Management Plan for Antarctic Specially Protected Area No. 151 Lions Rump, King George Island, South Shetland Islands

Introduction

Lions Rump (62º08'S; 58º07'W) is located on the southwestern coast of King George Island, South Shetland Islands, covering approximately 1.32 km^2 in area.

The Area takes its name from the distinctive rocky hill lying between the southern extremity of King George Bay and Lions Cove.

The Area was originally designated as Site of Special Scientific Interest No. 34 through Recommendation XVI-2 (1991, SSSI No. 34) after a proposal by Poland on the grounds that it contains diverse biota and geological features and is a representative example of the terrestrial, limnological, and littoral habitats of the maritime Antarctic. In accordance with Decision 1 (2002), the Area was redesignated as Antarctic Specially Protected Area (ASPA 151). A revised Management Plan was adopted through Measure 1 (2000). The Area was designated primarily to protect the site's ecological values. The Area is also valuable as a reference site with diverse avian and mammalian Antarctic fauna, against which disturbance at sites situated near sites of human activity can be measured.

Based on the Environmental Domains Analysis for Antarctica (Resolution 3 (2008)) ASPA No 151 lies within Environment A (Antarctic Peninsula northern geologic), which is a small, terrestrial environment around the northern Antarctic Peninsula consisting entirely of ice-free land cover and sedimentary geology (Morgan et al. 2007). Other protected areas containing Domain A include ASPA No 111, ASPA No 128 and ASMA No 1.

There are four other ASPAs on King George Island and seven more on other islands of the South Shetland Archipelago, but only one of them (ASPA No 128 Western Shore of Admiralty Bay) represents both the same Environmental Domain A, and the same primary reason of designation (area with important or unusual assemblages of species, including major colonies of breeding native birds or mammals). Lions Rump, in contrast to ASPA No 128, is located ca 30 km from the nearest station and has been subjected to minimal disturbance by human activity. Therefore, ASPA No 151 complements ASPA No 128 by protecting a site against which human impact can be measured.

The Area is considered to be sufficiently large to provide adequate protection to the values described below. The biological, geological and scientific values of Lions Rump are vulnerable to human disturbance (e.g trampling, oversampling, disturbance of wildlife). Therefore, it is important that human activities in the Area are managed to minimize the risk of impacts.

The earliest information about penguin populations at Lions Rump was given by Stephens in 1958 (Croxall and Kirkwood 1979). Later studies come from works by Jabłoński (1984), Trivelpiece *et al.* (1987), Ciaputa and Sierakowski (1999) and Korczak-Abshire et al. (2013). Since 2007 a monitoring programme of birds and pinnipeds is carried out in the Area according to CCAMLR standard methods (pinniped census every 10 days, penguins' and other birds' nests census once during breeding season, fledglings weighting once during the season, recording of vagrant birds).

In 1989/90 and 2004 botanical studies were conducted in the Area, and vegetation maps of the Area were done, showing changes in lichen spatial distribution caused by climatic changes (Olech 1993, 1994, pers. comm.). An attempt to estimate ages of lichen colonization on the oldest maraines of the White Eagle Glacier was done (Angiel, Dąbski 2012).

Ornithogenic soils in the area of penguin rookery at Lions Rump were described by Tatur (1989), and than included into regional pedological synthesis (Tatur 2002). Surface loamy weathering cover of the Area was not described in soils categories yet. Large south part of the Area was covered by glacier 30 years ago during investigations preceding establishment of ASPA No 151. Due to retreat of glaciers in the result of regional warming, a new fresh, ice-free, postglacial landscape has appeared (Angiel, Dąbski 2012).

Paleogene and Neogene rocks from the Area and its close surroundings provide data important for world glacial history. The sequence consists of sedimentary and volcanic rocks from preglacial Eocene terrestrial and fresh water sediments to onlapping sequence of Early Oligocene diamictict and Miocene pillow lavas. Eocene sedimentary, pyroclastic and andesite rocks covering a main part of Area belong to "Lions Cove

Formation". This unit was introduced by Birkenmajer (1980, 1981) and described in more detail in later papers (Birkenmajer et al. 1991, 1994, Birkenmajer 2001). "Lions Cove Formation" was excluded from "Lions Rump Group" of Barton (1961, 1965). Eocene age for "Lions Cove Formation" was proposed by Smellie et al. (1984) on the base of single K-Ar dating and was confirmed by many K-Ar determinations performed during ACE IPY project (Pańczyk i Nawrocki 2011,Tatur et al. 2009, Krajewski et al. 2009, Krajewski et al. 2010, Tatur et al. 2010., Krajewski et al. 2011). Oligocene tillites and glaciomarine sediments of "Polonez Cove Formation" (see Birkenmajer 2001) border the Area forming steep rocky walls from the west, south and east sides. Central part of the area is covered by the youngest Miocene andesite lavas an pillow-lavas forming hummocks along cliff (K-Ar datings from Ace Group, pers. comm.).

