Marine mammals records in the Haswell archipelago, East Antarctica

Sergey Golubev

Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, Borok, 152742, Russia

Abstract

This is the first comprehensive review of marine mammal records from the Haswell archipelago (Davis Sea, East Antarctica), collected in 1912-2016. The goal of the review is to provide baseline ecological and faunal information on the marine mammals during the historical period (species diversity and status). Eight marine mammal species were recorded within the survey area. Ross seals (*Ommatophoca rossii*) and sei whales (*Balaenoptera borealis*) were seen very rarely. Killer whales (*Orcinus orca*), southern elephant seals (*Mirounga leonina*) and leopard seals (*Hydrurga leptonyx*) appeared rarely and few in numbers. Crabeater seals (*Lobodon carcinophaga*) were rare in general but common during the rare seasons of early fast ice breaking. Weddell seals (*Leptonychotes weddellii*) were common year-round. Antarctic minke whales (*Balaenoptera bonaerensis*) were seasonally common. Weddell seals and Antarctic minke whales were recorded annually. Only Weddell seals were found year-round. Leopard seals were seasonal residents, the remaining species were seasonal visitors in the area. The archipelago is an annual breeding site for Weddell seals (up to 10 pups per breeding season). Rare breeding of crabeater seals is possible. The information presented in this paper was obtained mostly through random observations and few historical records. During the long-term monitoring, a single agreed-upon data collection protocol was not used. As a result, the status of each marine mammal species in this paper should be regarded as preliminary. The review represents a basis for the development of further research programs. A unified protocol for the year-round registration of marine mammals under the conditions of the Mirny Station for the program for monitoring the biota of the Haswell archipelago is proposed.

Key words: Davis Sea, Mirny Station, cetaceans, pinnipeds

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*Corresponding author: S. Golubev <gol_arctic@mail.ru>

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Introduction

In 1912, the discoverers of the Haswell archipelago received the first short information on marine mammals (Mawson 1915) in this area. After a significant break, zoological observations resumed in 1956 with the establishment of the Mirny Station. However, in the following years, they did not become the focus of in-depth and versatile research interest of biologists. This work partially addresses current knowledge gaps and encourages biologists to increase their research efforts in this direction. The goal of the review is to provide baseline ecological and faunal information on the marine mammals of the Haswell Islands during the historical period (species diversity and status).

Material and Methods

The material was collected in the Haswell archipelago, in the coastal part of the continental shelf of the Davis Sea (Treshnikov Bay, Queen Mary Land, southern Indian Ocean). The Russian Mirny Antarctic Research Station (66° 33′ 11″ S, 93° 00′ 35″ E) provided the basis for research activities. Seventeen relatively large islands and 4 coastal nunataks are less than 3 kilometres from the station (excluding Ploskiy Island). The islands are scattered over a compact (2.5×3.5 km) area (Voronov and Klimov 1960). Haswell Island is the largest (0.82 km²) and highest (93 m above sea level) rock of the archipelago. The height of smaller islands generally ranges from 10 to 35 m above sea level (Voronov and Klimov 1960). The area is rich in icebergs. For most of the year, the sea is covered with fast ice, the width of which may exceed 30 km (Korotkevich 1959c, Shesterikov 1959, [1] - Mirny Observatory 2020).

The basis of this review is formed by opportunistic records of marine mammals, collected by researchers mainly in 1912-2016. Invasive methods of research (harvesting of crabeater seals (*Lobodon carcinophaga*), Ross (*Ommatophoca rossii*) and Weddell seals (*Leptonychotes weddellii*) were practiced in the Mirny area and its environs from 1914 (Mawson 1915) until 1967 (Makushok 1959, Tolstikov 1959, Arseniev 1960, Krylov 1972). The historical records are supplemented by the author's observations made from January 8, 2012 to January 7, 2013, and from January 9, 2015 to January 14, 2016. Islands of archipelago and sea ice were visited on foot during the fast ice period (April – December). In 2012, there were 46 trips, in 2015 there were 15 trips. Data on the dynamics of the year-round cycle of the monthly mean abundance (hereinafter abundance) of Weddell seals that hauled out on the fast ice were collected from February 1, 2015 to January 7, 2016 during the daytime – from 12:30 to 13:00 local time.

