

# Management Plan for Antarctic Specially Protected Area No. 127 HASWELL ISLAND (Haswell Island and Adjacent Emperor Penguin Rookery on Fast Ice)

## Revised Management Plan

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

Haswell Island is a unique breeding site for almost all breeding bird species in East Antarctica including the: Antarctic petrel (*Talassoica antarctica*), Antarctic fulmar (*Fulmarus glacioides*), Cape petrel (*Daption capense*), Snow petrel (*Pagodroma nivea*), Wilson's storm petrel (*Oceanites oceanicus*), South polar skua (*Catharacta maccormicki*), and Adelie penguin (*Pygoscelis adeliae*). The Area supports five species of pinnipeds, including the Ross seal (*Ommatophoca rossii*) which is a protected species.

South-east of the island, there is a large colony of Emperor penguins (*Aptenodytes forsteri*) on fast ice.

The Area consists of Haswell Island (66°31'S, 93°00'E), about 1 km<sup>2</sup> in area, the largest of a group of islands lying close to Mirny station, together with its littoral zone and the area of fast ice, when present. ATCM VIII (Oslo, 1975) approved its designation as SSSI 7 on the aforementioned grounds after a proposal by the USSR. Map 1 shows the location of the Haswell Islands (except Vkhodnoy Island), Mirny station, and logistic activity sites. It was renamed and renumbered as ASPA No. 127 by Measure 1 (2002).

Currently it is proposed to detail the boundaries of the Antarctic Specially Protected Area, Haswell Island (66°31'S, 93°00'E), about 1 km<sup>2</sup> in area and the adjacent section of Davis Sea fast ice of approximately 5 km<sup>2</sup> (when present), that supports a colony of Emperor penguins (Map 2). It is one of a few Emperor penguin colonies in the vicinity of a permanent Antarctic station, and therefore it has advantages for the study of the species and its habitat.

Described by biologists during the first Soviet expeditions, the Area was studied in the 1970s and recent years, providing valuable materials for comparative analyses and monitoring of the long-term long environmental impact of a large Antarctic station.

### **2. Aims and Objectives**

Research in the ASPA is conducted to provide a better understanding of how natural and anthropogenic environmental changes affect the status and dynamics of local populations of flora and fauna, and how these changes affect the interaction between key species of the Antarctic ecosystem.

Management at Haswell Island aims to:

- Avoid direct impact of logistic activities on the Area;
- Regulate access to the Area;
- Avoid anthropogenic changes in the structure and abundance of local populations of flora and fauna;
- Allow scientific research, provided it is for compelling scientific reasons that cannot be served elsewhere;
- Facilitate scientific research on the environment in the context of monitoring and assessment of human impact on populations;
- Encourage environmental education and awareness.

### **3. Management Activities**

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

- When the vessel is approaching Mirny station and upon arrival at the station, all persons arriving shall be informed of the existence and location of the ASPA and the relevant provisions of the Management Plan.
- Copies of the Management Plan and maps of the Area showing its location shall be available at all units engaged in logistic and scientific activities on the Haswell Islands.
- A sign showing directions of the Area boundaries, with clear statements of entry restrictions (“No entry! Antarctic Specially Protected Area”), shall be placed at the crossing point of lines Gorev Island – Fulmar Island and Cape Mabus – eastern extremity of Haswell Island to help avoid inadvertent entry into the Area following the formation of fast ice which is safe for pedestrian and vehicle traffic. Information signs shall be installed at the top of Cape Mabus slope, and at station activity sites in the direct vicinity of the Area.
- Markers and signs erected within the Area shall be secured, maintained in good condition, and have no impact on the environment.
- Overflight shall only be allowed under those conditions as set out under 7. *Permit Conditions*

The Management Plan shall be revised periodically to ensure that the values of the Antarctic Specially Protected Area are adequately protected. Any activity in the Area shall be preceded by the environmental impact assessment.

### **4. Period of Designation**

Designated for an indefinite period.

### **5. Maps**

Map 1: Location of the Haswell Islands, Mirny Station, and logistic activity sites.

Map 2: Boundaries of Antarctic Specially Protected Area 127, Haswell Island.

Map 3: Location of breeding seabird colonies.

Map 4: Topographic map of Haswell Island.

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

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

The Area occupies a territory inside polygon ABFEDC (66° 31' 10" S, 92° 59' 20" E; 66° 31' 10" S, 93° 03' E; 66° 32' 30" S, 93° 03' E; 66° 32' 30" S, 93° 01' E; 66° 31' 45" S, 93° 01' E; 66° 31' 45" S, 92° 59' 20" E) (Map 2). The marked section of fast ice in the Davis Sea encompasses the most likely routes taken by Emperor penguins during the breeding season.

#### *Topography*

The Area boundaries on fast ice closer to the station can be broadly (visually) identified on site as directions EF (Vkhodnoy Island – Fulmar Island) and ED (Cape Mabus – eastern extremity of Haswell Island). A sign showing the directions of the Area boundaries, with clear statements of entry restrictions (“No entry! Antarctic Specially Protected Area”), shall be placed in point E. Information signs showing distance to the Area boundary shall be installed at station activity sites in the direct vicinity of the Area (at the top of Cape Mabus slope, and on Buromsky, Zykov, Fulmar, and Tokarev Islands).

It is highly unlikely that the outlying marine boundaries of the Area will be crossed inadvertently, as there is presently no activity this far away from the station. These boundaries have no visual features and shall be identified by the map.

