have not yet been undertaken, contaminants in the local marine ecosystem remain

very low and human impacts on the ecosystem as a whole, particularly at Colline Ippolito, are considered to be generally minor.

The biological and scientific values at Edmonson Point and Colline Ippolito are vulnerable to human disturbance. The vegetation, water-saturated soils and freshwater environments are susceptible to damage from trampling, sampling and pollution. Scientific studies could be compromised by disturbance to phenomena or to installed equipment. It is important that human activities are managed so that the risks of impacts on the outstanding values of the Area are minimised.

The total Area of 5.49 km^2 comprises the ice-free area of Edmonson Point (1.79 km^2), the smaller but similar ice-free area at Colline Ippolito (1.12 km^2) approximately 1.5 km to its north which is designated a Restricted Zone, and the adjacent marine environment (2.58 km^2) extending 200 m offshore from Edmonson Point and Colline Ippolito and including Baia Siena (Siena Bay) (Map 1).

2. Aims and objectives

Management at Edmonson Point aims to:

- avoid degradation of, or substantial risk to, the values of the Area by preventing unnecessary human disturbance;
- allow scientific research while ensuring protection from mutual interference and/or over-sampling;
- allow scientific research provided it is for reasons which cannot reasonably be served elsewhere;
- protect sites of long-term scientific studies from disturbance;
- preserve a part of the natural ecosystem as a potential reference area for the purpose of future comparative studies;
- minimise the possibility of introduction of alien plants, animals and microbes to 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:

- Copies of this management plan, including maps of the Area, shall be made available at Mario Zucchelli Station at Terra Nova Bay (Italy), Gondwana Station (Germany), and at any other permanent stations established within 100 km of the Area;
- Structures, markers, signs, fences or other equipment erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer necessary;
- Durable wind direction indicators should be erected close to the designated helicopter landing sites whenever it is anticipated there will be a number of landings in a given season;
- Markers, which should be clearly visible from the air and pose no significant risk to the environment, should be placed to mark the designated helicopter landing sites;
- Markers, such as a series of durable sticks, should be placed to mark the preferred inland walking routes between the Adélie penguin colony and the designated helicopter landing sites;
- 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 Programmes operating in the region shall consult together with a view to ensuring these steps are carried out.

3(i) Management issues

Key management issues relate to the protection of potentially sensitive features, such as: moist soils that can be easily disturbed; the extensive but fragile vegetation cover; a variety of lakes and streams; two species of breeding birds and one breeding species of seal.

Priority issues are also the management of activities that may be harmful or interfere with fauna and flora including aircraft access, movements within the area, camping, facilities, installation/removal of equipment, use of materials, waste disposal and coordination of the multidisciplinary scientific activities.

Logistics constraints imposed restrictions to the study seasons that often started after penguins arrival at the colony. The necessity to decrease impacts for nesting penguins and skuas, made impossible to put in activity the CEMP research camp (Map 2 and 4). Moreover snow coverage and distance from the colony made difficult the use of the alternative camping site (site A Map 2). For this reason during the 2011 summer campaign, a new camp position, suitable for research activity with reduced impacts on birds, was identified. Its position, 74°19'44.58"S 165° 8'4.99"E, is near the helicopter landing site B (Map 2 and 4). The camp included 1 big apple, 1 toilet tent and 1 generator and some fuel drums for 40 days of autonomy and was removed at the end of the study season. It is recommended to use this location for future CEMP research activities.

4. Period of designation

Designated for an indefinite period.

5. Maps and photographs

Map 1: Edmonson Point ASPA No. 165, Wood Bay, Victoria Land, Ross Sea. Map specifications: Projection: UTM Zone 58S; Spheroid: WGS84; Ice-free areas and coastline derived from rectified Quickbird satellite image with a ground pixel resolution of 70 cm, acquired 04/01/04 by Programma Nazionale di Ricerche in Antartide (PNRA), Italy. Horizontal accuracy approx ±10 m; elevation information unavailable. Inset 1: the location of Wood Bay in Antarctica. Inset 2. The location of Map 1 in relation to Wood Bay and Terra Nova Bay. The location of Mario Zucchelli Station (Italy), Gondwana Station (Germany), and the nearest protected areas are shown.

Map 2: Edmonson Point, ASPA No. 165, Physical / human features and access guidelines. Map derived from digital orthophotograph with ground pixel resolution of 25 cm, from ground GPS surveys and observations, and from Quickbird satellite image (04/01/04).

Map specifications: Projection: Lambert Conformal Conic; Standard parallels: 1st 72° 40' 00" S; 2nd 75° 20' 00"S; Central Meridian: 165° 07' 00" E; Latitude of Origin: 74° 20' 00" S; Spheroid: WGS84; Vertical datum: Mean Sea Level. Vertical contour interval 10 m. Horizontal accuracy: ±1 m; vertical accuracy expected to be better than ±1 m.

Map 3: Restricted Zone, Colline Ippolito: Edmonson Point ASPA No. 165. Map derived from Quickbird satellite image (04/01/04). Map specifications as for Map 2, except for horizontal accuracy which is approx ±10 m, and elevation information is not available. Sea level is approximated from coastline evident in satellite image.

Map 4: Edmonson Point ASPA No. 165, topography, wildlife and vegetation. Map specifications as for Map 2, except for contour interval which is 2 m.

Map data and preparation: PNRA, Dipartimento di Scienze Ambientali (Università di Siena), Environmental Research & Assessment (Cambridge), Gateway Antarctica (Christchurch).

6. Description of the Area

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

GENERAL DESCRIPTION

Edmonson Point (74°20' S, 165°08' E) is a coastal ice-free area of 1.79 km^2 situated at Wood Bay, 50 km north of Terra Nova Bay, and 13 km east of the summit and at the foot of Mount Melbourne (2732 m), Victoria Land. The Area comprises a total of 5.49 km^2, including the entire ice-free ground of Edmonson Point (1.79 km^2), the separate ice-free area of Colline Ippolito (Ippolito Hills) (1.12 km^2) approximately 1.5 km north-west of Edmonson Point, and the nearshore marine environment and intervening sea of Baia Siena (Siena Bay) between these ice-free areas (2.58 km^2), which lie east and at the foot of the permanent ice sheet extending from Mount Melbourne (Map 1). Part of the glacier from Mount Melbourne separates the two ice-free areas on land. A broad pebbly beach extends the length of the coastline of Edmonson Point, above which cliffs rise up to 128 m towards the south of the Area. The topography of the Area is rugged, with several hills of volcanic origin of up to 134 m in height, and ice-free slopes rising to around 300 m adjacent to the ice sheet, although accurate elevation information in these areas is not currently available. Undulating ice-cored moraines, boulder fields and rock outcrops are separated by small ash plains and shallow valleys. The Area is dissected by numerous valleys and melt streams, with several small lakes, and seepage areas being common features throughout the Area. In the central region of Edmonson Point are several wide shallow basins, at about 25 m elevation, covered by fine scoria and coarse sand, mixed with extensive carpets of vegetation and areas of patterned ground. The northern coast of Edmonson Point is a cuspate foreland comprising several raised beaches.

The environmental character of Colline Ippolito is similar to that of Edmonson Point. This area has a narrow boulder beach backed by a ridge running parallel to the coast. Small meltwater streams run through shallow gullies and across flats into two lakes behind the coastal ridge in the north. Ridges and cones rise to about 200 m before merging with the snow fields and glaciers of Mount Melbourne in the south.

BOUNDARIES

The margin of the permanent ice sheet extending from Mount Melbourne is defined as the boundary in the west, north and south of the Area (Maps 1-3). The eastern boundary is marine, which in the southern half of the Area follows the coastline 200 m offshore from the southern to northern extremities of the ice-free area of Edmonson Point. From the northern extremity of Edmonson Point, the eastern boundary extends NW across Baia Siena for a distance of 2 km to a position 200 m due east from the coast of the northern extremity of Colline Ippolito. Baia Siena is thus enclosed within the Area. Boundary markers have not been installed because the ice sheet margin and the coast are obvious boundary references.