1. Description of values to be protected

Lions Rump was first designated a protected area as a representative of the terrestrial, limnological and littoral ecosystems of King George Island, possessing diverse biota and rock formations (volcanic and sedimentary rocks important for world geological history). In the Antarctic Protected Areas Database it is included as an area with important or unusual assemblages of species, including major colonies of breeding native birds or mammals.

The original goals for designating the Area are still relevant.

The breeding avifauna of the Area is diverse and numerous, including three pygoscelid penguin species (Adélie penguin *Pygoscelis adeliae*, Gentoo penguin *Pygoscelis papua* and Chinstrap penguin *Pygoscelis antarctica*), as well as eight other bird species such as Cape pigeon *Daption capense*, Wilson's storm petrel *Oceanites oceanicus*, black-bellied storm petrel *Fregatta tropica*, snowy sheathbill *Chionis alba*, McCormick's skua *Catharacta maccormicki*, Antarctic skua *Catharacta antarctica*, Dominican gull *Larus dominicanus*, and Antarctic tern *Sterna vittata*.

Furthermore, Elephant seals (*Mirounga leonina*), Weddell seals (*Leptonychotes weddellii*), Leopard seals (*Hydrurga leptonyx*), Crabeater seals (*Lobodon carcinophagus*), and Fur seals (*Arctocephalus gazella*) rest and/or breed on the beaches.

ASPA No 151 includes the unique pre-glacial Eocene and partially glacial Oligocene sequences. Continental glacial sequence of "Polonez Formation" (tillites and glacial diamicts bearing erratic clasts) provides the oldest known hard evidence of the coming Cenozoic glaciation (28-32 SIS dating). Outcrops providing hard data of this event should be protected, therefore collecting petrified wood, rare leaves, layers of coal representing lustros (vitrinite) brown-coal methaphase and volcanic bombs from tuff deposits in the Area without Permit is prohibited. Eocene flora (Mozer, in press) is identical with flora cropping from the other side of White Eagle Glacier (Zastawniak 1981, 1990), and consistent with regional floristic pattern (Pool et al 2001).

Lions Rump contains rich lichen flora, and numerous stands of two native vascular plants, *Colobanthus quitensis* and *Deschampsia antarctica*. The lichen biota of the Area consists of 148 taxa, making it one of the most diverse sites in the Antarctic.

The original values of the Area associated with the marine bottom fauna cannot be confirmed as one of the primary reasons for special protection of the Area because there is a lack of new data available describing the communities. However, future research may reaffirm them. Therefore, marine boundary of the Area has not been redefined.

The Area has not been subjected to frequent visits, scientific research and sampling. Human presence in the Area is currently estimated as two persons carrying out monitoring research between 1st November and 30th March. Therefore, the Area may be regarded as a reference site for future comparative studies.

Since 2007 a monitoring programme of birds and pinnipeds is carried out in the Area, in accordance with standard CCAMLR methods (pinniped census every 10 days, penguins' and other birds' nests census once during breeding season, fledglings weighting once during the season, recording of vagrant birds). Data serve as a basis for the conservation of Antarctic marine living resources, to detect and record significant changes in critical components of the ecological system, and to compare population trends with other areas (such as ASPA No 128 Western Shore of Admiralty Bay) that experience the greater level of human activities..

2. Aims and objectives

Management of the Area aims to:

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- avoid degradation of, or substantial risk to, the the values of the Area by preventing unnecessary human disturbance to the Area
- allow scientific research in the Area provided it is for compelling reason which cannot be served elsewhere and which will not jeopardize the natural ecological system in the Area. Invasive practices used during biological research are excluded in this area.
- prevent or minimize the introduction and dispersal of non-native species (plants, animals and microbes)
- preserve the Area as a reference site for future comparative studies

3. Management activities

The following management activities shall be undertaken to protect the values of the Area:

- Visits shall be made as necessary to assess whether the ASPA continues to serve the purposes for which it was designated and to ensure management and maintenance measures are adequate
- The Management Plan shall be reviewed at least every five years and updated as required
- A copy of this Management Plan shall be made available at Arctowski Station (Poland: 62º09'34"S, 058º28'15"W), Comandante Ferraz Station (Brazil: 62º05'07"S, 58º23'32"W), Machu Picchu Station (Perú: 62º05'30"S, 58º28'30"W), Copacabana Field Station (USA: 62º10'45" S, 58º26'49" W), Hennequin Point Refuge (Equador: 62º07'16"S, 58º23'42"W) and in the refuge proximate to the Area (62º07'54"S, 58º09'20"W)
- The staff authorized to access the Area shall be specifically instructed on the conditions of this Management Plan
- Markers, signs and other structures erected within the Area for scientific or management purposes shall be secured and maintained in good condition and removed when no longer required
- Approach distances to fauna must be respected, except when the scientific projects may require otherwise and this is specified in the relevant permits.
- All scientific and management activities within the Area should be subject to an Environmental Impact Assessement (Annex I of the Protocol on Environmental Protection to the Antarctic Treaty)
- Where appropriate, National Antarctic Programmes are encouraged to coordinate activities to prevent excessive sampling of biological and geological material within the Area, to prevent or minimize the danger of introduction and dispersal of non-native species, and to keep environmental impacts, including cumulative impacts, to an absolute minimum.