There are no paths or roads within the Area.

#### *Ice conditions*

The Area comprises Haswell Island (the largest island in the archipelago), its littoral zone, and the adjacent section of fast ice in the Davis Sea. Russia's Mirny Observatory on Mirny Peninsula located in coastal nunataks south of the ASPA has been operational since 1956.

For the larger part of the year, the sea within the Area is covered with fast ice, whose width reaches 30-40 km by the end of winter. Fast ice breaks up between December 17 and March 9 (February 3, on average) and freezes between March 18 and May 5 (April 6, on average). The probability that the ice-free period off Mirny will last more than 1 month is 85%, more than 2 months 45%, and more than 3 months 25%. The Area is always full of icebergs frozen in the ice. In summer, when fast ice disappears, icebergs drift westward along the coast. Seawater temperature is always below zero. The tide has an irregular daily pattern.

#### *Environmental domains analysis*

Based on the Environmental Domains Analysis for Antarctica (Resolution 3(2008)) Haswell Island is located within Environment L *Continental coastal-zone ice sheet*.

#### *Biological Features*

Coastal waters support a rich benthic fauna. Fish fauna in the Area is dominated by various icefish species, while Antarctic toothfish (*Dissostichus mawsoni*) and Antarctic silverfish (*Pleuragramma antarcticum*) are less abundant. An ample forage base and the availability of suitable nesting sites create a favorable environment for numerous seabirds. According to records, there are 12 bird species in the vicinity of Mirny (Table 1).

The coastal fauna is mainly represented by pinnipeds, among which Weddell seals (*Leptonychotes weddelli*) are most abundant. Other Antarctic seal species can be seen occasionally in very small numbers. Minke whales (*Balaenoptera acutorostrata*) and killer whales (*Orcinus orca*) have frequently been observed near Mirny.

Table 1: The avifauna of the Haswell Islands (ASPA 127).

1	Emperor penguin ( <i>Aptenodytes forsteri</i> )	B, M
2	Adelie penguin ( <i>Pygoscelis adeliae</i> )	B, M
3	Chinstrap penguin ( <i>Pygoscelis antarctica</i> )	V
4	Macaroni penguin ( <i>Eudyptes chrysolophus</i> )	V
5	Southern fulmar ( <i>Fulmarus glacioides</i> )	B
6	Antarctic petrel ( <i>Thalassoica antarctica</i> )	B
7	Cape petrel ( <i>Daption capense</i> )	B
8	Snow petrel ( <i>Pagodroma nivea</i> )	B
9	Southern giant petrel ( <i>Macronectes giganteus</i> )	V
10	Wilson's storm petrel ( <i>Oceanites oceanicus</i> )	B
11	Pomarine skua ( <i>Stercorarius pomarinus</i> )	V
12	South-polar skua ( <i>Catharacta maccormicki</i> )	B
13	Lonnberg skua <i>Catharacta</i> ( <i>Antarctica lonnbergi</i> )	V
14	Kelp gull ( <i>Larus dominicanus</i> )	V

Notes: B – breeding species; M – molting sites in the vicinity of the station; V – vagrant species.

At present, seabirds nest on six out of seventeen archipelago islands. Seven species breed directly on the islands, and one species – the Emperor penguin (*Aptenodytes forsteri*) – on fast ice. A few vagrant species have also been observed in the Area. In general, core species composition of the avifauna remains stable during past 60 years, and is characteristic of the East Antarctica coastal areas. Recent updates to the species list (Table 1., added Southern giant petrel *Macronectes giganteus* and Lonnberg skua *Catharacta Antarctica lonnbergi*) are explained by more extensive ornithological observations at the Mirny station during last decade. All new species are recorded as vagrants only. At the same time, the Southern giant petrel observed in 2006 for the first time at Mirny, seems to become rare but regular visitor to the Area.

#### *Emperor penguin (*Aptenodytes forsteri*)*

The Emperor penguin colony of the Haswell Islands is located on fast ice in the Davis Sea 2 to 3 km north-east of the Mirny Observatory and usually within 1 km of Haswell Island. The colony was discovered and

## ATCM XXXIV Final Report

described by the Western Party of the Australasian Antarctic Expedition on November 25, 1912. However, a detailed study of the colony was initiated only after the establishment of the Mirny Observatory. Since its foundation in 1956, the Observatory has been conducting periodic monitoring of the size of the breeding population. The first round-the-year observation of the colony was initiated by E.S. Korotkevich in 1956 (Korotkevich, 1958), continued until 1962 (Makushok, 1959; Korotkevich, 1960; Prior, 1968), and was then resumed by V.M. Kamenev in the late 1960s-early 1970s (Kamenev, 1977). After a long break, observations of the avifauna were resumed at the area in 1999-2011 (Gavrilo, Mizin, 2007, Gavrilo, Mizin, 2011, Neelov et al., 2007).

Table 2 shows a schedule of various phenological events in the Emperor penguin colony of the Haswell Islands.

Table 2: Dates of phenological events in the Emperor penguin colony, Haswell Islands.

