Management Plan

for Antarctic Specially Protected Area No. 165 EDMONSON POINT, WOOD BAY, VICTORIA LAND, ROSS SEA

Introduction

Edmonson Point (74°20' S, 165°08' E, 5.49 km^2) is located in Wood Bay, Victoria Land, Ross Sea. The total Area of the ASPA is 5.49 km^2 and 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).

The primary reasons for the designation of this Area as an ASPA are the outstanding ecological and scientific values which require protection from possible interference that might arise from unregulated access. An exceptional diversity of freshwater habitats is present, with numerous streams, lakes, ponds and seepage areas. The site is considered one of the best in Antarctica for studies of algal ecology.

The Area hosts a colony of Adélie penguins (*Pygoscelis adeliae*) and is an important breeding site of South Polar Skua (*Stercorarius maccormicki*).

The Area was first designated as an Antarctic Specially Protected Area (ASPA) through Measure 1 (2006) after a proposal by Italy; the Area was reviewed in 2011 (Measure 8 (2011)) and in 2017 (Measure 7 (2017)).

The Area is classified as Environment D – East Antarctic coastal geologic based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) and is classified as Region 8 – North Victoria Land under the Antarctic Conservation Biogeographic Regions (ACBR) classification (Resolution 3 (2017)). The area is identified as Important Bird Area 175 according to Resolution 5 (2015).

1. Description of values to be protected

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 observed, showing nutrient conditions ranging from eutrophic to oligotrophic. Such a wide range of freshwater habitats is rare in Victoria Land. 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 2000-2500 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 (*Stercorarius 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 the research stations 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 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.

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.

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 and long-term monitoring of terrestrial and marine ecosystems, provided that such activities are for compelling reasons that cannot be served elsewhere;
- allow scientific research while ensuring protection from mutual interference and/or over-sampling;
- preserve a part of the natural ecosystem as a potential reference area for the purpose of future comparative studies;
- prevent, to the maximum extent practicable, the introduction of non-native species and pathogens that may endanger or alter the local ecosystems;
- allow visits for management purposes in support of the aims of the Management Plan and for educational and outreach purposes provided that such activities will not jeopardise the natural ecological system in that Area.

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 all permanent stations that operate in the vicinity of the area, and permit holders shall be specifically instructed on the contents of the management plan;
- 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;
- 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 and should be placed to mark the preferred inland walking routes between the Adélie penguin colony and the designated helicopter landing sites;
- Any abandoned equipment or material shall be removed to the maximum extent practicable 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 are encouraged to promote international collaboration and to consult together to coordinate sampling and bird mapping activities thus reducing cumulative impact and preventing oversampling of soil, flora and fauna within the Area.

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

Edmonson Point (74°20' S, 165°08' E) is a coastal ice-free area 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 there 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. The ice sheet margin and the coast represent obvious boundary references.

Climate

Since November 1999, a weather station installed near the penguin colony at Edmonson Point provides continuous meteorological records. The average mean temperature of the whole period recorded is -9.9 °C. Mean monthly temperature ranges from -25.2°C in July to -0.9°C in January. During summer, Edmonson Point Area experiences extended periods with temperatures above 0 °C. The mean annual snow accumulation is about 20-50 cm, equivalent to 10-20 mm of water (Bargagli *et al.,* 1997). Relative humidity is low (15-40% day, 50-80% night), precipitations are occasional, in the form of light snow, and wind speeds are mostly low (average is about 5 knots). Weather conditions deteriorate from late January, with frequent subzero daytime temperatures, snow-fall and high winds. Available data for the summer season at Edmonson Point indicate prevailing winds from North North-East and South-South-West, while they blow from North-West during wintertime. Average daily wind speeds are generally in the range of 3-6 knots, with daily maximums usually being of 6-10 knots, and only occasionally reaching up to 25-35 knots. Daily average air temperatures ranged from around -25°C in July and August, -17°C in October, about -10°C in November, -2.5°C in December, -1°C in January, and decrease to -5°C in February. The highest daily maximum temperatures were recorded from December 2013 to January 2014 when they reached +11.3°C. Average daily relative humidity generally ranged between 40-60%.