CLIMATE

No extended meteorological records are available for Edmonson Point, although annual data for McMurdo Station, Scott Base and Cape Hallett suggest the average mean temperature in the Edmonson Point vicinity would be around -16º C, and the mean annual snow accumulation about 20-50 cm, equivalent to 10-20 cm of water (Bargagli *et al.,* 1997). Short-term data are available for December 1995 – January 1996, collected during the BIOTEX 1 expedition. During this period temperatures ranged from -7º C to 10º C, with 0º C exceeded every day. Relative humidity was low (15-40% day, 50-80% night), precipitation occasional as light snow and wind speeds mostly low. From late January weather conditions deteriorated, with frequent subzero daytime temperatures, snow-fall and high winds. Data available for summer seasons in 1998-99 and 1999-00 from a weather station installed near the penguin colony suggest prevailing summer winds at Edmonson Point come from the east, southeast and south. Daily average wind speeds were generally in the range of 3-6 knots, with daily maximums usually being of 6-10 knots, occasionally reaching up to

25-35 knots. Daily average air temperatures ranged from around -15°C in October, -6°C in November, -2.5°C in December to -1°C in January, decreasing to -3.5°C again in February (Olmastroni, pers. comm., 2000). The highest daily maximum in the two summer periods was recorded as 2.6°C on 25 December 1998. The average air temperature recorded over both summers was approximately -4°C, while the average wind speed was 4.5 knots. Average daily relative humidity generally ranged between 40-60%.

GEOLOGY AND SOILS

The geology at Edmonson Point is derived from Cenozoic eruptive activity of Mount Melbourne (Melbourne Volcanic Province), part of the McMurdo Volcanic Group (Kyle, 1990), combined with glacial deposits from the marine-based ice sheet that covered much of the Victoria Land coastline during the last glacial maximum (7500 to 25000 years B.P) (Baroni and Orombelli, 1994). The volcanic complex at Edmonson Point is composed of a large subaerial tuff ring, scoria cones, lava flows, and subaquatic megapillow lava sequences (Wörner and Viereck, 1990). The rocks are mainly of basaltic and/or trachytic composition, and include various additional volcanic products, such as accumulations of tuffs, pumices and debris deposits (Simeoni *et al.,* 1989; Bargagli *et al.*, 1997). The ground surface is composed mainly of dry, coarse-textured volcanic materials with a low proportion of silt and clay (Bargagli *et al.,* 1997). These exposed surfaces, as well as beneath the surfaces of stones and boulders, are often coated with white encrustations or efflorescences of soluble salts. Most of the ground is dark-coloured, with brownish or yellowish patches of scoria and tuffite. Unstable scree is common on hill slopes, which are dry and mostly unvegetated. Valley and basin floors are covered by fine scoria and coarse sand (Bargagli *et al.,* 1999).

GEOMORPHOLOGY

A series of marine deposits are visible on the cuspate foreland at the northern extremity of Edmonson Point. The gently sloping raised beaches of the foreland are composed of differing ratios of sands, pebbles and boulders distributed over lava flows (Simeoni *et al.,* 1989). Numerous small crater-like pits, many containing melt-water or ice, can be observed just above the high tide mark in this locality; these are thought to have been formed by extreme tides and the melting of coastal ice accumulations. South of the cuspate foreland, volcanic bedrock exposures are common over much of the ground extending up to about 800 m inland from the coast, most evident in the prominent hills of about 120 m in height in the central northern part of Edmonson Point. A series of late-Pleistocene moraines and related tills lie on the western side of these exposures, with bands of Holocene ice-cored moraine, talus and debris slopes adjacent to the glacier ice which extends from Mount Melbourne (Baroni and Orombelli, 1994).

STREAMS AND LAKES

There are six lakes on Edmonson Point, ranging in length up to 350 m, and in area from approximately 1600 m^2 up to 15,000 m^2 (Map 2). Two further lakes occur behind the coastal ridge at Colline Ippolito, the largest of which is approximately 12,500 m^2 (Map 3). In addition, on Edmonson Point there are approximately 22 smaller ponds of diameters of less than 30 m (Broady, 1987). The larger ponds are permanently ice-covered, with peripheral moats forming during the summer. Detailed physico-chemical characteristics and limnology of the lakes of Edmonson Point are reported in Guilizzoni *et al*. (1991). There are numerous streams throughout the Area, some of which are supplied with meltwater from the adjacent ice sheet, while others are fed by lakes and general ice / snow melt. Several stream beds have flood terraces of fine soil covered by pumice-like pebbles of 5-10 mm diameter. Many of the streams and pools are transient, drying up shortly after the late snow patches in their catchments disappear.

PLANT BIOLOGY

Compared to several other sites in central Victoria Land, Edmonson Point does not have a particularly diverse flora, and there are only a few extensive closed stands of vegetation. Six moss species, one liverwort, and at least 30 lichen species have been recorded within the Area (Broady,

1987; Lewis Smith, 1996, 1999; Lewis Smith pers. comm., 2004; Castello, 2004). Cavacini (pers. comm., 2003) noted that recent analyses have identified at least 120 alga and cyanobacteria species present at Edmonson Point. These are present in a range of forms including algal mats on soil and as epiphytes on mosses, and in a range of habitats such as in lakes, streams and snow, and on moist ornithogenic and raw mineral soils. At the onset of summer, snow melt reveals small stands of algae and moss on valley floors, although much of these lie buried by up to 5 cm of wind-blown and melt-washed fine mineral particles. This community is capable of rapid growth during December, when moisture is available and soil temperatures are relatively high, bringing shoot apices up to a centimetre above the surface as the surface accumulation of sand is washed or blown away. Increased water flow or strong winds can quickly bury these stands, although sufficient light for growth can penetrate 1-2 cm below the surface (Bargagli *et al.,* 1999).The principal moss communities occur on more stable substrata which are not subjected to burial by sand, for example in sheltered depressions or along the margins of ponds and meltwater streams, and seepage areas below late snow beds where moisture is available for several weeks. Some of these are among the most extensive stands found in continental Antarctica, being of up to 3000 m^2, most notably the stand of *Bryum subrotundifolium* (= *B. argenteum*) several hundred metres west of the main Adélie colony (Map 4). Other, less extensive, notable stands occur near the lake adjacent to the Adélie colony (Map 4), and smaller localized stands of *Ceratodon purpureus* (with relatively thick deposits of dead organic material) being found in a valley in the north of Edmonson Point and in the upper area of the principal stream in the northern ice-free area. Greenfield *et. al*. (1985) suggested that, apart from Cape Hallett, no area in the Ross Sea has a comparable abundance of plants, although in 1996 a similarly extensive area colonised almost exclusively by *Bryum subrotundifolium* (= *B. argenteum*) was discovered on Beaufort Island (ASPA No. 105), approximately 280 km to the south of Edmonson Point.

The moss-dominated communities comprise up to seven bryophyte species, several algae and cyanobacteria and, at the drier end of the moisture gradient, several lichens encrusting moribund moss (Lewis Smith, 1999; Bargagli *et al.,* 1999). There are mixed communities or zones of *Bryum subrotundifolium* (= *B. argenteum*), *B. pseudotriquetrum* and *Ceratodon purpureus*. In some wetter sites the liverwort *Cephaloziella varians* occurs amongst *C. purpureus*. Dry, very open, often lichen-encrusted moss communities usually contain *Hennediella heimii*, and often occur in hollows which hold small late snow patches. *Sarconeurum glaciale* occurs in a stable scree above the large lake in the south of the Area (Lewis Smith, 1996). The upper portions of moss colonies are often coated with white encrustations of soluble salts (Bargagli *et al.,* 1999).

The lichen communities are relatively diverse, with 24 species identified and at least six crustose species so far unidentified, although few are abundant (Castello, 2004; Lewis Smith, pers. comm. 2004). Epilithic lichens are generally sparse and not widespread, being mainly crustose and microfoliose species restricted to rocks used as skua perches and occasionally on stable boulders in scree, moist gullies and temporary seepage areas. Macrolichens are scarce, with *Umbilicaria aprina* and *Usnea sphacelata* found in a few places. The former species is more abundant on the gently sloping intermittently inundated outwash channels of Colline Ippolito, together with *Physcia* spp. and associated with small cushions of *Bryum subrotundifolium* (= *B. argenteum*) (Given, 1985, 1989), *B. pseudotriquetrum* and *Ceratodon purpureus* (Lewis Smith, pers comm. 2004). *Buellia frigida* is the most widespread crustose lichen on the hard lavas, but a distinct community of nitrophilous species occurs on rocks used as skua perches (*Caloplaca, Candelariella, Rhizoplaca, Xanthoria*). In gravelly depressions below late snow beds, moss turves are often colonised by encrusting cyanobacteria and ornithocoprophilic lichens (*Candelaria, Candelariella, Lecanora, Xanthoria*) and, where there is no bird influence, by the white *Leproloma cacuminum* (Lewis Smith, 1996).