<b>Penguins arrive at the colony site</b>	Last 10 days in March
<b>Peak of the mating period</b>	Late April – first ten days in May
<b>Commencement of egg laying</b>	First 5 days in May
<b>Commencement of hatching</b>	July 5–15
<b>Chicks start leaving brood pouches</b>	Last 10 days in August
<b>Chicks start getting together in creches</b>	First 10 days in September
<b>Chicks start molting</b>	Late October – early November
<b>Adult birds start molting</b>	Last 10 days in November – first 5 days in December
<b>The colony starts disintegrating</b>	Last 10 days in November – mid-December
<b>Birds abandon the colony site</b>	Last 5 days in December – first 10 days in January

The most recent data on the colony status were obtained during 2010-2011 when the colony initially consisted of two sub-colonies 400 m apart. Single adult birds and those with eggs and chicks migrated between the subcolonies. Later, the third subcolony separated. All subcolonies were located and moved within the same area as in previous years, i.e. east and south-east off the Haswell Island.

During last decade, the Haswell colony of the emperor penguins should be considered rather stable and even slightly increasing. Highest population numbers as observed during egg laying period in 2010/2011 season reached ca. 13,000 adults, which is the maximal counts for the last 12 years (RAE, unpublished data). According to estimates and censuses conducted in 1956–1966, the total population varied from 14,000 to 20,000 birds (Korotkevich, 1958, Makushok, 1959, Prior, 1964, Kamenev, 1977). After that, during 1970-s – 1980-s population declined at ca. 30%, but later, in 2000-s, a recovery process is observed.

Comparative analysis of the emperor penguin population dynamics in two colonies located in the same ecoregion (80°E - 140°E), i.e. Haswell and Pointe Géologie, revealed similar trends during past 60 years (Barbraud et al., 2011). Before 1970-s penguin population at Pointe-Geologie Archipelago, Terre Adelie (ASPA 120) was stable, and at Haswell it was also stable or slightly decreasing. Population growth rate notably decreased and population numbers declined in both colonies during climatic regime shift in 1970-1980. Magnitude of decline was similar as well, and the numbers of breeding pairs correlated. Given that, one could suggest common large-scale environmental/climatic changes and related ecosystem shifts observed widely over the Southern Ocean might affect penguin populations. The same string negative factor is likely to impact both populations. The ice cover, which is known to effect emperor penguin ecology, is suggested to be such a factor. In particular, decrease in iced cover and earlier onset of the fast-ice break-up dates negatively impacted penguin survival and further breeding population numbers via changes in food availability as shown previously Barbraud, Weimerskirch, 2001, Jenouvrier et al., 2009). During past 20 years both colonies demonstrated positive population dynamics under conditions of increasing extent of the ice cover and shift of fast-ice break-up onset to the later dates.

Table 3: Factors affecting the population of Emperor penguins on the Haswell Islands and relevant mitigation actions.

	<b>Actions to mitigate the impact of anthropogenic factors</b>
--	--

<b>Anthropogenic factors</b>	Disturbance by visitors	Visits to the colony should be strictly regulated
	Collection of eggs	The collection of eggs is prohibited, except in accordance with a permit for research issued by a national authority.
	Disturbance by flights	Flight route and height should be selected in accordance with this Management Plan
<b>Natural factors</b>	Climate changes and related changes in food resources. Ice conditions affect food availability and survival of adults and chicks. (Decrease in sea ice extent in April – June leads to decline in population growth rate and population numbers decline. An early break-up of fast ice increases chick mortality).	

Data on changes in the size of other populations are less complete (Table 4). Long-term changes may show a negative trend. However, it's not possible to make well-grounded conclusions based just on the three surveys with not full coverage of the populations and which are several decades apart.

Table 4: Long-term changes in the size of bird populations on the Haswell Islands. Trend: 0 = uncertain, -1 = negative, ? = supposed.

Species	1960s-1970s, adults in individuals	1999/2001	2009/10, adults in individuals	Trend
Adelie penguin	41,000-44,500	Ca. 31,000 adults	Ca. 27,000	-1
Southern fulmar	9,500-10000	2300 nests with clutches	Ca. 5,000	-1
Antarctic petrel	900-1050	150-200 nests with clutches	Ca. 500	-1
Cape petrel	750	150 nests with clutches	Ca. 300	-1
Snow petrel	600-700	60-75 nests with clutches	No data	-1 ?
Wilson's storm-petrel	400-500	Min 30 occupied nests	Over 80	-1 ?
South-polar skua	48 (24 pairs)	Min. 38 (19 pairs)	134 (62 pairs)	1

The data from Haswell Island area show possible long-term negative trends in different seabird species including both penguins and flying birds. It is possible that large-scaled climate changes may be responsible for the negative population dynamics in the Haswell Island area, not only in emperor penguin populations but also in other seabird populations except for the south-polar skua.

More research and further monitoring are needed to reveal population trends in the birds of Haswell Island and to understand their causes.

#### **6(ii) Definition of seasons; restricted and prohibited zones within the Area**

Entry into any part of the Area is allowed only for holders of a Permit issued by an appropriate National Authority.

Activity in the Area shall be subject to special restrictions during the bird breeding season:

- From mid-April to December in the vicinity of the Emperor penguin colony; and
- From October to March in the vicinity of the nesting sites on Haswell Island.

## ATCM XXXIV Final Report

The location of the breeding colonies is shown in Map 3. Emperor penguins, which are especially sensitive to disturbance, shall also be protected outside the designated breeding site as the breeding site may vary in location.

### **6(iii) Structures within the Area**

A beacon – a metal pole whose base is secured by stones – is located on Haswell Island. There are no other structures on the island.