Geology and soils

The geological setting of Edmonson Point is dominated by the Cenozoic eruptive activity of Mount Melbourne (Melbourne Volcanic Province), that is part of the McMurdo Volcanic Group (Kyle, 1990). The bedrock is overlaid by 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 BP) (Baroni and Orombelli, 1994). The volcanic complex 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, with 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, dry and mostly unvegetated screes are common on the hill slopes. Valley and basin floors are covered by fine scoria and coarse sand (Bargagli *et al.,* 1999). A survey of soils across Edmonson Point indicated considerable variation in types and elemental composition, ranging from dry fellfield to guano-enriched ornithogenic soil (Smykla *et al*. 2015, 2018a)

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. They were likely formed by extreme tides and 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. They are 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 lay 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

Six lakes up to 350 m long and 1600 m^2 to 15,000 m^2 wide (Map 2) are reported at Edmonson Point. Two more lakes occur behind the coastal ridge at Colline Ippolito, the largest of which is approximately 12,500 m^2 wide (Map 3). In addition, there are approximately 22 smaller ponds less than 30 m in diameter (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.

Terrestrial Ecology

Studies of terrestrial ecology at Edmonson Point were initiated in the 1980s. In the 1990s, Edmonson Point became the location of BIOTEX 1, the first SCAR Biological Investigation of Antarctic Terrestrial Ecosystems (BIOTAS) research expedition. 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, further studies of this type are on-going at Edmonson Point (IPECA project). Microbiological analyses were carried out on permafrost active layer (Bargazza *et al*., 2019; Papale *et al*., 2018; Canini *et al*., 2020, 2021; Severgnini *et al*., 2021) and in water and sediment of four coastal lakes (Papale *et al*. 2022). In the active layer, taxonomical composition showed that Proteobacteria and Actinobacteria (27.3 and 18.4%, respectively) dominated the prokaryotic community, with most of their members playing crucial roles in organic matter turnover (Papale *et al*. 2018). Acidobacteria, Nitrospirae, Chloroflexi and Bacteroidetes ranged between 3.6 and 7.8% of total sequences. Firmicutes (2.6%), Gemmatimonadetes (2.5%), Parcubacteria (1.9%), Latescibacteria (1.7%), Cyanobacteria (1.5%) constituted a minor component.

The Edmonson Point beach has been also studied through remote sensing techniques in Ponti *et al*. (2021) that remarked as the beach has been interested by permafrost with probable saline talik underlying that can change the topography of the beach with the progressive active layer thickening but also the effect of the storms that can bring huge amount of iceberg on the beach shaping the beach itself.

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; Smykla *et al*. 2010). Cavacini (1997, 2001) reported 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 changes in the recent time, due to the warming in the area were stressed in Cannone *et al*. (2021) that pointed out as a warming trend and an active layer thickening in the last 20 years leaded important changes of vegetation (mosses) but also a progressive soil alkalinization, especially where soil were covered by scarce vegetation cover or were bare. The effect of the vegetation and in particular, of the different species of mosses and their water holding capacity has been also underlined thanks to the thermal and vegetation monitoring within the Edmonson Point area (Hrbaceck *et al*., 2020).

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 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).

Invertebrates

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 (Cakil *et al*., 2021; Frati *et al.,* 1996; Garlaschè *et al.,* 2020; Lewis Smith, 1996; Smykla *et al*. 2010).

A survey of microfauna across soil environments at Edmonson Point by Smykla *et al*. (2017, 2018b) also revealed a high diversity of rotifers (18 of 24 species identified) followed by four nematodes and two tardigrades. The authors consider the Area a biodiversity hot-spot for microfauna in the Ross Sea region.

Breeding birds

Two species of birds are known to breed at Edmonson Point: Adélie penguins (*Pygoscelis adeliae*); south polar skua (*Stercorarius maccormicki*). Flocks of *snow petrels* (*Pagodroma nivea*) have been observed flying over the Area, and Wilson's storm petrels (*Oceanites oceanicus*) have been regularly sighted. Neither of these species is known to breed within the Area.

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). Investigations on the colony began in the early 1980s. The number of breeding pairs recorded between 1981 and 2022 is reported in Table 1. Abandoned nesting sites located ~1 km to the northwest of the current colony were occupied approximately 355 – 2000 calendar years B.P., on bedrock adjacent to the cuspate foreland (Baroni and Orombelli, 1994; Lambert *et al*. 2002; Emslie *et al*. 2007).