Early work on the algal flora at Edmonson Point identified 17 species as Cyanophyta, 10 as Chrysophyta and 15 as Chlorophyta (Broady, 1987). More recent analyses (Cavacini, pers. comm., 2003) have identified 120 alga and cyanobacteria species, which is considerably more than the

numbers of species of Cyanophyta (28), Chlorophyta (27), Bacillariophyta (25) and Xanthophyta (5) recorded previously (Cavacini, 1997, 2001; Fumanti *et al.*, 1993, 1994a, 1994b; Alfinito *et al.*, 1998). Broady (1987) observed few areas of algal vegetation on ground surfaces; the most extensive were oscillatoriacean mats in moist depressions in areas of beach sand, which may have been temporary melt ponds prior to when the survey was undertaken. Similar mats were found adjacent to an area of moss with a *Gloeocapsa* sp. as an abundant associate. *Prasiococcus calcarius* was observed in the vicinity of the Adélie penguin colony, both as a small area of rich green crusts on soil and growing on an area of moribund moss cushions. Other epiphytic algae include Oscillatoriaceae, *Nostoc* sp., unicellular chlorophytes including *Pseudococcomyxa simplex*, and the desmid *Actinotaenium cucurbita*. Substantial stream algae were observed with waters containing oscillatoriacean mats over the stream beds, wefts of green filaments attached to the surface of stones (mainly *Binuclearia tectorum* and *Prasiola* spp.), small ribbons of *Prasiola calophylla* on the under-surfaces of stones, and dark brown epilithic crusts of cyanophytes (dominated by *Chamaesiphon subglobosus* and *Nostoc* sp.) coating boulders. Ponds present in beach sand contained *Chlamydomonas* sp. and cf. *Ulothrix* sp., while ponds fertilized by penguin and skua guano contained *Chlamydomonas* sp. and black benthic oscillatoriacean mats. Other ponds also contained rich benthic growths of Oscillatoriaceae, frequently associated with *Nostoc sphaericum*. Other abundant algae were *Aphanothece castagnei*, *Binuclearia tectorum*, *Chamaesiphon subglobosus*, *Chroococcus minutus*, *C. turgidus*¸ *Luticola muticopsis*, *Pinnularia cymatopleura*, *Prasiola crispa* (particularly associated with penguin colonies and other nitrogen-enriched habitats), *Stauroneis anceps*, various unicellular chlorophytes, and – in the highest conductivity pond in beach sand – cf. *Ulothrix* sp.

Algae and cyanobacteria are locally abundant in moist soils, and filaments and foliose mats of *Phormidium* spp. (dominant on patches of wet ground and in shallow lake bottoms), aggregates of *Nostoc commune* and a population of diatoms have been identified (Wynn-Williams, 1996; Lewis Smith pers. comm., 2004). The fungal species *Arthrobotrys ferox* has been isolated from moss species *Bryum pseudotriquetrum* (= *B. algens*) and *Ceratodon purpureus*. *A. ferox* produces an adhesive secretion which has been observed to capture springtails of the species *Gressittacantha terranova* (about 1.2 mm in length) (Onofri and Tosi, 1992).

7. Scientific values

7(i) Invertebrate

There is a high diversity of soil nematodes in the moist soils at Edmonson Point when compared to other areas described in Victoria Land. Nematodes found at Edmonson Point include *Eudorylaimus antarcticus*, *Monhysteridae* sp., *Panagrolaimus* sp., *Plectus antarcticus*, *P. frigophilus*, and *Scottnema lyndsayea* (Frati, 1997; Wall pers. comm., 2000). The latter species, previously only known from the McMurdo Dry Valleys, was found at Edmonson Point in 1995-96 (Frati, 1997). Less abundant are the springtails, most commonly *Gressittacantha terranova*, which was found under rocks and on soil and mosses in a number of moist microhabitats (Frati, 1997). Red mites (likely to be either *Stereotydeus* sp. or *Nanorchestes*, although species not identified) are common in aggregations beneath stones in moist habitats, and Collembola, rotifers, tardigrades and a variety of protozoans are also found (Frati *et al.*, 1996; Lewis Smith, 1996; Wall pers. comm., 2000; Convey pers. comm., 2003).

7(ii) Breeding birds

Adélie penguins (*Pygoscelis adeliae*) breed in two groups near the coast in the central and eastern-most part of Edmonson Point, occupying an area of about 9000 m^2 (Map 4). The number of breeding pairs recorded between 1981-2005 is summarised in Table 1, the average number in this period being 2080. In 1994-95 the majority of birds were recorded to arrive around 30-31 October, while the majority of the season's chicks had fledged by 12 February, with fledging complete by 21

February (Franchi *et al.*, 1997). An abandoned nesting site, occupied approximately 2600-3000 years ago, lies about 1 km to the northwest of the current colony, on bedrock adjacent to the cuspate foreland (Baroni and Orombelli, 1994).

Table 1. Adélie penguins (breeding pairs) at Edmonson Point 1981-2005 (data Woehler, 1993; Olmastroni, 2005, *pers. comm*.).

Year	No. of breeding pairs	Year	No. of breeding pairs
1981	1300	1995	1935
1984	1802	1996	1824
1987	2491	1997	1961
1989	1792	1999	2005
1991	1316	2001	1988
1994	1960	2003	2588
		2005	2385
		2007	2303
		2010	2112
		2016	2704

Between 2005 and 2010 according to CEMP procedures, three population counts were made at Edmonson Point, the colony consisting of 2385, 2303 and 2112 occupied nests in 2005, 2007 and 2010 respectively.

The average number since the beginning of the research program being 2112. Thus total population seem stable with respect to the average value 2080 from 1994 to 2005.

The colony, in the last count carried out in November 2016, consists of 3066 breeding pairs distributed in 11 under colonies (data sent to the CCAMLR in June 2016).

The population of skua (Stercorarius maccormicki) was evaluated in about 100 breeding pairs in the whole area, slightly less do as reported by Pezzo *et al*, (2001), although sufficiently in line with that reported by Piece et al, (2001) regarding the relationship between skuas and penguins of about 1:20.

The ratio between skua and penguin remained high (1:20) as previously reported by Pezzo *et al*, (2001). Edmonson Point's skua population nearby Adélie penguin colony remained stable through years consisting of about 130 breeding pairs in the 2010 summer season. Also at Edmonson Point North and South 55 and 61 breeding pairs respectively , were counted in 2010 summer season.

A breeding colony of south polar skuas (*Catharacta maccormicki*) within the Area is one of the most numerous in Victoria Land, with over 120 pairs, of which 36 pairs occupy Colline Ippolito (CCAMLR, 1999; Pezzo *et al*., 2001; Volpi pers. comm. 2005). . Furthermore the Area includes two "club sites", nearby large freshwater ponds, used throughout the breeding seasons by groups of non-breeders ranging between 50 and 70 individuals (Pezzo 2001; Volpi 2005 pers. comm.). Flocks of snow petrels (*Pagodroma nivea*) have been observed flying over the Area, and Wilson's storm petrels (*Oceanites oceanicus*) have been sighted regularly. Neither of these latter two species is known to breed within the Area.

Penguin Nest Camera (NC49)

The System of Digital images PNC49 (Australian Antarctic Division) was installed at Edmonson Point during the 2014-15 antarctic campaign. This tool allows, through the acquisition of images remotely the monitoring of area with about 30 nests of control, external to the APMS area. The Penguin Nest Room, reactivating autonomously after the winter season, thanks to the solar panel and batteries, has allowed us to observe the first arrival into the reproductive area to the 20/10/2015.

All images were collected and sent to colleagues of the Australian Antarctic Division, to become part of an international database for research on reproductive phenology of the Adelie penguin.

7(iii) Breeding mammals

At Edmonson Point numerous (>50) Weddell seals (Leptonychotes weddellii) regularly breed in the near shore marine environment (on fast ice) within the Area. Females use this area to give birth and raise pups on the fast ice along the coastline of the whole Area. Later in the summer Weddell seals frequently haul out on beaches within the Area.