A heated shack containing an emergency food supply may be located on one of the neighboring islands (but not on Haswell Island).

### **6(iv) Location of other protected areas within close proximity**

HSM No 9 Cemetery on Buromskiy Island is located in 200 m to boundary of the Area.

## **7. Permit Conditions**

### **7(i) Permit conditions**

Entry into the Area is prohibited unless in accordance with a Permit issued by an appropriate national authority. Issue of a Permit to enter the Area must satisfy the following conditions:

- A Permit is issued only for purposes specified in para. 2 of the Management Plan;
- Permits shall be issued for a stated period;
- The actions permitted will not jeopardize the ecosystems of the Area or interfere with existing scientific research;
- Visits to the Area under a Permit shall be allowed to organized groups accompanied by a authorized person. Relevant information shall be entered in the Visit Logbook specifying the date and purpose of the visit and the number of visitors. The leader of the Mirny station keeps the Logbook. The authorized person is appointed in accordance with national procedure; and
- A visit report shall be supplied to the authority named in the Permit by the end of stated period or annually.

Permits shall be issued for scientific research, monitoring studies, or inspections that do not require collection of biological materials or fauna samples, or that require collecting in small quantities. A Permit for a visit to or stay in the Area shall specify the scope of tasks to be implemented, the implementation period, and the maximum number of staff allowed to visit the Area.

### **7(ii) Access to and movement within the Area**

Vehicles other than skidoos are prohibited within the Area.

When approaching or moving within the Area, care shall be taken to avoid any disturbance to birds and seals, especially during the breeding season. Deterioration of the conditions of or approaches to the bird nesting sites, or seal haulouts shall be prohibited at all times.

*Haswell Island.* The western or south-western slopes are most suitable for access (Map 4). Movement shall only be on foot.

*Fast ice section.* During the formation of fast ice which provides pedestrian and vehicle safety, entry into the section shall be at any suitable place from the Mirny station. The use of any vehicles in the Area shall be prohibited during the nest sitting season (May-July). When using skidoos, visitors shall not approach the Emperor penguin colony closer than 500 m (irrespective of its location).

Overflight of the Area is prohibited during the most sensitive period of the Emperor penguin breeding cycle, from April 15 to August 31.

During the remainder of the year, overflight of the Area shall be conducted according to the following restrictions (Table 5). Direct overflights of the seabird breeding colonies should be avoided whenever it is possible.

Table 5: Minimum overflight heights within the Area according to aircraft type.

Aircraft type	Number of engines	Minimum height above ground	
		Feet	Meters
Helicopter	1	2,460	750
Helicopter	2	3,300	1,000
Fixed-wing	1 or 2	2,460	750
Fixed-wing	4	3,300	1,000

**7(iii) Activities that are or may be conducted in the Area, including restrictions on time or place**

- Research on avifauna and other environmental studies that cannot be conducted elsewhere;
- Management activities, including monitoring.
- Education visits to the Emperor penguins colony except of the early nesting period (May – July)

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

Structures or scientific equipment may be installed in the Area only for compelling scientific or management purposes approved by an appropriate authority pursuant to the effective regulations.

**7(v) Location of field camps**

Camping shall be allowed only for safety reasons, and every precaution shall be taken to avoid damage to the local ecosystem and disturbance to the local fauna.

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

No living organisms or chemicals other than chemicals required for scientific purposes specified in the Permit shall be introduced into the Area (chemicals introduced for scientific purposes shall be removed from the Area before the Permit expiry).

Fuel is not to be stored in the Area unless it is required for essential needs relating to the permitted activity. Anything introduced shall be for a stated period only, handled so that the risk to the ecosystem is minimized, and removed at the conclusion of the stated period. No permanent storage facilities shall be established in the Area.

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

Taking of or harmful interference with native flora or fauna is prohibited, except by Permit. In the case the activity is determined to have less than a minor or transitory impact, it should be conducted in accordance with the *SCAR Code of Conduct for the Use of Animals for Scientific Purposes in Antarctica*, to be used as a minimum standard.

**7(viii) Collection or removal of anything not brought into the Area by the Permit holder**

Collection or removal of anything not brought into the Area by the Permit holder shall only be for scientific or management purposes specified in the Permit.

However, human waste may be removed from the Area, and dead or pathological samples of fauna and flora may be removed for laboratory analysis.

**7(ix) Disposal of waste**

All waste shall be removed from the Area.

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

Permits to enter the Area may be granted to carry out scientific observation, monitoring, and site inspection activities, which may involve limited collection of fauna samples, eggs, and other biological materials for scientific purposes. To help maintain the environmental and scientific values of the Area, visitors shall take every precaution against the introduction of alien materials and organisms.

Any long-term monitoring sites shall be appropriately marked on a map and on site. A map showing the boundary of the ASPA shall be displayed at Mirny station. A copy of the Management Plan shall be displayed at Mirny station. A copy of the Management Plan shall be freely available at Mirny station.

Visits to the Area shall be limited to scientific, management and educational purposes.

**7(xi) Requirements for reports**

Parties should ensure that the principal holder of each Permit issued submits to the appropriate authority a report describing the activities undertaken. Such reports should include, as appropriate, the information identified in the visit report form contained in the Guide to the Preparation of Management Plans for Antarctic Specially Protected Areas. Parties should maintain a record of such activities, and, in the Annual Exchange of Information, should provide summary descriptions of activities conducted by persons subject to their jurisdiction, which should be in sufficient detail to allow evaluation of the effectiveness of the management plan. Parties should, wherever possible, deposit originals or copies of such original reports in a publicly accessible archive to maintain a record of usage, to be used both in any review of the management plan and in organizing the scientific use of the Area.