4. Period of designation

The Area is designated for an indefinite period.

5. Maps

Map 1. The location of Lions Rump in relation to King George Island.

Map 2. Lions Rump in greater detail.

Map 3. Vegetation map of Lions Rump.

Map 4. Geological map of Lions Rump.

6. Description of the area

6(i) Geographical co-ordinates, boundary markers and natural features

The Area is located on the southern coast of King George Bay, King George Island, in the South Shetlands Islands (Map 1, 2). It is described as all the land and sea falling within the area bounded by the following co-ordinates:

62°07'48"S, 58°09'17"W;

62°07'49"S, 58°07'14"W;

62°08'19"S, 58°07'19"W;

62°08'16"S, 58°09'15"W;

62º08'16"S, 58º09'15"W.

The Area includes the littoral and sublittoral zones extending from the eastern end of Lajkonik Rock to the most northerly point of Twin Pinnacles. From this point the boundary extends to the easternmost end of the columnar plug of Lions Head to the east of White Eagle Glacier. On land, the Area includes the coast with raised beaches, freshwater pools and streams on the south side of King George Bay, around Lions Cove, and the moraines and slopes which lead to the lower ice tongue of White Eagle Glacier, then westward to a small moraine which protrudes through the ice cap south-east of Sukiennice Hills.

The ice-free area of ASPA No 151 exhibits a range of geomorphological features, including beaches of various width and length, moraines, hills and inland rocks (Map 4). The highest point rises to the altitude of c. 190m. Geologically, Lions Rump area is made up mainly of tuff, fuffite, lahar bearing wood and andesite basalt lava layer interbedding, deposited inside tectonic paleovalley. In the upper part of this sequence andesite lava flow (42-45 Ma K/Ar dating) preceded by lahars occur.. These terrestrial pyroclastics were exposed to alluvial erosion and valleys were ultimately filled with massive conglomerate (Conglomorate Bluff). All that complex of rocks belonging to Eocene "Lions Cove Formation" was cut by younger andesite dykes (Lions Rump). "Lions Cove Formation" is topped by glaciomarine clastic sediments of "Oligocene Polonez Cove Formation" (Krakowiak and Low Head Members). Oligocene rocks form steep walls surrounding the Area. Area is largely covered by glacial moraines and slope loamy deposits. The front of White Eagle Glacier is marked by large, dome-shaped moraine ridges belonging to several Holocene stages of glacier advance and retreat. Eocene sediments were affected by complex alteration related to post magmatic changes, weathering processes and low grade metamorphism. Chloritization, palagonization and zeolitization is observed along all the sediments. Terrestial Eocene and glaciomarine Oligocene are covered by Miocene andesite lavas and pillow lavas flows (c. 20 Ma, ACE group pers. com.). That volcanic rock occupy central part of ASPA No 151 territory, and most of them form Sukiennice Hills.

Large numbers of penguins breed throughout the Area. In 2010/11 there were 3,751 occupied nests of Adèlie penguins, 3004 occupied nests of gentoo penguins, and 32 occupied nests of Chinstrap penguins. Since 1995/96 a significant decrease in Adèlie penguin breeding population and a significant increase in gentoo penguin breeding population were observed. Chinstrap population is not numerous enough to detect any statistically significant changes.

There are 8 other bird species breeding in the Area (Cape Pigeon *Daption capense*, Wilson's storm petrel *Oceanites oceanicus*, Black-bellied storm petrel *Fregatea tropica*, sheathbill *Chionis alba*, McCormick's skua *Catharacta maccormicki*, Antarctic Skua *Catharacta antarctica*, Dominican Gull *Larus dominicanus*, and Antarctic Tern *Sterna vittata*). In 2010/11 the most numerous were: Antarctic Tern (57 nests), Cape pigeon (55 nests) and Dominican gull (26 nests).

Elephant seals (*Mirounga leonina*), Weddell seals (*Leptonychotes weddellii*), Leopard seals (*Hydrurga leptonyx*), Crabeater seals (*Lobodon carcinophagus*), and Fur seals (*Arctocephalus gazella*) rest and/or breed on the beaches. In 2010/11 four harems and 71 pups of Elephant seals were observed in the Area. The maximum numbers of Fur seals exceeded 1500 individuals.

Approximately 13 taxa of macroalgae were found in the littoral zone of the Area. The most common among them were: green algae (*Monostroma hariotti*), red algae (*Georgiella confluens, Iridaea cordata* and *Leptosarca simplex*), and brown algae (*Adenocystis utricularis* and *Ascoseira mirabilis*). There is rich and abundant bottom fauna in the marine part of the Area, with Bivalve as the dominant group. Both Amphipoda and Polychaeta also contribute significantly to benthic fauna abundance. Species composition and proportion of endemics indicate that King George Bay is transitional between Antarctic and Subantarctic (unpublished data). Marine part of the Area is shallow, with a lot of skerries and rocks, and is not accessible to ships.