8. Scientific Research

8(i) CCAMLR Ecosystem Monitoring Programme (CEMP) Studies

1. The presence at Edmonson Point of breeding penguin colonies and the absence of krill fisheries within their foraging range make this a critical site for comparative studies and inclusion with other CEMP sites in the ecosystem monitoring network established to meet the objectives of CCAMLR. The purpose of protected area designation is to allow planned research and monitoring to proceed, while avoiding or reducing, to the greatest extent possible, other activities which could interfere with or affect the results of the research and monitoring programme of alter the natural features of the site.

2. The Adélie penguin is a species of particular interest for CEMP routine monitoring and directed research at this site. For this purpose the Adélie Penguin Monitoring Program, a joint research project between Italian and Australian biologists, has been ongoing at Edmonson Point since 1994-95. An Automated Penguin Monitoring System (APMS) along with on-site observations by researchers, forms the basis of a study of at least 500-600 nests within the northern sector of the colony as part of the CEMP (CCAMLR, 1999; Olmastroni *et al*., 2000). Fences have been installed to direct penguins over a bridge which registers their weight, identity and crossing direction as they move between the sea and their breeding colony.

3. Parameters routinely monitored include trends in population size, demography, duration of foraging trips, breeding success, chick fledging weight, chick diet and breeding chronology.

4. The studies on Adélie penguin also involve population monitoring, experiments with satellite transmitters and temperature-depth recorders to investigate foraging location and duration. Combined with stomach flushing to record the diet of monitored penguins, this programme is developing comprehensive observations of Adélie penguin feeding ecology (Olmastroni, 2002). Diet data (Olmastroni *et al*., 2004) confirmed the results of studies from krill distribution in the Ross Sea (Azzali and Kalinowski, 2000; Azzali *et al.*, 2000) and indicate that this colony is located at a transition point in the availability of *E. superba* between northern and more southerly colonies where this species is absent or rare in the diet of penguins (Emison, 1968; Ainley, 2002). These studies also highlighted the importance of fish to the diet of the Adélie penguin, which represented up to 50% of stomach contents in some years.

Local sea ice and weather data contribute to the understanding of possible factors affecting the breeding biology of this species (Olmastroni *et al*., 2004). Moreover behavioural studies are also part of the research (Pilastro *et al.*, 2001).

Research on the south polar skua colony focuses on breeding biology (Pezzo *et al*., 2001), population dynamics, biometry, reproductive biology and migratory patterns. Since 1998/99 more than 300 south polar skuas have been banded by metal and coloured rings, which facilitate field research that requires the recognition of individual birds and will allow for identification of birds migrating from the Area.

8(ii) Scientific Research after 2005

Ecology of marine birds and CCAMLR Ecosystem Monitoring Programme (CEMP) Studies.

The studies on Adélie penguin population involved demographic parameters that were estimated in relation to individual characteristics (sex and age) and to large scale (Ross Sea winter ice extent anomalies and SOI) and local scale (food availability) environmental variables. While large-scale environmental factors affected adult survival, breeding success varied principally according to local variables. Breeding success was particularly low when local stochastic events (storms) occurred at sensitive times of the breeding cycle (immediately after the hatching) (Olmastroni et al. 2004; Pezzo et al, 2007; Ballerini et al., 2009). Also changes in fast-ice extent in front of the breeding area influenced the adult breeders transit times between colony and foraging grounds, and females conducted longer foraging trips, dived for longer periods and made more dives than males. The diving parameters were affected neither by the sex nor by the year, but differed between the breeding stages (Nesti et al, 2010). Annual adult survival probability at Edmonson Point (0.85, range 0.76– 0.94) was similar to that estimated from other Adélie penguin populations in which individuals were marked with passive transponders. An annual average survival rate of 0.85 seems to be typical of the species and is consistent with an expected average lifespan of about 11 years (6.6 years after adulthood) (Ballerini et al., 2009).

Some aspects of the breeding biology of the south polar skua, during five seasons are under investigation being the subject of a doctoral thesis that is being carried out at University of Siena (A. Franceschi, Aspetti della Biologia riproduttiva dello Stercorario di McCormick, *Stercorarius maccormicki*).

Related projects to the vegetation

At Edmonson Point, over the past five years, several research projects on issues related to the vegetation were started.

1) long-term monitoring: installation of n. 3 permanent plot for the monitoring of long-term vegetation, permafrost and soil thermal regime (period of the plot installation 2002)

2) analysis of the CO2 streams: the analyzes were carried out using CO2 portable analyzers (IRGA) by selecting different types of vegetation cover in the vicinity of the long-term monitoring sites

3) during the 2014/2015 campaign, we have fitted manipulation experiments for the study of potential future impacts of climate change. These experiments were made (and are still in progress) along a latitudinal gradient from Finger Point (77 ° S) at Apostrophe Island (73 ° S). For these experiments Edmonson Point is the master site is the site with the largest number of complex experiments and the replicas. In all sites for each experiment it was carried out a plot of treatment accompanied by a control plot (undisturbed).
The types of manipulation are as follows:
a) An increase of the temperature using open top chambers (OTC) according to the protocol ITEX (International Tundra EXperiment);
b) canopies for the exclusion of the precipitation;
c) barriers for redistribution of the snowpack by wind (Snow fences).
In addition to these manipulations related to the physical environment they were implemented manipulations of the regime of water / snow / nutrients. In particular, the additions include: A) the snow; B) liquid water; C) N-NO3; D) N-Urea; E) P-PO4; F) Guano.

4) further molecular analyzes are being carried out relatively to the phylogeny and filogrografia of mosses of the genus Bryum pan-Antarctic level also using samples of biological material collected at Edmonson Point.

8(iii) Other Scientific Activities

Studies of terrestrial ecology at Edmonson Point were initiated in the 1980s, although this type of research and other forms of science increased in the 1990s, in particular by Italian scientists. Edmonson Point was the location of BIOTEX 1, the first SCAR Biological Investigation of Antarctic Terrestrial Ecosystems (BIOTAS) research expedition, during December 1995 and January 1996. Ten researchers from three countries participated in a variety of scientific projects which included: taxonomic, ecological, physiological and biogeographical studies on cyanobacteria, algae, bryophytes, lichens (including chasmolithic and endolithic communities), nematodes, springtails and mites; studies of soil and freshwater biogeochemistry; microbial metabolic activity and colonisation studies; and investigations into the photosynthetic responses to ambient and controlled conditions of mosses, lichens and plant pigments that may act as photoprotectants (Bargagli, 1999). While the BIOTAS programme has now formally concluded, it is expected that further studies of this type will be on-going at Edmonson Point.

9. Human Activities/Impacts

Edmonson Point was probably first visited on 6 February 1900 when Carsten Borchgrevink landed just north of Mount Melbourne on "a promontory almost free of snow .... about 100 acres in extent" and climbed about 200 m up the slopes (Borchgrevink, 1901: 261). The Wood Bay region was rarely mentioned during the following 70 years, and presumably was visited only infrequently. Activity in the area increased in the 1980s, first with visits by the GANOVEX expeditions (Germany). Botanical research was undertaken in December 1984 (Given, 1985; Greenfield *et. al*., 1985; Broady, 1987) and in January 1989, at which time the first proposals for special protection of the site were made (Given pers. comm. 2003). Italy established a station in close proximity at Terra Nova Bay in 1986-87 and increased research interest in the site followed.

The modern era of human activity at Edmonson Point has been largely confined to science. The impacts of these activities have not been described, but are believed to be minor and limited to items such as campsites, footprints, markers of various kinds, human wastes, scientific sampling, handling of limited numbers of birds (e.g. installation of devices to track birds, stomach lavage, biometric measurements, etc), and potentially some impacts associated with helicopter access and installation and operation of camp and research facilities at the penguin colony and on the northern cuspate foreland. At least one fuel spill of around 500 ml, and other smaller spills, were reported in 1996 as a result of refuelling operations at the generator and fuel store located at the penguin colony (see disturbed sites marked on Map 4). In addition, seaborne litter is occasionally washed onto beaches within the Area. The Restricted Zone at Colline Ippolito has received less human activity than Edmonson Point and impacts in this area are expected to be negligible.