## 8. References

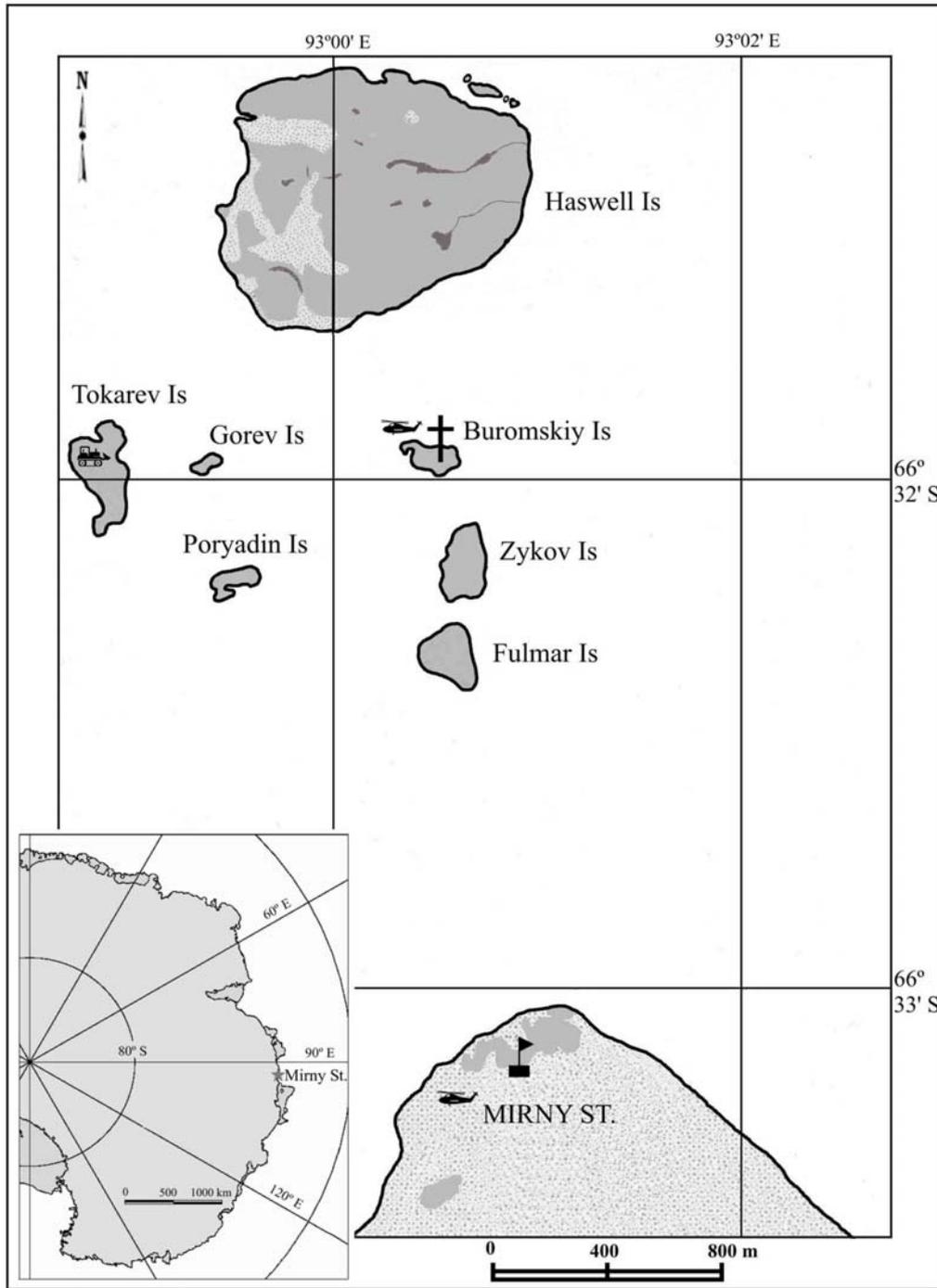
- Androsova, E.I.. Antarctic and Subantarctic bryozoans // Soviet Antarctic Expedition Newsletter.-1973.-No. 87.-P.65-69. (in Russian)
- Averintsev, V.G. Ecology of sublittoral polychaetes in the Davis Sea // Animal Morphology, Systematics and Evolution.-L.,1978.-P.41-42. (in Russian)
- Averintsev, V.G. Seasonal variations of sublittoral polychaetes in the Davis Sea // Marine Fauna Studies.-L.,1982.-Vol.. 28(36).-P.4-70. (in Russian)
- Barbroud C. & Weimerskirch H. 2001 Emperor Penguins and climate change. Nature, 411: 183 – 185.
- Barbroud C., Gavrilov M., Mizin Yu., Weimerskirch H. Comparison of emperor penguin declines between Pointe Géologie and Haswell Island over the past 50 years. Antarctic Science. 2011. (Accepted)
- Budylenko, G.A., and Pervushin, A.S. The migration of finwhales, sei whales and Minke whales in the Southern Hemisphere // Marine Mammals: Proceedings of VI All-Union Meeting.-Kiev, 1975.-Part.1.-P.57-59. (in Russian)
- Bushueva, I.V. A new Acanthonotozommella species in the Davis Sea (East Antarctica) // Zool. Zhurn.-1978.-Vol.57, issue 3.-P.450-453. (in Russian)
- Bushueva, I.V. A new Pseudoharpinia (Amphipoda) species in the Davis Sea (Antarctica) // Zool. Zhurn.-1982.-Vol.61, issue.8.-P.1262-1265.
- Bushueva, I.V. Some peculiarities of off-shore amphipod (Gammaridea) distribution in the Davis Sea (East Antarctica) // Hydrobiology and Biogeography of Cold and Moderate World Ocean Waters in the Off-shore Zone: Report Abstracts.-L.,1974.-P.48-49. (in Russian)
- Bushueva, I.V. Some peculiarities of Paramola walkeri ecology in the Davis Sea (East Antarctica) // Off-shore Biology: Abstracts of Reports Presented at the All-Union Conference. - Vladivostok,1975.-P.21-22. (in Russian)
- Chernov, A., Mizin, Yu. 2001 Avifauna observations at Mirny Station during RAE 44 (1999-2000) — The State of the Antarctic Environment as Shown by Real-time Data from Russia's Antarctic Stations. — SPb: AARI. (in Russian)
- Doroshenko, N.V. The distribution of Minke whales (Balaenoptera acutorostrata Lac) in the Southern Hemisphere // V All-Union Meeting on Marine Mammal Research: Report Abstracts. - Makhachkala, 1972.-Part1.-P.181-185. (in Russian)
- Egorova, E.N. Biogeographic composition and possible development of gastropods and bivalves in the Davis Sea, // Soviet Antarctic Expedition Newsletter.-1972.-No. 83.-P.70-76. (in Russian)
- Egorova, E.N. Mollusks of the Davis Sea (East Antarctica).- L.:Nauka, 1982.-144 pp. - (Marine Fauna Research; No. 26(34). (in Russian)
- Egorova, E.N. Zoogeographic composition of the mollusk fauna in the Davis Sea (East Antarctica) // Mollusks. Major Results of the Study: VI All-Union Mollusk Research Meeting.- L.,1979.-Vol.6.-P..78-79. (in Russian)
- Gavrilov, M.V., Chupin, I.I., Mizin, Yu.A., and Chernov A.S. 2002. Study of the Biological Diversity of Antarctic Seabirds and Mammals. – Report on Antarctic Studies and Research under the World Ocean Federal Targeted Program. SPb: AARI (unpublished). (in Russian)
- Gavrilov M., Mizin Yu. 2007. Penguin population dynamics in Haswell Archipelago area, ASPA № 127, East Antarctica. – p. 92 in Wohler E.j. (ed.) 2007. Abstracts of oral and poster presentations, 6th International Penguin Conference. Hobart, Australia, 3-7 September 2007
- Gavrilov M., Mizin I. Current zoological researches in the area of Mirny station.Russian Polar Researches. Iss. 3. AARI, 2011.