The lichen (lichenized fungi) biota of the Area consist of 148 taxa (Map 3). Moreover 11 lichenicolous fungi species were recorded. The most diverse genera are Caloplaca (19 species) and Buellia (9 species), Lecanora (8 species). The highest species richness was found in places with diversified habitats, eg, with rocks, near penguin colonies or in places of bird perching. The lowest species richness was found in recently deglaciated terraine (young moraines) or in snowbeds. Since 1988/90 changes in lichen spatial distribution were observed, caused by glacial retreat and resulting water deficit. Liverworts have little importance in local plant communities. They occur mostly in moss banks. Fungi are rare or uncommon. Knowledge of the Area freshwater algae is poor.

6 (ii) Access to the Area

Access shall be by small boats landing outside the Area. Accessible beach is situated outside the western boundary of the Area, in front of the refuge (62º07'54"S, 58º09'20"W).

Access to the Area from the recommended landing site shall be on foot.

Helicopters may land in the Area only in case of emergency. Suggested landing site is situated on flat area 50-100 m eastward from refuge, on both sides of the Area boundary. Changeable distribution of marine mammals, snow patches and stream tributories should be taken into account during landing. Landing on vegetation or near the wildlife should be avoided to the maximum extent possible. To avoid overflying breeding sites, approach should be preferably be from the north, or west.

6 (iii) Location of structures within the Area

A sign-board is located on a marine terrace outside the western border of the Area.

A four-berth wooden refuge (62º07'54"S, 58º09'20"W) constructed by Poland is located on a flat marine gravel terrace about 50m outside the western boundary of the Area.

The nearest scientific research stations are located 30 km west (Arctowski Station – Poland, 62º09'34"S, 058º28'15"W) and north-west (Comandante Ferraz – Brazil, 62º05'07"S, 58º23'32"W) from the Area.

6 (iv) Location of other Protected Areas within close proximity

ASPA No 125, Fildes Peninsula, King George Island (25 de Mayo), and ASPA No 150, Ardley Island, Maxwell Bay, King George Island (25 de Mayo), lie about 50 km west of Lions Rump. ASPA No 132, Potter Peninsula, King George Island (25 de Mayo), South Shetland Islands, lies about 35 km to the west. ASMA

No 1, Admiralty Bay, King George Island and ASPA No 128, Western shore of Admiralty Bay, King George Island, South Shetland Islands, lie about 20 km to the west.

6(v) Special zones within the Area

None

7. Permit conditions

7 (i)General permit conditions

Permits may be issued only by appropriate national authorities as designated under Annex V Article 7 of the Protocol on Environmental Protection to the Antarctic Treaty.

Conditions for issuing a permit for the Area are that:

- it is issued only for a compelling scientific purpose which cannot be served elsewhere, or
- it is issued for essential management purposes such as inspection, maintenance or review
- the actions permitted will not jeopardize the natural ecological system 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 this Management Plan,
- the permit, or an authorized copy, must be carried within the Area,
- a permit is issued for a stated period only,
- a report is supplied to the authority named in the Permit,
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- the appropriate authority should be notified of any activities/measures undertaken that were not included in the Permit.

7 (ii) Access to and movement within the Area

Access to, and movement within the Area shall be on foot from the direction of the recommended landing site on the beach near the refuge.

Access shall be limited in order to avoid disturbance to birds, and damage to vegetation and geological features.

Land vehicles are prohibited in the Area. Helicopters may land only in case of emergency (see *6(ii)*).

Overflight operations by fixed-wing aircraft and helicopters shall be carried out, as a minimum requirement, in accordance with the "Guidelines for the Operation of Aircraft near Concentrations of Birds" contained in Resolution 2 (2004).

No pedestrian routes are designated within the Area, but persons on foot should at all times avoid disturbance to birds and mammals, and damage to vegetation and paleontological (marine fauna in Polonez Cove Formation, wood and rare leaves in lahars) and geological (erratics) evidences.

7 (iii) Activities which are or may be conducted within the Area, including restrictions on time and place

- Compelling scientific research which cannot be conducted outside the Area, and which will not damage or interfere with any aspect of the Area's biological, geological, or aesthetic values.
- Essential management activities, including monitoring.

7 (iv) Installation, modification or removal of structures

No additional structures are to be erected in the Area, or scientific equipment installed, except for compelling scientific or management reasons and for a pre-established period, as specified in a Permit. Installation (including site selection), maintenance, modification or removal of structures and equipment shall be

undertaken in a manner that minimises disturbance to the Area. All structures or scientific equipment installed in the Area shall be clearly identified by country, name of the principal investigator and year of installation.

All such items should be free of organisms, propagules (e.g. seeds, eggs) and non-sterile soil, and be made of materials that can withstand the environmental conditions and pose minimal risk of contamination of the Area. Removal of specific structures or equipment for which the Permit has expired shall be a condition of the Permit. Permanent structures or installations are prohibited.