9(i) Restricted and managed zones within the Area

Restricted Zone

The ice-free area of Colline Ippolito (1.12 km^2) approximately 1.5 km north-west of Edmonson Point is designated as a Restricted Zone in order to preserve part of the Area as a reference site for future comparative studies, while the remainder of the terrestrial Area (which is similar in biology, features and character) is more generally available for research programmes and sample collection. The northern, western and southern boundaries of the Restricted Zone are defined as the margins of the permanent ice extending from Mount Melbourne, and are coincident with the boundary of the Area (Maps 1 and 3). The eastern boundary of the Restricted Zone is the mean low water level along the coastline of this ice-free area.

Access to the Restricted Zone is allowed only for compelling scientific reasons or management purposes (such as inspection or review) that cannot be served elsewhere within the Area.

9(ii) Structures within and near the Area

CEMP Site: A fibreglass cabin for field observation, containing instrumentation and APMS panel, and two Nunsen huts for 4 people were installed by PNRA in 1994/95 to support CEMP research. These structures are located on a rocky knoll at an elevation of 16 m, 80 m from the coast and 40 m south of the northern sub-colony of penguins (Maps 2 and 4). At the beginning of each field season a generator and a number of fuel drums are temporarily stored about 20 m from the camp and removed at the end of each season. Adjacent to the northern penguin sub-colony, fences of metal net (30-50 cm) have been installed to direct penguins over the APMS weigh bridge.

Other activities: Approximately 50 plastic cloches were installed at 10 locations throughout the Area in 1995-96 as part of BIOTEX-1 (Maps 2 and 4). A number of additional cloches were installed the previous year at four locations (Wynn-Williams, 1996). It is not precisely known how many of these cloches remain within the area. Temporary camp facilities were installed at the location of the designated camp site for the duration of the BIOTEX-1 programme, which have now been removed.

During the thirtieth Italian Antarctic expedition has been removed much of the fence surrounding the colony D (Map 4) and the underlying part. It 'been completely eliminated the barrier in the valley under the Automated Penguin Monitoring System (APMS), by limiting only to the fence surrounding the APMS. We have so improved and freed the area from several meters of the fence and over 40 iron bolts that were in the ground. (Map 4).

On 28 October 2016, during the Antarctic campaign XXXII, the old field has been reclaimed: were removed two fuel drums and the Nansen Hut located near the apple. Then remains the apple, APMS and outbuildings, the weather station and the Penguin Nest Camera at A,B observation points (Map 4)

The nearest permanent stations are Mario Zucchelli Station at Terra Nova Bay (Italy), Gondwana Station (Germany) and Jang Bogo Station (Republic of Korea) which lie approximately 50, 44 and 43 Km south respectively.

9(iii) Location of other protected areas within close proximity of the Area

The nearest protected areas to Edmonson Point are the summit of Mount Melbourne (ASPA No. 118), which lies 13 km to the west, and a marine area at Terra Nova Bay (ASPA No. 161), which lies approximately 52 km to the south (Map 1, Inset 2).

10. 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 research on the Area, or for compelling scientific reasons that cannot be served elsewhere; or
- it is issued for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- access to the Restricted Zone is allowed only for compelling scientific reasons or management purposes (such as inspection or review) that cannot be served elsewhere within the Area;
- the actions permitted will not jeopardise the ecological or scientific values of the Area;
- any management activities are in support of the objectives of the Management Plan;
- the actions permitted are in accordance with the Management Plan;

- the Permit, or an authorised copy, shall be carried within the Area;
- a visit report shall be supplied to the authority named in the Permit;
- Permits shall be issued for a stated period.
- The appropriate authority should be notified of any activities/measures undertaken that were not included in the authorised Permit.

10(i) Access to and movement within the Area

Access to the Area shall be by small boat, on foot or by helicopter. Movement over land within the Area shall be on foot or by helicopter. Access to the Area by vehicle is restricted according to the conditions described below.

Small boat access

The Edmonson Point part of the Area may be entered at any point where pinnipeds or seabird colonies are not present on or near the beach. Access for purposes other than CEMP research should avoid disturbing pinnipeds and seabirds (Map 1 and 2). There are no special restrictions on landings from the sea, although when accessing the main ice-free area of Edmonson Point visitors shall land at the northern cuspate foreland and avoid landing at breeding bird colonies (Map 2).

Restricted conditions of vehicle access

Use of vehicles within the Area is prohibited, except at the southern boundary of the Area where they may be used on sea ice to gain access to the shore, from where visitors shall proceed on foot. Thus, vehicle use shall avoid interference with animal feeding routes and the Adélie penguin colony. When using vehicles on sea ice care should be exercised to avoid Weddell seals which may be present: speed should be kept low and seals shall not be approached by vehicle closer than 50 m. Access over land by vehicles is allowed to the boundary of the Area. Vehicle traffic shall be kept to the minimum necessary for the conduct of permitted activities.

Aircraft access and overflight

All restrictions on aircraft access and overflight stipulated in this plan shall apply during the period 15 October – 20 February inclusive. Aircraft may operate and land within the Area according to strict observance of the following conditions:

(i) All overflight of the Area for purposes other than access shall be conducted according to the height restrictions imposed in the following table:

Minimum overflight heights within the Area according to aircraft type

Aircraft type	Number of Engines	Minimum height above ground	
		Feet	Metres
Helicopter	1	*2461*	750
Helicopter	2	*3281*	1000
Fixed-wing	1 or 2	*1476*	450
Fixed-wing	4	*3281*	1000

(ii) Helicopter landing is normally allowed at only three designated sites (Maps 1-4). The landing sites with their coordinates are described as follows:

(A) shall be used for most purposes, located on the northern cuspate foreland of Edmonson Point (Map 2) (74°19'24"S, 165°07'12"E);

(B) is allowed in support of the Adélie Penguin Monitoring Programme when necessary for transport of heavy equipment / supplies (Map 2) (74°19'43"S, 165°07'57"E); and

(C) is allowed for access to the Restricted Zone, located at the northern ice-free area (Colline Ippolito, Map 3) (74°18'50"S,165°04'29"E).

(iii) In exceptional circumstances, helicopter access may be specifically authorised elsewhere within the Area for the purpose of supporting science or management according to conditions imposed by the Permit on access location(s) and timing. Landing of helicopters at sites of mammals and seabird sites and significant vegetation shall be avoided at all times (Maps 2-4).

(iv) The designated aircraft approach route is from the west of the Area, from over the lower eastern ice slopes of Mount Melbourne (Maps 1-3). Aircraft shall approach the main designated landing site (A) on the cuspate foreland from the north-west over or near Baia Siena (Siena Bay). When appropriate, access to landing site (B) should follow the same route and proceed a further 700 m SE. The departure route is identical in reverse.

(v) When appropriate, access to landing site (C) should be from the lower eastern ice slopes of Mount Melbourne and proceed directly to the landing site from the south over the land or where this is not feasible over Baia Siena (Siena Bay), avoiding skuas nesting to the north of the landing site;

(vi) Use of smoke grenades to indicate wind direction is prohibited within the Area unless absolutely necessary for safety, and any grenades used should be retrieved.

Foot access and movement within the Area

Movement on land within the Area shall be on foot. Visitors should move carefully so as to minimise disturbance to the breeding birds, soil, geomorphological features and vegetated surfaces, and should walk on rocky terrain or ridges if practical to avoid damage to sensitive plants and the often waterlogged soils. Pedestrian traffic should be kept to the minimum consistent with the objectives of any permitted activities and every reasonable effort should be made to minimise trampling effects. Pedestrians that are not undertaking research or management related to the penguins shall not enter the colonies and should maintain a separation distance from the breeding birds of at least 15 m at all times. Care should be exercised to ensure monitoring equipment, fences and other scientific installations are not disturbed.

Pedestrians moving between the helicopter landing sites (A) or (B) to the Adélie colony shall follow the preferred walking routes marked on Maps 2 and 4 or follow a route along the beach.

10(ii) Activities that are or may be conducted in the Area, including restrictions on time or place

- The research programme associated with the CCAMLR CEMP
- Scientific research that will not jeopardise the ecosystem of the Area;
- Essential management activities, including monitoring.

10(iii) Installation, modification or removal of structures

No structures are to be erected within the Area except as specified in a Permit. All scientific equipment installed in the Area must be approved 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 to the Area. Removal of specific equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures are prohibited.