The area of daily observations was limited: in the north and west by the islands of Haswell, Tokarev, Vkhodnoy, Tyulen′i, Stroiteley. In the south, it was limited by the Antarctic coast between the Hill of the Winds and the Komsomolsky nunataks; in the east – tabular icebergs. The area covered by the survey from the Mirny nunataks was about 8 km², but sometimes increased up to 12 km² during the fast ice survey on foot. The total area observed by various researchers varied from 7.05 km² to 17.5 km² (Starck 1980a, Mizin and Chernov 2000, Mizin 2007, Mizin 2010, S. Golubev, unpublished data).

Results and Discussion

Eight species of marine mammals have been recorded in the waters of the Haswell archipelago – 3 species of cetaceans (sei whales (*Balaenoptera borealis*), Antarctic minke whales (*Balaenoptera bonaerensis*), killer whales (*Orcinus orca*) and 5 species of pinnipeds (southern elephant seals (*Mirounga leonina*), Weddell seals, crabeater seals, leopard seals (*Hydrurga leptonyx*) and Ross seals).

Cetacean species

Sei whales are very rare seasonal visitors because only few observations have been made. In December 1956, single individuals were observed near the Mirny (Arseniev 1960); on February 27, 1958, several individuals were encountered near the Mirny (Makushok 1959).

Antarctic minke whales are common seasonal visitors to the archipelago. They are often found around the Haswell Islands (Harris et al. 2015) and absent during winter (Medvedev and Boronin 1968). Whales are recorded annually between the destruction of fast ice, the removal of ice from the water area, and the formation of the early stages of fast ice. In early summer, Antarctic minke whales approach the edge of the fast ice. They can also be found directly under the ice (Arseniev 1960, Propp 1968, Medvedev and Boronin 1968, observations by polar explorers) in places with wide cracks and open water between the ice fields. When fast ice is missing, some individuals rarely come to the coast of the continent (for example, to Radio Bay) and feed there for a short time, usually less than half an hour (S. Golubev, unpublished data). In February 2010, from 1 to 6 Antarctic minke whales regularly fed between Cape Mabus and nunatak Hill of the Winds (Mizin 2010). In 2012, Antarctic minke whales were recorded from February 2 to March 19 (8 sightings in February and 2 sightings in March), in 2015 – from February 9 to March 31 (1 sighting in February and 4 sightings in March). They were observed singly (n=9), in pairs (n=3), in groups of 3 individuals (n=2) and 6 individuals (n=1) (Mizin 2010, S. Golubev, unpublished data). Most Antarctic minke whales migrate west along the coast during the austral summer season.

Killer whales are rare seasonal visitors to the archipelago. Killer whales are often seen in the vicinity (Harris et al. 2015). They are not recorded annually in the period between the destruction of fast ice, its removal from water area, respectively, and the formation of new ice. In the 1966/1967 season, killer whales were observed near the Mirny in late December – early January and were less common than Antarctic minke whales (Medvedev and Boronin 1968). There were 7 records of 12 individuals in the study area from 1999 to 2015 (Table 1). Killer whales were found individually (n=5) and in groups as well. The latter reached two observations of several individuals: 3 (n=1) or 4 (n=1). They were recorded more often in austral summer than in early autumn. In 2012 and 2015, killer whales migrated to the west. Their migration trajectories were mainly north of the Haswell Islands (n=4).

Pinniped species

Southern elephant seals are rare, non-annual seasonal visitors to the Haswell Islands. The majority of animal records took place at the Komsomolsky nunatak and in the vicinity. Southern elephant seals were recorded in austral summer (n=3) and au-

tumn (n=4). Solitary animals were observed most often (n=5). During the molting period, an aggregation (3 individuals, n=1) of southern elephant seals was observed on the northern coast of the Haswell Island (Starck 1980a). In autumn, solitary seals reached the edge of the continent. In cases where the sex was known (n=4), the proportion of females and males was equal, young and immature individuals predominated. The number of records of southern elephant seals has increased in the area during the two decades of the 21st century (Table 2).

Ross seals are very rare seasonal visitors to the archipelago and its environs (Mawson 1915, Korotkevich 1958, Table 3).

№	Date	Number	Source
1	Summer 2007	1	Personal communication of the station staff
2	Summer 2009/2010	3	Mizin 2010
3	22.3.2010	1	Mizin 2010
4	15.2.2012	1	Personal communication of the station staff
5	18.2.2012	1	Personal communication of the station staff
6	19.3.2012	1	Personal communication of the station staff
7	15.3.2015	4	Personal communication of the station staff

Table 1. Records of killer whales (*Orcinus orca*) in the Haswell archipelago, 1999-2015.