## ATCM XXXIV Final Report

- Gruzov, E.N. Echinoderms in coastal biocenoses of the Davis Sea (Antarctica) // Systematics, Evolution, Biology, and Distribution of Modern and Extinct Echinoderms.-L.,1977.-P.21-23. (in Russian)
- Kamenev, V.M. Adaptive peculiarities of the reproduction cycle of some Antarctic birds. - Body Adaptation to Far North Conditions: Abstracts of Reports Presented at the All-Union Meeting. Tallinn, 1984. P. 72-76. (in Russian)
- Kamenev, V.M. Antarctic petrels of Haswell Island // Soviet Antarctic Expedition Newsletter.-1979.-No. 99.-P.78-84. (in Russian)
- Kamenev, V.M. Ecology of Adelie penguins of the Haswell Islands // Soviet Antarctic Expedition Newsletter. 1971. No. 82. P. 67-71. (in Russian)
- Kamenev, V.M. Ecology of Cape and snow petrels. - Soviet Antarctic Expedition Newsletter. 1988. No. 110. P. 117-129. (in Russian)
- Kamenev, V.M. Ecology of Emperor penguins of the Haswell Islands. – The Adaptation of Penguins. M., 1977. P. 141-156. (in Russian)
- Kamenev, V.M. Ecology of Wilson’s storm petrels (*Oceanites oceanicus* Kuhl) on the Haswell Islands // Soviet Antarctic Expedition Newsletter. 1977. No. 94. P. 49-57. (in Russian)
- Kamenev, V.M. Protected Antarctica. – Lecturer’s Aid. L.: Znanie RSFSR, 1986. P. 1-17. (in Russian)
- Kamenev, V.M. The Antarctic fulmar (*Fulmarus glacialis*) of the Haswell Islands // Soviet Antarctic Expedition Newsletter. - 1978. No. 98. P. 76-82. (in Russian)
- Korotkevish, E.P. 1959 The birds of East Antarctica. – Arctic and Antarctic Issues. – No. 1. (in Russian)
- Korotkevish, E.P. 1960 By radio from Antarctica. — Soviet Antarctic Expedition Newsletter. - № 20-24. (in Russian)
- Krylov, V.I., Medvedev, L.P. The distribution of the Cetaceans in the Atlantic and South Oceans // Soviet Antarctic Expedition Newsletter.-1971.-No. 82.-P.64-66. (in Russian)
- Makushok, V.M. 1959 Biological takings and observations at the Mirny Observatory in 1958. — Soviet Antarctic Expedition Newsletter. – No. 6. (in Russian)
- Minichev, Yu.R. Opisthobranchia (Gastropoda, Opisthobranchia) of the Davis Sea // Marine Fauna Research.-L.,1972.-Vol.11(19).-P.358-382. (in Russian)
- Mizin, Yu.V. 2004 Report on the Ecological and Environmental Research Program Conducted by RAE 48 at the Mirny Observatory – SPb: AARI, unpublished. (in Russian)
- Neelov A.V., Smirnov I.S., Gavrilov M.V. 2007 50 years of the Russian studies of antarctic ecosystems. – Problemy Arktiki i Antarktiki. – № 76. – Pp. 113 – 130
- Popov, L.A., Studenetskaya, I.R. Ice-based Antarctic seals // The Use of the World Ocean Resources for Fishery Needs. An overview by the Central Research Institute of Fishery Information and Technical Studies. Series. 1.- M., 1971. Issue 5.-P.3-42. (in Russian)
- Prior, M.E. 1964 Observations of Emperor penguins (*Aptenodytes forsteri* Gray) in the Mirny area in 1962. Soviet Antarctic Expedition Newsletter. – No. 47. (in Russian)
- Pushkin, A.F. Some ecological and zoogeographic peculiarities of the Pantopoda fauna in the Davis Sea // Hydrobiology and Biogeography of Cold and Moderate World Ocean Waters in the Off-shore Zone: Report Abstracts.- L.,1974.-P.43-45. (in Russian)
- Splettstoesser J.F., Maria Gavrilov, Carmen Field, Conrad Field, Peter Harrison, M. Messiel, P. Oxford, F. Todd 2000 Notes on Antarctic wildlife: Ross seals *Ommatophoca rossii* and Emperor penguins *Aptenodytes forsteri*. New Zealand Journal of Zoology, 27: 137-142.
- Stepaniants, R.D. Coastal hydrozoans of the Davis Sea (materials of the 11<sup>th</sup> Soviet Antarctic Expedition, 1965/66) // Marine Fauna Research.- L.,1972.-Vol.11(19).-P.56-79. (in Russian)