10(iv) Location of field camps

Semi-permanent camps and temporary camping is permitted within the Area at the primary designated site on the cuspate foreland of Edmonson Point (Map 2). Camping at the CEMP Research camp (Maps 2 & 4) is permitted only for purposes of the Adélie Penguin Monitoring Programme. When necessary within the Restricted Zone for purposes specified in the Permit, temporary camping is permitted at the designated site (C) (74°18'51"S, 165°04'16"E) approximately 100 m west of helicopter landing site (Map 3).

10(v) Restrictions on materials and organisms which can be brought into the Area

No living animals, plant material or microorganisms shall be deliberately introduced into the Area and the precautions listed in 7(ix) below shall be taken against accidental introductions. In view of the presence of breeding bird colonies at Edmonson Point, no poultry products, including products containing uncooked dried eggs, including wastes from such products, shall be released into the Area. No herbicides or pesticides shall be brought into the Area. Any other chemicals, including radio-nuclides or stable isotopes, which may be introduced for scientific or management purposes specified in the Permit, shall be removed from the Area at or before the conclusion of the activity for which the Permit was granted. Fuel is not to be stored in the Area, unless authorised by Permit for specific scientific or management purposes. Fuel spill clean-up equipment should be made available for use at locations where fuel is being regularly handled. Anything introduced shall be for a stated period only, shall be removed at or before the conclusion of that stated period, and shall be stored and handled so that risk of any introduction into the environment is minimised. 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. The appropriate authority should be notified of anything released or not removed that was not included in the authorised Permit.

10(vi) Taking or harmful interference with native flora or fauna

Taking or harmful interference with native flora or fauna is prohibited, except by Permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Where taking or harmful interference with animals is involved, the *SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica* should be used as a minimum standard.

10(vii) Collection or removal of anything not brought into the Area by the Permit holder

Collection or removal of anything not brought into the Area by the Permit holder shall only be in accordance with a Permit and should be limited to the minimum necessary to meet scientific or management needs. Permits shall not be granted if there is a reasonable concern that the sampling proposed would take, remove or damage such quantities of rock, soil, native flora or fauna that their distribution or abundance on Edmonson Point would be significantly affected. Anything of human origin likely to compromise the values of the Area, which was not brought into the Area by the Permit Holder or otherwise authorised, may be removed unless the impact of removal is likely to be greater than leaving the material *in situ*: if this is the case the appropriate authority should be notified.

10(viii) Disposal of waste

All wastes, except human wastes, shall be removed from the Area. Human wastes shall either be removed from the Area, or incinerated using purpose-designed technologies such as a propane-burning toilet, or in the case of liquid human wastes may be disposed of into the sea.

10(ix) Measures that are necessary to ensure that the aims and objectives of the Management Plan can continue to be met

1. Permits may be granted to enter the Area to carry out monitoring and site inspection activities, which may involve the small-scale collection of samples for analysis or review, or for protective measures.
2. Any specific long-term monitoring sites shall be appropriately marked.
3. To help maintain the ecological and scientific values of Edmonson Point special precautions shall be taken against introductions. Of concern are microbial, invertebrate or plant introductions from other Antarctic sites, including stations, or from regions outside Antarctica. All sampling equipment or markers brought into the Area shall be thoroughly cleaned. 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.

10(x) Requirements for reports

Parties should ensure that the principal holder for each Permit issued submits to the appropriate authority a report describing the activities undertaken. 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. Parties should maintain a record of such activities and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of 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 organising the scientific use of the Area.

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Appendix 1

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Appendix 2 Permits issued

During 2006-2011 Italian Antarctic Campaign have been issued the permits for the

Interference or sampling of following living organisms into the Edmonson Point ASPA N° 165:

2006/2007 campaign

Organism denomination	Amount N° or Kg	Sampling System
Pygoscelis adeliae	2000	visual census
" " "	10	tagging
" " "	10	feathers sampling
Stercorarius maccormicki	200	visual census

Have been carried out water sampling from lakes. Permit for entry in ASPA 165 have been performed for 40 days in the field camp.

2007/2008 campaign

Organism denomination	Amount N° or Kg	Sampling System

Have been issued permits for entry in ASPA 165 only for meteo station control for 2 times, 3hours each time

2008/2009 campaign

Organism denomination	Amount N° or Kg	Sampling System

No activity has been performed at Edmonson Point ASPA 165 during 2007/2008 campaign

2009/2010 campaign

Organism denomination	Amount N° or Kg	Sampling System
Pygoscelis adeliae	2000	visual census
" " "	18	feathers and blood sampling
Stercorarius maccormicki	120	visual census
" " "	10	feathers and blood sampling
Mosses	200 g	manual sampling
Algae	200 g	manual sampling

Have been carried out water sampling, mosses and algae from lakes. Permit for entry in ASPA 165 have been performed during 31 days in the field camp and for 3 hours for other sampling.

2010/2011 campaign

Organism denomination	Amount N° or Kg	Sampling System
Mosses	600 g	manual sampling
Algae	400 g	manual sampling
Lichens on rocks and soils	600 g	manual sampling
Colonized rocks and soils by microorganisms and lichens	2 Kg	manual sampling

Sampling and studies activities into the ASPA area have been carried out in 12 different times for a total of 28 hours of work.

Appendix 3 Permits issued

During 2011-2016 Italian Antarctic Campaign have been issued the permits for the interference or sampling of following living organisms into the Edmonson Point ASPA N° 165:

2011/2012 campaign

Organism denomination	Amount N° or Kg	Sampling System
Moses	0.005 kg	manual system
Lichens	0.002 kg	manual system

Permit for entry in ASPA 165 have been performed in the field camp for 4 times, 3 h each time and 3 times for meteo activities 1h heach time. 15 hours in total

2012/2013 campaign

Organism denomination	Amount N° or Kg	Sampling System
Moses	0.08 kg	manual system
Lichens	0.05 kg	manual system

Have been issued permits for entry in ASPA 165 for research activities and meteo station control . The total time inside the ASPA during the 2012-13 campaing has been about 27 h

2013/2014 campaign

Organism denomination	Amount N° or Kg	Sampling System
Lacustrine algae	1 kg	manual system

Moses	1.2 kg	manual system
Lichene	0.1 kg	manual system
Faeces and guano	how need	manual system
Bivalve fossil	3 species for stratigraphic layer	manual system

Have been issued permits for entry in ASPA 165 only for meteo station control for 2 times, 3hours each time . The total time inside the ASPA during the 2013-14 campaing has been about 25 h

2014/2015 campaign

Organism denomination	Amount N° or Kg	Sampling System
Project on Conservation of a polar mesopredator species susceptible to ecosystem change	3000 Pygoscelis adeliae	visual Census
	N° 20 feathers and blood sampling	manual system
	Stercorarius maccormicki 120	visual census
	n°10 feathers and blood sampling	manual system

He was made a field at the ASPA n° 165 (Edmonson Point) for a period of about 60 days. Have been issued permits for entry in ASPA also for meteo station control for 2 times, 3hours each time . The total time inside the ASPA during the 2014-15 campaing has been about 6 h and 60 days

2015/2016 campaign

Organism denomination	Amount N° or Kg	Sampling System
surface with biological crust	1.5 kg	Using sterile spade