Table 1. Adélie penguins (breeding pairs) at Edmonson Point between 1981-and 2022 (data Woehler, 1993; Olmastroni, et al., 2022 and references therein).

Year	No. of breeding pairs	Year	No. of breeding pairs
1981	1300	2003	2588
1984	1802	2005	2385
1987	2491	2007	2303
1989	1792	2010	2112
1991	1316	2015	3066
1994	1960	2016	2737
1995	1935	2018	2704
1996	1824	2019	2955
1997	1961	2020	3078
1999	2005	2022	2889
2001	1988		

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 CCAMLR Ecosystem Monitoring Program (CEMP) sites in the ecosystem monitoring network established to meet the objectives of CCAMLR. 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.

The studies on Adélie penguin 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 their 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). Behavioural studies were also part of the research (Pilastro *et al*., 2001).

A project called "PenguinERA" of the Italian National Program of Research in Antarctica is being carried out to understand the ecological role of the Adélie penguin. The research, initiated in 2017, is being conducted with an advanced multidisciplinary approach, combining a series of field surveys, remote data acquisition (using a penguin nest camera, an automated monitoring system, and photogrammetry modelling based on surveys conducted by unmanned aerial vehicles (UAVs)) and laboratory analyses.

Abundance estimates and reproductive success data collected during the expeditions on the Adèlie penguin population at Edmonson Point were processed in accordance with CCAMLR Standard Methods and sent to the committee in June 2018 and June 2019, 2020, and 2022, thus updating the historical dataset started in 1994. While total population abundance did not vary greatly, a different arrangement of breeding groups within the colony was observed, probably because of intraspecific competition and the high skua predation pressure over time (Fattorini *et al* 2019, Olmastroni *et al* 2022).

Monitoring of reproductive success at the end of breeding seasons showed a relatively stable level, and values were in line with those measured at the two Terra Nova Bay colonies (Adélie Cove and Inexpressible Island; Olmastroni *et al* 2020, 2022). 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).

The study of foraging areas by satellite telemetry was carried out in two years. Foraging trips between the colony and the sea were tracked through Splashtag and Spot tag (Wildlife Computers) transmitters deployed on 30 animals at Edmonson Point during the breeding season. Tracking maps showed that penguins foraged between fast ice and pack ice in the vicinity of Terra Nova Bay and Wood Bay and will contribute to update the long-term dataset existing for this colony (Olmastroni *et al* 2020, Hindell *et al* 2018, Ropert-Coudert *et al* 2018, unpublished data).

Within the Area there is also one of the most numerous breeding colonies of south polar skuas (*Stercorarius maccormicki*) in Victoria Land, The colony is being monitored together with the penguin population. It consists of over 120 pairs, 36 of which occupy Colline Ippolito (CCAMLR, 1999; Pezzo *et al*., 2001; Piece *et al*., 2001, Olmastroni *et al*. 2022). The overall ratio between south polar skua and penguin is about 1:20. Numbers of breeding skuas nesting around the penguin colony at Edmonson Point ranged 61-81, in line with a previous census of 68 in 2014/15 but suggesting a possible decreasing trend in this area when compared to older values (120 nests measured up to 2010, Pezzo *et al*. 2001 and unpublished data).The Area also 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.). 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.

The inclusion of Edmonson Point area in ASPA 165 has indeed helped to maintain its outstanding ecological and scientific values. Keeping the protection of the site from unregulated access remains essential.

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.

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. Italy established a station in close proximity at Terra Nova Bay in 1986-87 and increased research interest in the site followed.

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. Some plastic cloches, installed at various locations throughout the Area in 1995-96 as part of BIOTEX-1 project as reported in map 2 (Wynn-Williams, 1996) are still present in 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.

6(ii) Access to the Area

The Area may be accessed by land, sea or air. There are no specific routes to enter the Area by land or sea. Overflight and landing restrictions apply within the Area, the specific conditions are set out in Section 7(ii) below.

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

A fibreglass cabin for field observation was installed by PNRA in 1994/95 to support CEMP research. The cabin is 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).

The Automated Penguin Monitoring System (APMS) weigh bridge is situated adjacent to the northern penguin sub-colony, metal fences 30-50 cm high are installed to direct penguins towards the APMS (Map 4).