7 (v) Location of the field camps

Camping is prohibited in the Area except in an emergency. A four-berth wooden refuge constructed by Poland is located on a flat marine gravel terrace ca 50 m outside the western boundary of the Area (62º07'54"S, 58º09'20"W). The refuge is used mostly by Polish researchers monitoring birds and pinnipeds in the Area. Additional camping outside the Area is possible on non-vegetated sites near the refuge. Care should be taken to minimise disturbance to wildlife.

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

No living animals, plant material or microorganisms shall be deliberately introduced into the Area. To ensure that the floristic and ecological values of the Area are maintained, special precautions shall be taken against accidentally introducing microbes, invertebrates or plants from other Antarctic sites, including stations, or from regions outside Antarctica. Special care must be extended to ensure that non-native grass *Poa annua* that is present in the vicinity of Arctowski Station will not be inadvertently introduced to the Area. All sampling equipment or markers brought into the Area shall be cleaned or sterilized. Introduction of non-sterile soil is prohibited.

To the maximum extent practicable, footwear, outer clothing, backpacks and other equipment used or brought into the Area shall be thoroughly cleaned before entering the Area. *CEP Non-native Species Manual* and *COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species* shall be used for further guidance. Potential non-native species spotted in the Area should be reported to the appropriate authorities.

In view of the presence of breeding bird colonies within the Area no poultry products, including food products containing uncooked dried eggs, shall be released into the Area or into adjacent sea.

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. Release of radio-nuclides or stable isotopes directly into the environment in a way that renders them unrecoverable should be avoided.

Fuel or other chemicals shall not be stored in the Area unless specifically authorised by Permit condition. They shall be stored and handled in a way that minimises the risk of their accidental spill into the environment, and their quantity shall be kept to the minimum needed for scientific or management purposes specified in the Permit.

Materials introduced into the Area shall be for a stated period only and shall be removed by the end of that 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 and not removed that was not included in the authorised Permit.

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

Taking or harmful interference with native flora and fauna is prohibited, except by Permit issued in accordance with Annex II to the Protocol on Environmental Protection to the Antarctic Treaty. Where taking

of or harmful interference with animals is involved, the *SCAR Code of Conduct for Use of Animals for Scientific Purposes in Antarctica* should be used as a minimum standard.

Information on taking and harmful interference will be duly exchanged through the Antarctic Treaty Information Exchange system.

To prevent human disturbance of the breeding penguin colony, visitors shall not approach within 10 m of the colony during breeding season, unless authorised by Permit for specific scientific or management purposes.

7 (viii) Collection and 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 reasonable concern that the sampling proposed would take, remove or damage such quantities of soil, sediment, flora or fauna that their distribution or abundance within the Area would be significantly affected.

Other material of human origin likely to compromise the values of the Area (e.g. plastic debris) which was not brought into the Area by the permit holder or otherwise authorised, may be removed from the Area unless the environmental impact of the removal is likely to be greater than leaving the material in situ; if this is the case the appropriate Authority must be notified and approval obtained.

7 (ix) Disposal of waste

All wastes, including solid human wastes, shall be removed from the Area in accordance with Annex III (Waste disposal nad waste management) of the Protocol on Environmental Protection to the Antarctic Treaty. Liquid human waste may be disposed of into the sea off the Area, at the end of the season.

7 (x) Measures that may be necessary to ensure that the aims and objectives of the Management Plan continue to be met

Permits may be granted to enter the Area to carry out biological monitoring and site inspection activities, which may involve the collection of small samples for analysis or audit, or to erect and maintain signpost, or protective measures. Scientific activities shall be performed in accordance with *SCAR's environmental code of conduct for terrestrial scientific field research in Antarctica.*

Any specific sites of long-term monitoring that are vulnerable to accidental disturbance should be appropriately marked and the information passed to other Parties through appropriate channels.

Interference and overlapping with long-term research and monitoring programmes should be avoided through consultations and an exchange of information in advance of the proposed activities.

7 (xi) Requirements for reports

The principal permit holder for each visit to the Area shall submit a report to the appropriate national authority as soon as practicable, and no later than six months after the visit has been completed..

The reports must include the information outlined in the Visit Report form, in accordance with Resolution 2 (2011). If appropriate, the national authority should also forward a copy of the visit report to the Party that proposed the Management Plan, to assist in managing the Area and reviewing the Management Plan.

Parties should, wherever possible, deposit originals or copies of such original visit reports in a publicly accessible archive to maintain a record of usage, for the purpose of any review of the Management Plan and in organising the scientific use of the Area.

The relevant authority shall be informed of any activity undertaken, any measure taken or material released and not removed which are not covered by a permit.