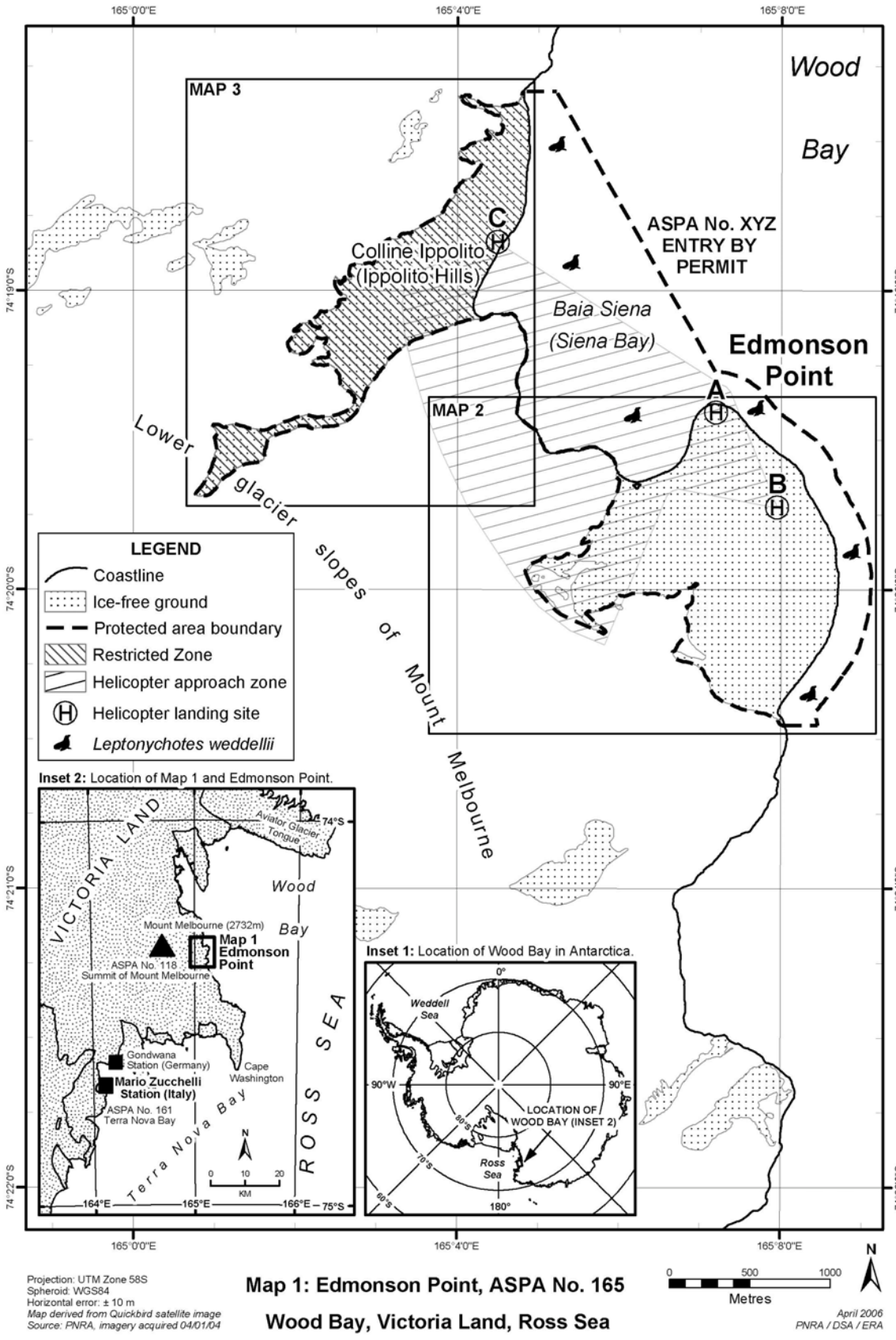
Have been issued permits for entry in ASPA also for meteo station control for 5 times, 3hours each time. The total time inside the ASPA during the 2015-16 campaing has been about 21 h .

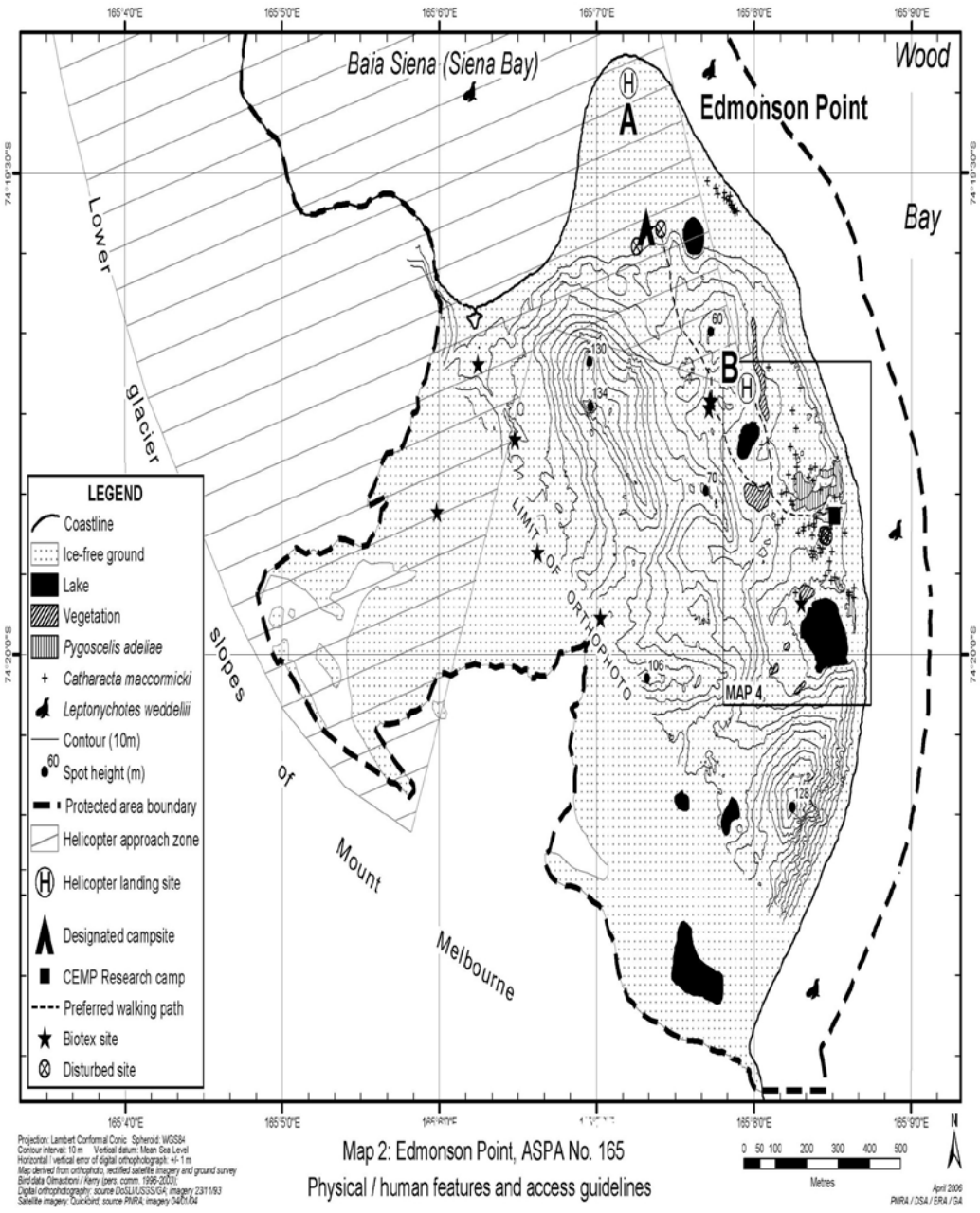
2016/2017 campaign

Organism denomination	Amount N° or Kg	Sampling System
Collection of tephra No living organism will be		samples by spatula
Algae; Planktonic invertebrates; Fish	5 for species	plankton net, fish line

Have been issued permits for entry in ASPA also for meteo station control for 5 times, 3hours each time. The total time inside the ASPA during the 2016-17 campaing has been about 43 h .