In 1990 an automated weather station (AWS) was installed by the Italian Antarctic Meteo Climatological Observatory not far from the old CEMP campsite (Map 4). Since 1999 it has been measuring surface pressure, temperature/relative humidity respect to water, wind speed and direction. In 2021 the AWS was renewed and the old electronics (Vaisala milos 200 model) and sensors were replaced with the newer ones (Vaisala Maws model).

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.

6(iv) Location of protected areas in the vicinity

The nearest protected areas to Edmonson Point are the High Altitude Geothermal Sites on Mount Melbourne (ASPA No. 175) 13 km to the west, Cape Washington and Silverfish Bay (ASPA No. 173) 24 km south, and the marine area Terra Nova Bay (ASPA No. 161) which lies approximately 52 km to the south (Map 1, Inset 2).

6(v) Special zones within the Area

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 to preserve this part of the Area as a reference site for future comparative studies. The northern, western and southern boundaries of the Restricted Zone are defined by 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.

7. Terms and conditions for entry permits

7(i) General permit conditions

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

- it is issued for scientific research or for compelling scientific reasons that cannot be served elsewhere or for essential management purposes consistent with plan objectives such as inspection, maintenance or review;
- access to the Restricted Zone may be 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 and 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.
- Overflight of bird colonies within the Area by Remotely Piloted Aircraft Systems (RPAS) shall not be permitted unless for scientific or operational purposes, in accordance with the Permit and following the recommendations contained in the Environmental Guidelines for Operation of RPAS in Antarctica (Resolution 4, 2018).

7(ii) Access to and movement within or over 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

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). Access by small boats should avoid disturbing birds and mammals.

Restricted conditions of vehicle access

Use of vehicles within the Area is generally 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. Vehicle use shall avoid disturbance to birds and mammals. When using vehicles on sea ice care should be exercised to avoid Weddell seals that may be present: speed should be kept low and seals shall not be approached by vehicle closer than 50 m. 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 and of the Guidelines for the Operation of Aircraft near Concentrations of Birds in Antarctica, Resolution 2 (2004):

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

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

Helicopter landing is allowed only at the landing designated sites A, B and C (Maps 1-4). The landing sites with their coordinates are described as follows:

- A - shall be used for most purposes and is located on the northern cuspate foreland of Edmonson Point (Map 2) (74°19'24"S, 165°07'12"E);
- B - shall be used in support of the Adélie Penguin Monitoring Programme or AWS maintenance or when necessary for transport of heavy equipment / supplies (Map 2) (74°19'43"S, 165°07'57"E
- C - shall be used 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).

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). Access to landing site (B) should follow the same route and proceed a further 700 m SE. 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. The departure routes are identical in reverse.

Foot access and movement within the Area

Movement on land within the Area shall be on foot. Visitors should move carefully 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 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 that existing 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 route marked by 9 wooden stakes driven into the ground (Maps 2 and 4) or follow a route along the beach.

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

- Compelling scientific research which cannot be undertaken elsewhere and will not jeopardise the values of the Area, including CCAMLR-CEMP activities;
- Essential management activities, including maintenance, monitoring and inspection.
- Educational and outreach activities, such as documentary reporting.

7(iv) Installation, modification or removal of structures

No structures should be erected within the Area except as specified in a Permit. All scientific equipment installed in the Area must be authorized by Permit and clearly identified by country, name of the principal investigator and year of installation. All such items should be cleaned and made of materials that pose minimal risk of contamination to the Area, also considering the risk of unintentional non-native species introduction. Permanent structures are prohibited. The Party, whose authority granted the original permit shall be responsible for the removal of specific equipment for which the Permit has expired.

7(v) Location of field camps

Semi-permanent camps and temporary camping is permitted within the Area at the two designated camping sites: on the cuspate foreland of Edmonson Point (Map 2) and on the flat area close to helipad B (Map 2 and 4). If absolutely necessary and only for the purposes specified in the Permit, temporary camping is permitted within the Restricted Zone at the designated site (C) (74°18'51"S, 165°04›16»E), approximately 100 m west of helicopter landing site (Map 3).

7(vi) Restrictions on materials and organisms which can be brought into the Area

No living animals, plant material, microorganisms or non-sterile soils shall be deliberately introduced into the Area. Raw poultry products and eggs are prohibited from the Area. No processed poultry products and wastes from such products, shall be released into the Area.

No herbicides or pesticides shall be introduced 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 required for conducting the activities authorised by the Permit. Fuel spill clean-up equipment should be made available for use at locations where fuel is being handled. Visitors must be adequately trained to respond to emergencies.