8. Supporting documentation

Non-Native Species Manual. Resolution 6 (2011) – ATCM XXXIV – CEP XIV, Buenos Aires (available at *http://www.ats.aq/documents/atcm34/ww/atcm34_ww004_e.pdf*)

Guidelines for the Operation of Aircrafts near Concentrations of Birds in Antarctica. Resolution 2 (2004) – ATCM XXVII - CEP VII, Cape Town (available at *http://www.ats.aq/documents/recatt/Att224_e.pdf*)

COMNAP/SCAR Checklists for supply chain managers of National Antarctic Programmes for the reduction in risk of transfer of non-native species – ATCM XXXIV/CEP XIV, Buenos Aires (avaible at https://www.comnap.aq/Shared%20Documents/checklistsbrochure.pdf)

SCAR Code of Conduct for the Use of Animals for Scientific Purposes (available at *http://www.scar.org/treaty/atcmxxxiv/ATCM34_ip053_e.pdf*)

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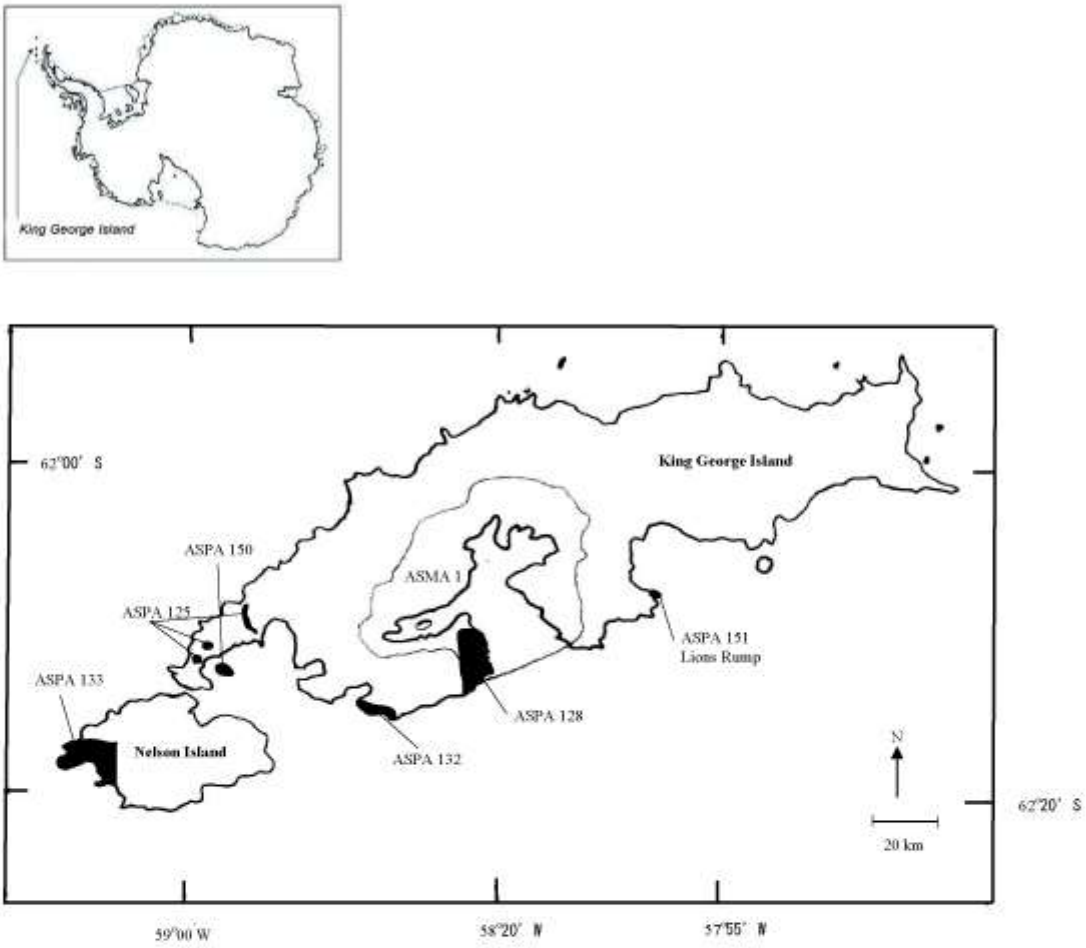
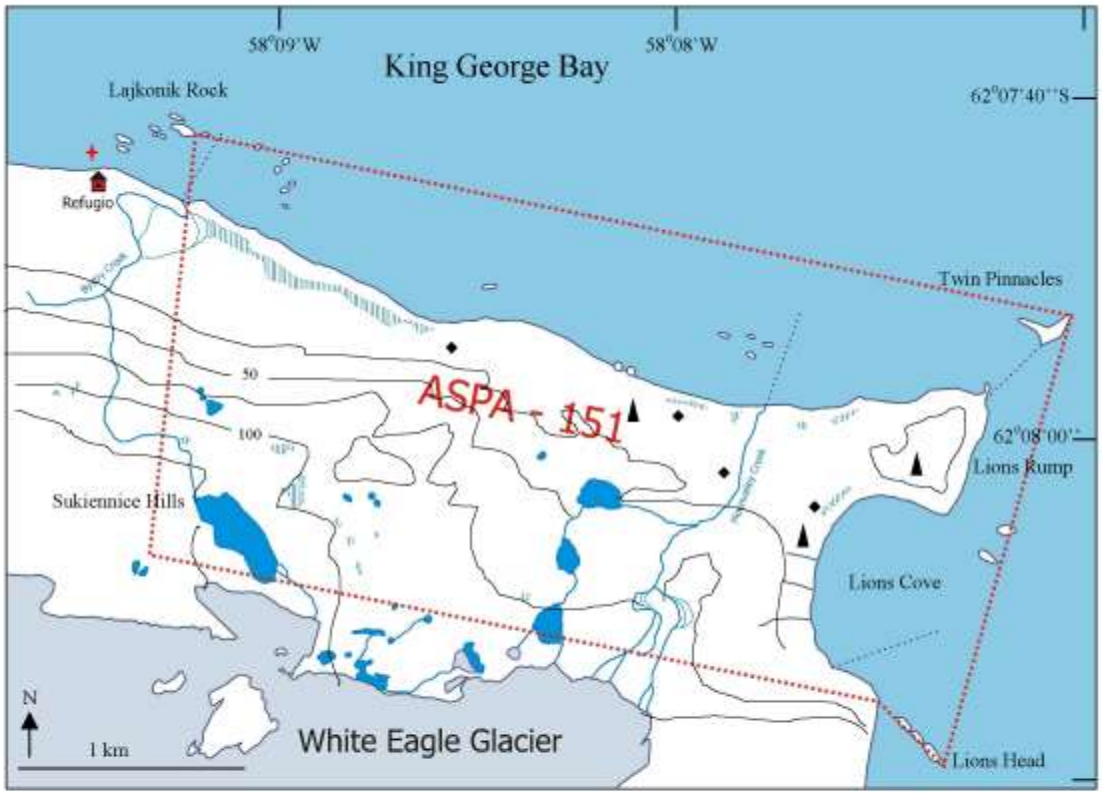
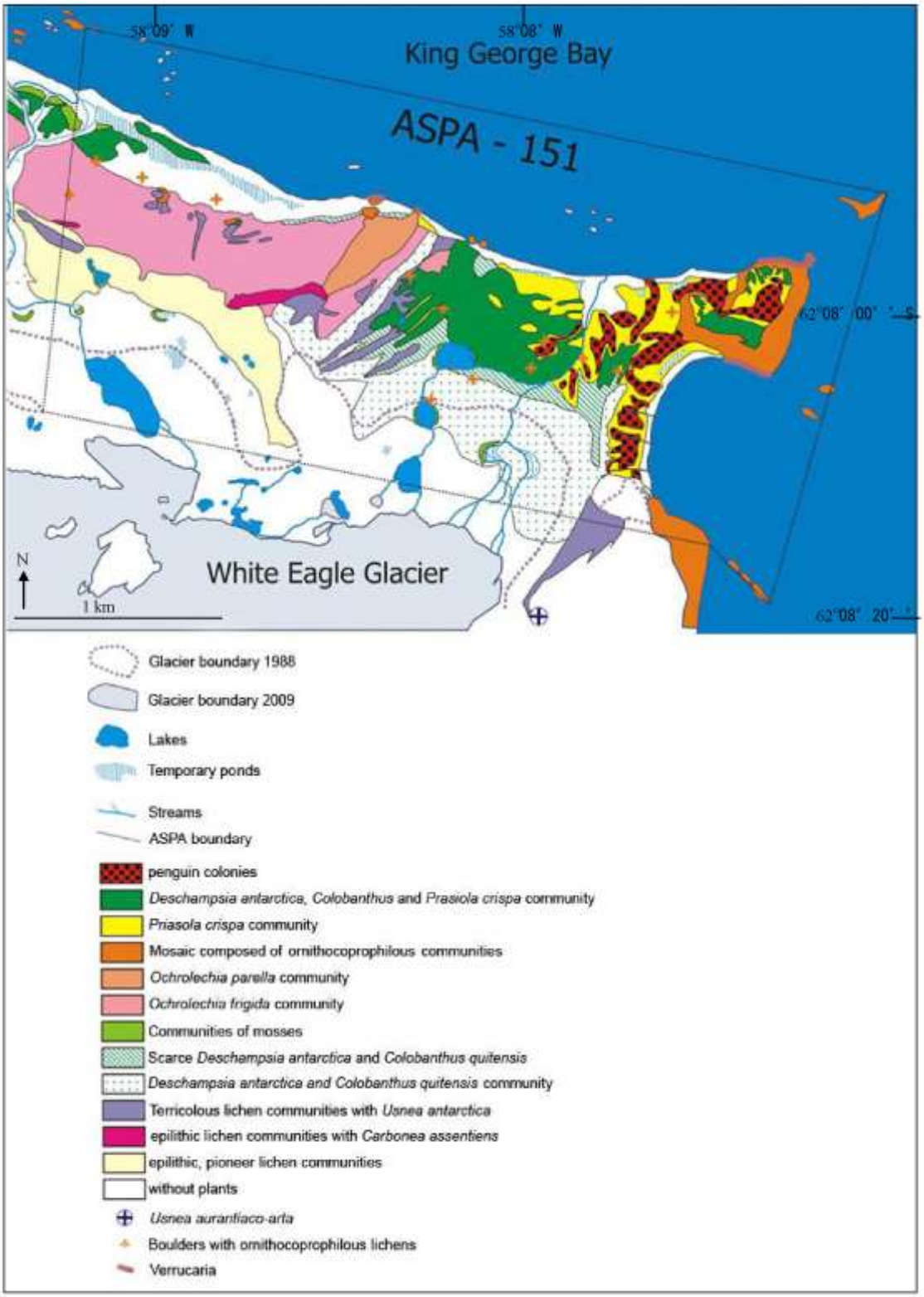