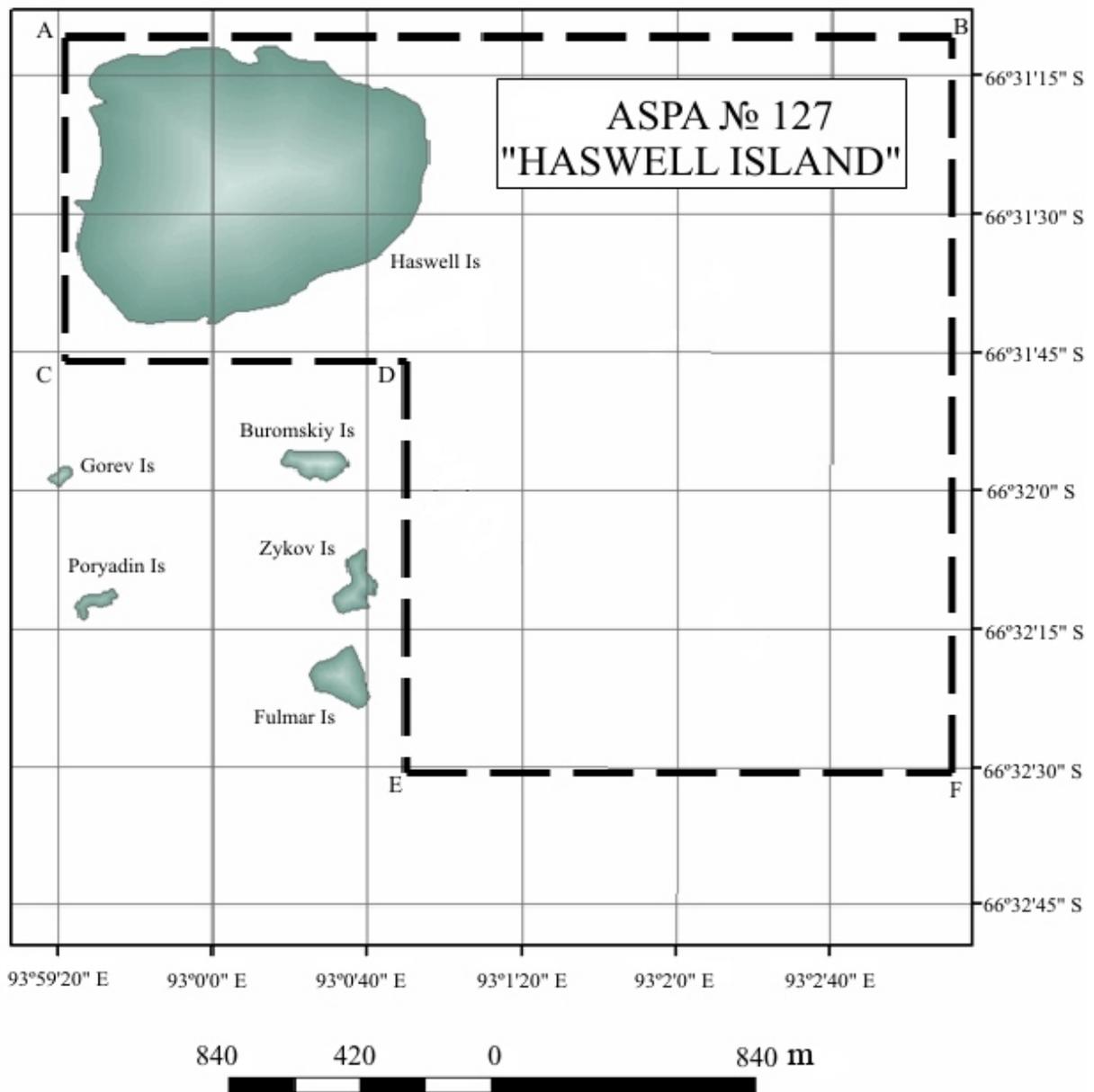
The Final Report of the Twenty Second Antarctic Treaty Consultative Meeting (Tromsø, Norway, May 25 – June 5, 1998). [Oslo, Royal Ministry of Foreign Affairs], P. – 93 – 130. (in Russian).