Edmonson Point ASPA 165 Maps

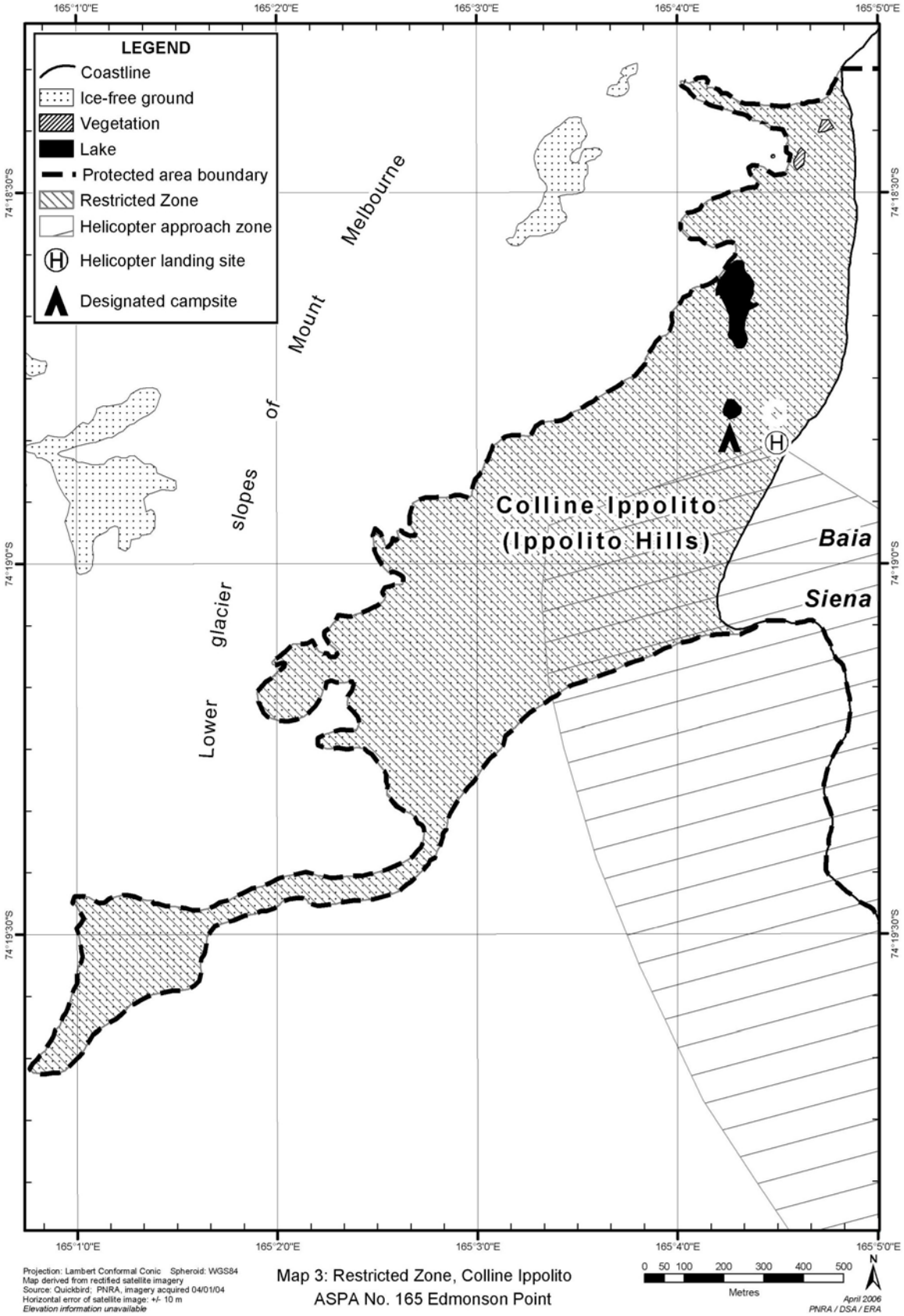




Map 2: Edmonson Point, ASPA No. 165
Physical / human features and access guidelines

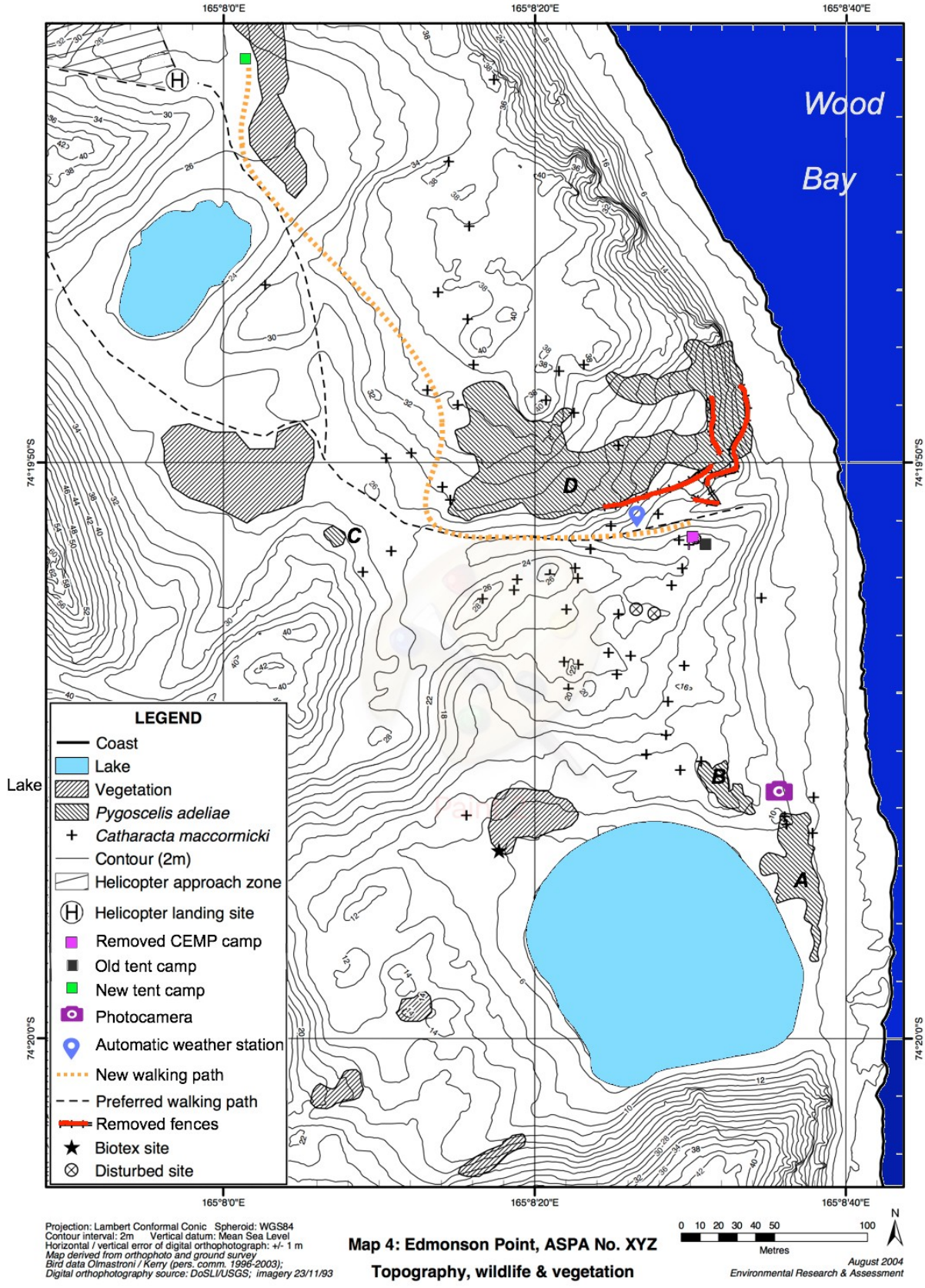
Projection: Lambert Conformal Conic. Spheroid: WGS84
Contour interval: 10 m Vertical datum: Mean Sea Level
Horizontal / vertical error of digital orthophotograph: +/- 1 m
Map derived from orthophoto, rectified satellite imagery and ground survey
Bird data Olmastoni / Kerry (pers. comm. 1996-2003).
Digital orthophotography: source DoSLI/USGS/GA: imagery 23/11/93
Satellite imagery: Quickbird: source PNRA; imagery 04/01/04

April 2006
PNRA / DSA / ERA / SA



Projection: Lambert Conformal Conic Spheroid: WGS84
Map derived from rectified satellite imagery
Source: Quickbird; PNRA, imagery acquired 04/01/04
Horizontal error of satellite image: +/- 10 m
Elevation information unavailable

Map 3: Restricted Zone, Colline Ippolito
ASPA No. 165 Edmonson Point


165°8'0"E
165°8'20"E
165°8'40"E
74°19'50"S
74°20'0"S
Wood
Bay
Lake
A
B
C
D
LEGEND
Coast
Lake
Vegetation
Pygoscelis adeliae
Catharacta maccormicki
Contour (2m)
Helicopter approach zone
Helicopter landing site
Removed CEMP camp
Old tent camp
New tent camp
Photocamera
Automatic weather station
New walking path
Preferred walking path
Removed fences
Biotex site
Disturbed site
Projection: Lambert Conformal Conic Spheroid: WGS84
Contour interval: 2m Vertical datum: Mean Sea Level
Horizontal / vertical error of digital orthophotograph: +/- 1 m
Map derived from orthophoto and ground survey
Bird data Olmastroni / Kerry (pers. comm. 1996-2003);
Digital orthophotography source: DoSLI/USGS; imagery 23/11/93
Map 4: Edmonson Point, ASPA No. XYZ
Topography, wildlife & vegetation
0 10 20 30 40 50 100
Metres
N
August 2004
Environmental Research & Assessment