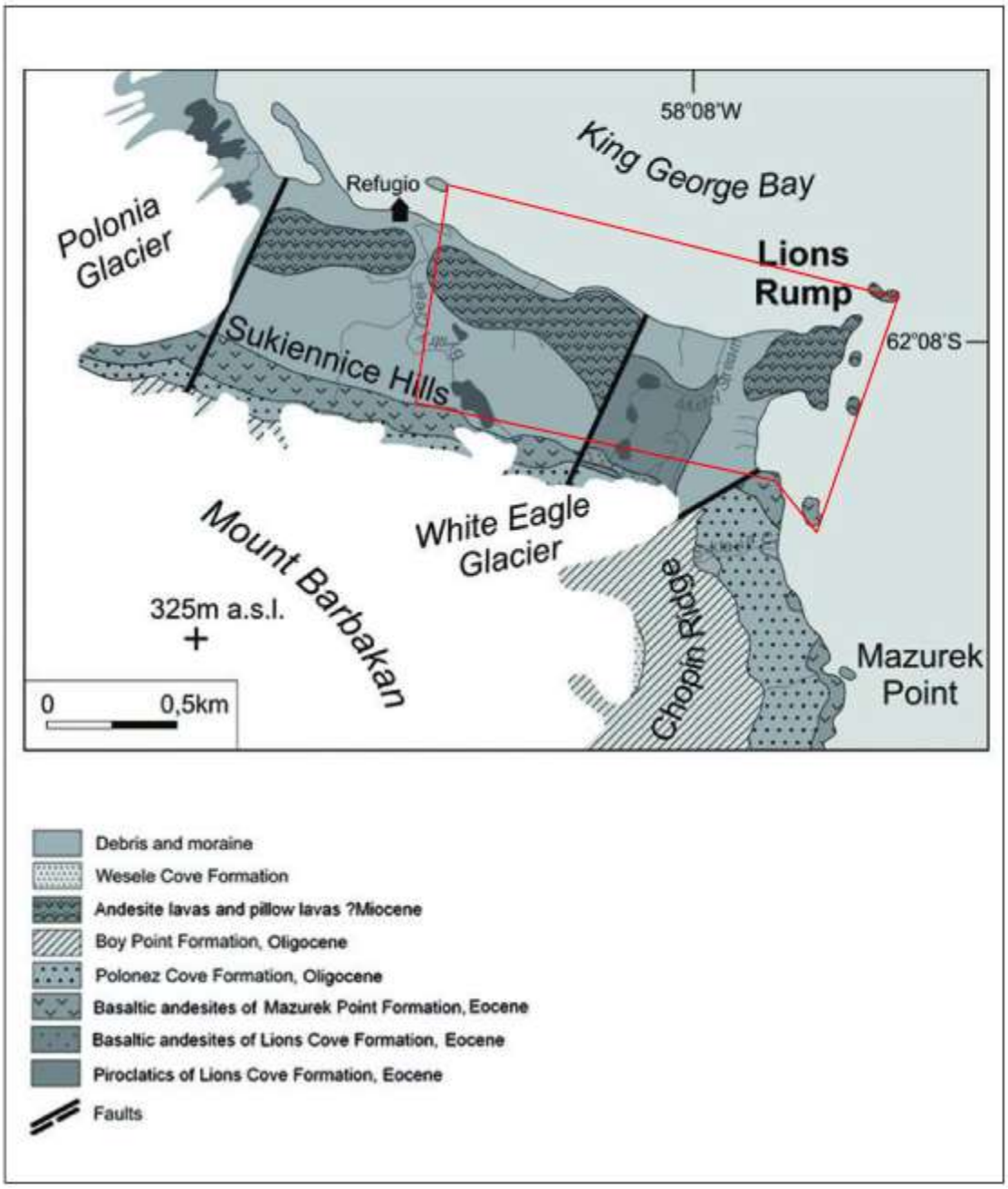
Map. 1. The location of ASPA 151 Lions Rump in relation to King George Island



Map 2. Lions Rump in greater detail.



Map 3. Vegetation map of Lions Rump



Map 4. Geological map of Lions Rump