Map 1: Location of the Haswell Islands, Mirny Station, and logistic activity sites.

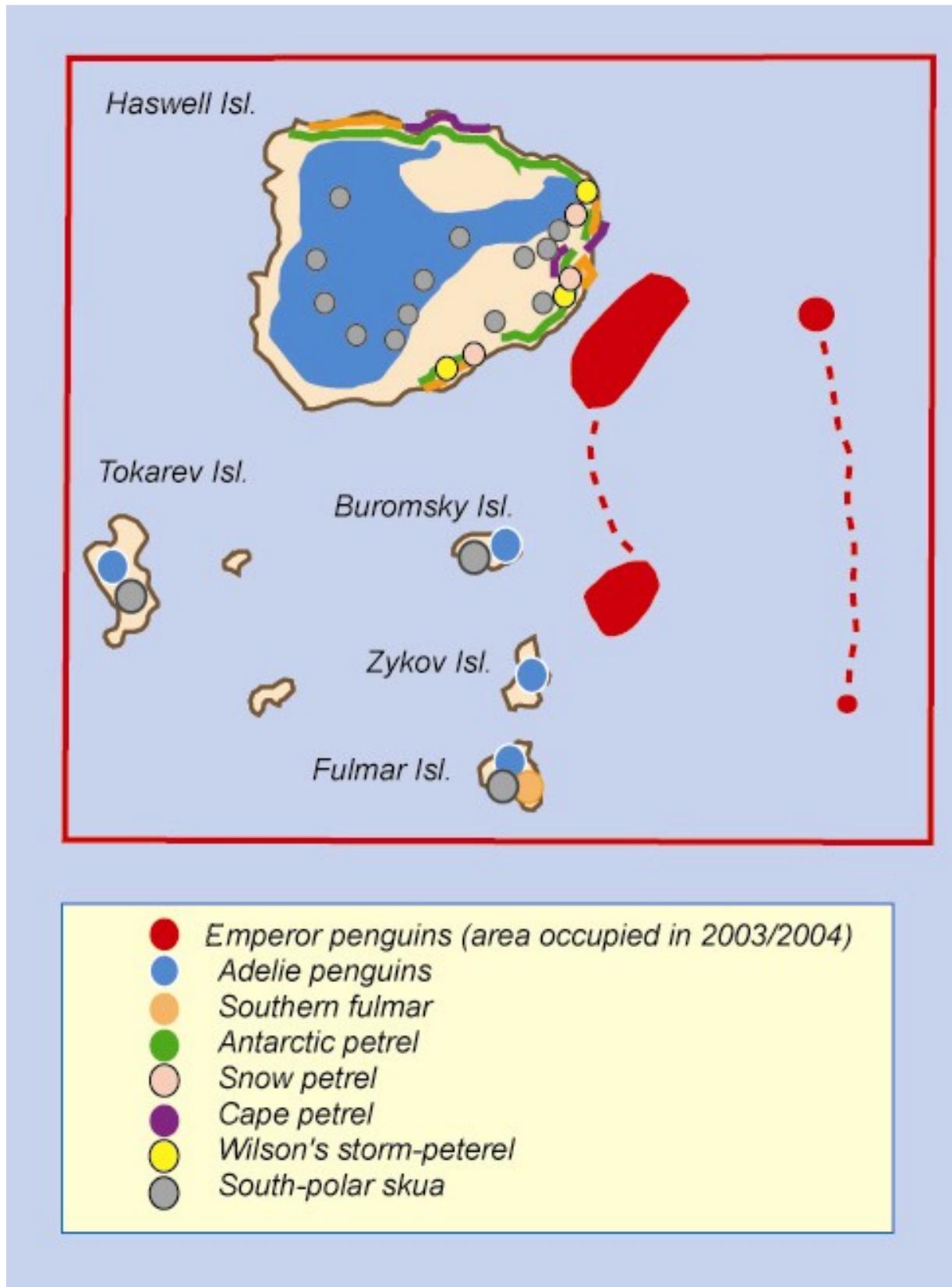


- |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |
| soil, rocks   | glacier   | lakes   | station   | cemetery  | helicopter pad  | vehicle debarkation site  |

Map 2: Boundaries of Antarctic Specially Protected Area 127, Haswell Island.



Map 3: Location of breeding seabird colonies.



Map 4: Topographic map of Haswell Island.