Anything introduced shall be for a stated period only, shall be stored and handled so that risk of any introduction into the environment is minimised and shall be removed at the conclusion of the stated period. 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.

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

Taking or harmful interference with native flora or fauna is prohibited, except in accordance with a 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 considered as a minimum standard.

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

Collection or removal of material from the Area is allowed only 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 in the Area 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, shall 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.

7(ix) Disposal of waste

All wastes, including human wastes, shall be removed from the Area. Liquid human wastes may be disposed of into the sea.

7(x) Measures that are necessary to continue to meet the aims of the Management Plan

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.

Any specific long-term monitoring site shall be appropriately marked.

To help maintaining the ecological and scientific values of the Area special precautions shall be taken against unintentional introductions of species, in particular microbes, invertebrates or plants 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.

7(xi) Requirements for reports

Parties should ensure that the principal holder for each Permit issued submits a report to the appropriate national authority. Such report should include, as appropriate, the information identified in the visit report form contained in the Revised Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas (Resolution 2, 2011). 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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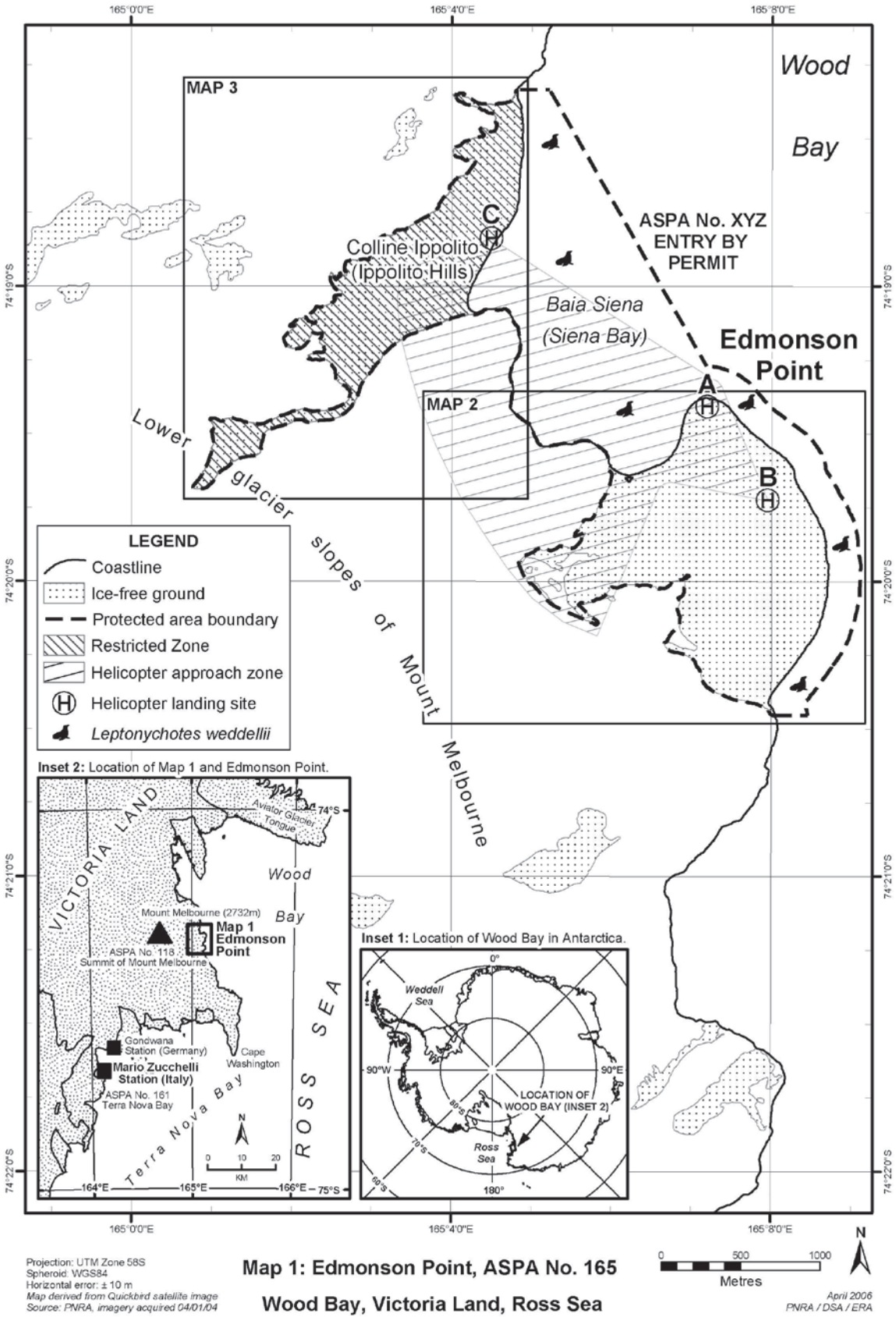
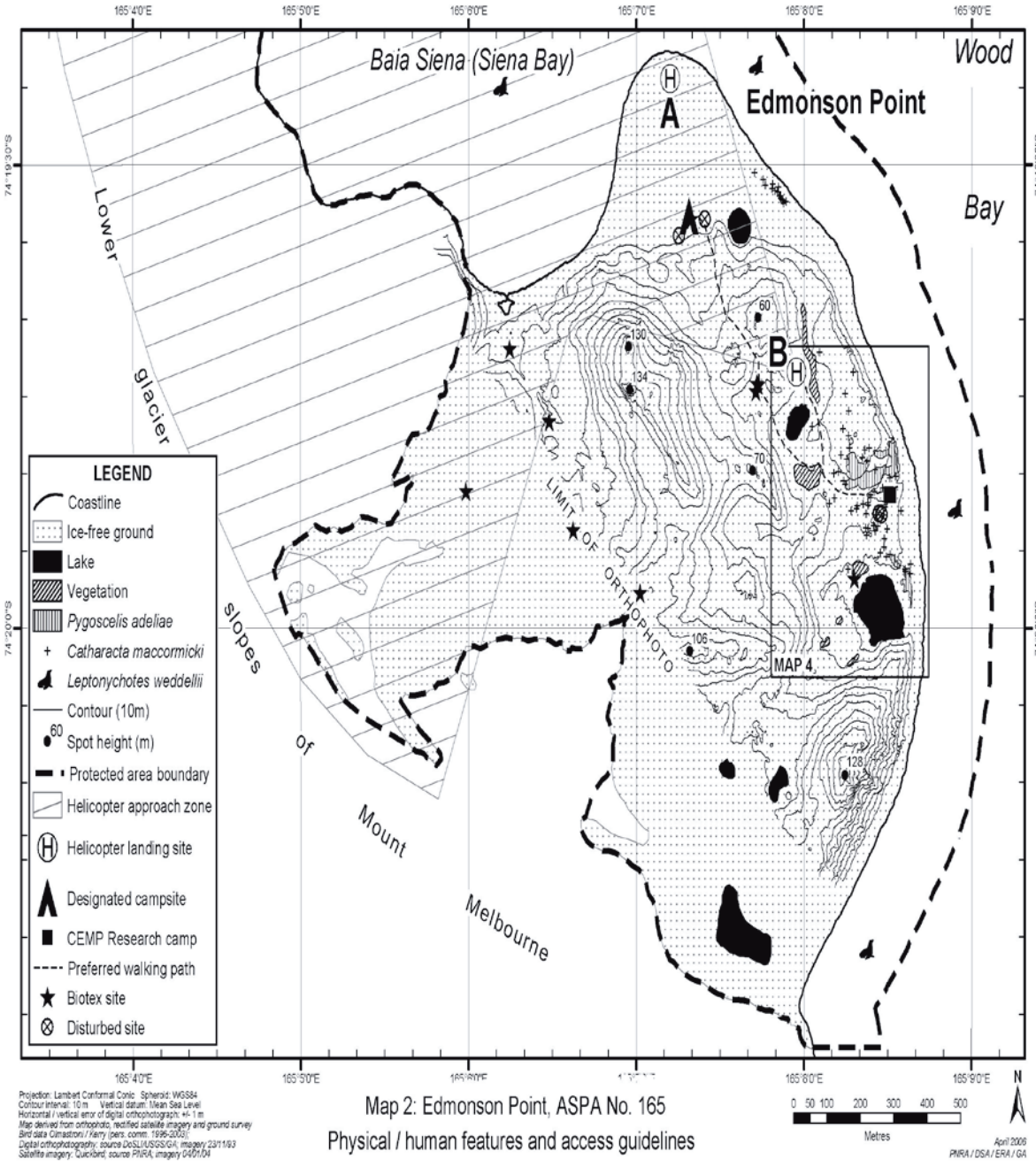
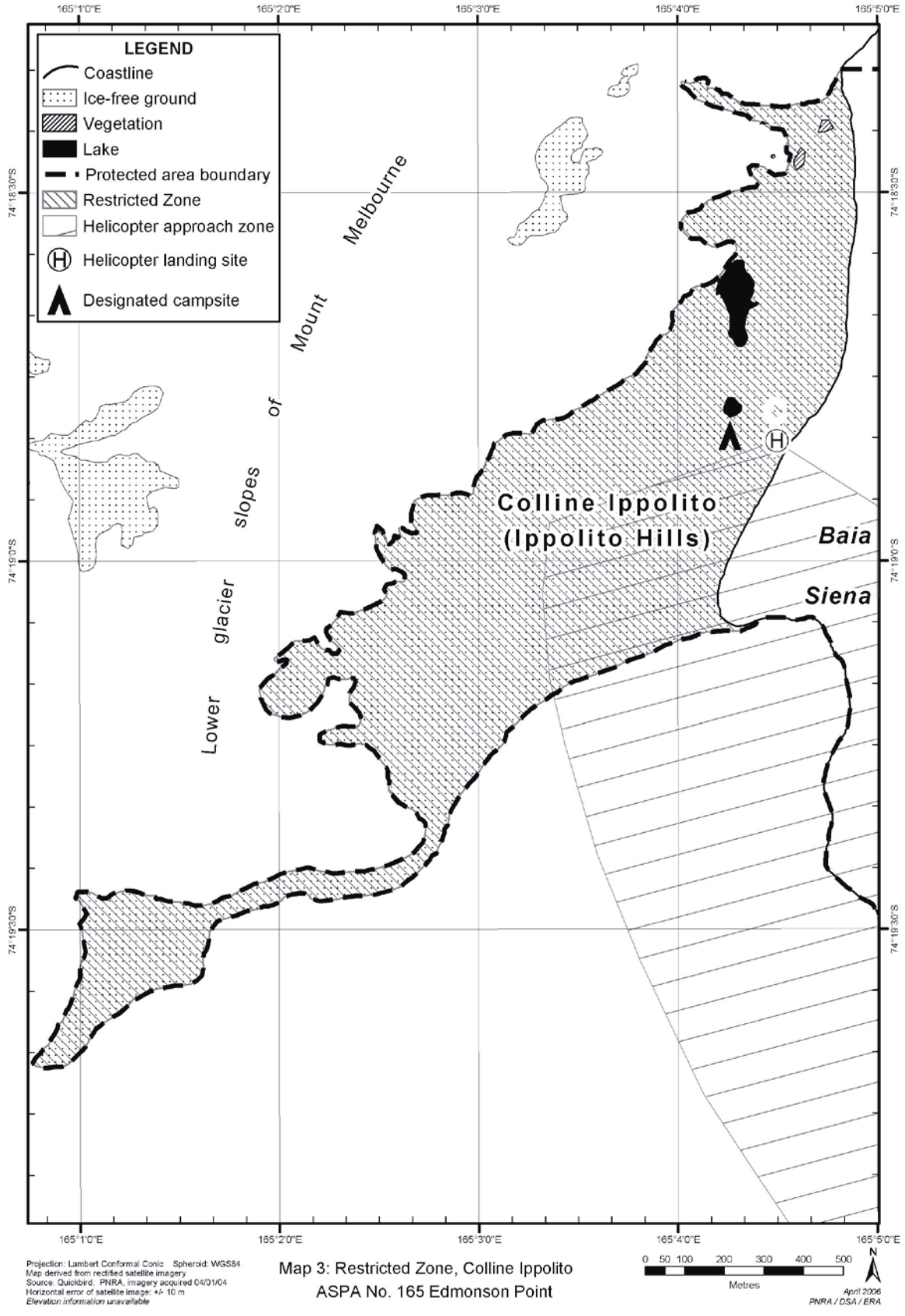
Edmonson Point ASPA 165 Maps





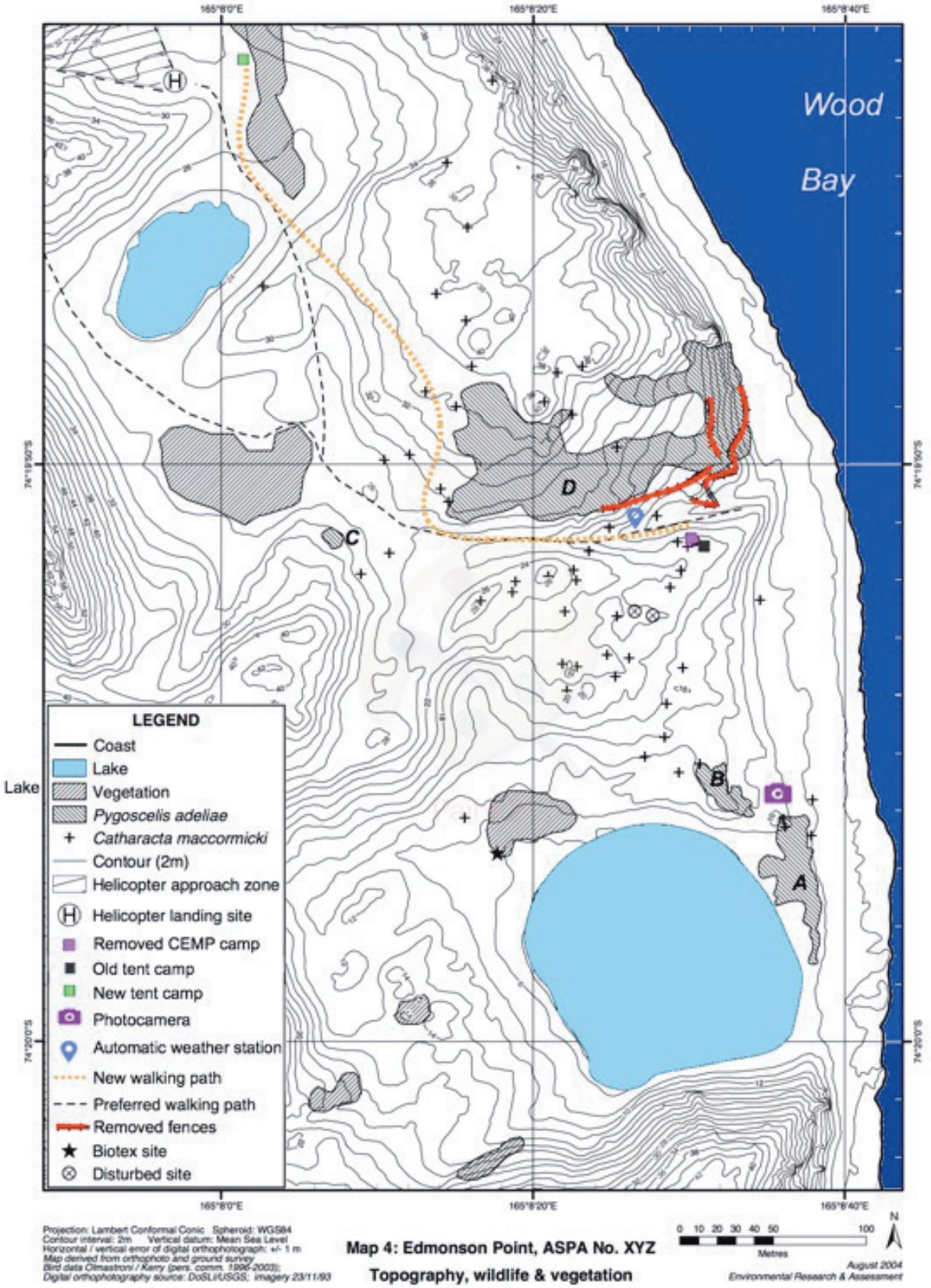
Projection: Lambert Conformal Conic Spheroid: WGS84
Contour interval: 10 m Vertical datum: Mean Sea Level
Horizontal / vertical error of digital orthophotograph: +/- 1 m
Map derived from orthophoto, rectified satellite imagery and ground survey
Bird data Olmastroni / Kerry (pers. comm. 1995-2003)
Digital orthophotography: source DoSLI/USGS/GA; imagery 23/11/93
Satellite imagery: Quickbird; source PNRA; imagery 04/01/04

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



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
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