№	Date	Number	Sex	Age	Site	Source
1	Summer 1957	Several			Near the Mirny Station	Korotkevich 1958
2	22.1.1979	3	2♀+♂		Haswell Island	Starck 1980a
3	March 2007	1	♂	Adult	Near the Komsomolsky nunatak	Personal communication of the station staff
4	December 2007	1	♂	Immature	Near the Mabus Point	Personal communication of the station staff
5	29.4.2009	1		Juwenile	Mabus Point	Mizin & Mizin 2021
6	20.4.2015	1	♀	Immature	Near the Komsomolsky nunatak	Author's unpublished data
7	4.5.2020	1			Between the islands of Fulmar and Zykov	Mizin & Mizin 2021

Table 2. Records of southern elephant seals (*Mirounga leonina*) on the Haswell archipelago, 1957-2020.

№	Date	Number	Site	Source
1	21.1.1914	1	Eight miles from Haswell Island	Mawson 1915
2	22.1.1914	5	Eight miles from Haswell Island	Mawson 1915
3	1956	1	Surroundings of the Mirny Station	Korotkevich 1958

Table 3. Records of Ross seals (*Ommatophoca rossii*) on the Haswell archipelago and its environs.

Crabeater seals are rare, in some seasons, common seasonal visitors to the archipelago. They are not observed annually and spend most of their time in drifting fast ice areas. Crabeater seals breed outside the Haswell Islands, but rare single females can breed on the archipelago. For example, 2 females were caught on fast ice on October 9, 1958, 12 km north of the Mirny, one of them had an embryo (Makushok 1959). Females with pups were observed on drifting ice near the Haswell Island in the 1956/1957 season (Arseniev 1960).

On the approach to the Mirny, crabeater seals were encountered in the belt of finely broken ice at 62° – 64° S (Krylov and Medvedev 1972) and further south in the belt of packed drifting ice (Makushok 1959, Syroechkovsky 1966). In austral summer, crabeater seals may come close to the Antarctic barrier as its width decreases (Arseniev 1960, Propp 1968). In the Mirny area, crabeater seals were observed after fast ice breaking from late December to early January. When fast ice established (April), they left this area and were absent in winter (Korotkevich 1958, 1959a, b). Crabeater seals are usually recorded during ice drift (Gollerbach and Syroechkovsky 1958, Syroechkovsky 1958, 1960, Arseniev 1960) in numbers of 1– 4 individuals (Starck 1980a, Table 4). Individuals drifting on ice floes have been repeatedly observed at a distance of 2.5 – 3 km from the Mirny (Mizin 2010, S. Golubev, unpublished data). In majority of cases, significant distances between the observer and the object did not allow reliable identification of the seal species. Most animal fixations occurred in February (Table 4) and the number of seals reached even tens of individuals in February 1966 (Propp 1968). The exception was the 1978/1979 austral summer season, when fast ice breakup in the Mirny occurred about 2 months earlier than usual (Starck 1980a). This was accompanied by a seasonal increase in the number of crabeater seals. Their maximum density in January 1979 reached 1.49 individuals/km² (Starck 1980a).

№	Date	Number	Observer/Source
1	6.10.1999	1	Mizin & Chernov 2000
2	14.2.2010	1	Mizin 2010
3	12.2.2012	1	Author's unpublished data
4	17.2.2012	3	Author's unpublished data
5	5.3.2012	1	Author's unpublished data

Table 4. Records of crabeater seals (*Lobodon carcinophaga*) in the Haswell archipelago, 1999-2012.

Weddell seals are common year-round residents of the archipelago. They breed annually. The most abundant species of seals (Mizin and Mizin 2021). In the austral summer, on the approach to the Mirny, Weddell seals can be encountered from the coast of Antarctica northward to 62° S in a belt of finely broken ice (Krylov and Medvedev 1972).

Breeding. There are no places in the archipelago where the concentration of puppy births is high. Perhaps this is due to limited number of suitable birthplaces for Weddell seals in the archipelago, combining shelters from strong katabatic winds (islands, heaps of sea ice, iceberg fragments) with local ice conditions – convenient entry into and exit from the water for

puppies. Birthplaces are spatially dispersed and usually include 1 – 2 mother-pup pairs. There is only 1 poorly documented report, when on November 16, 1958, 2 places were found on fast ice near the cracks, in each of which 10 – 12 females with pups were observed (Tolstikov 1959). In fact, from 1999 to 2016, no more than 10 pups were born on the archipelago annually. The most frequent place of birth of puppies was found on the Tyulen'i Islands. The birth of pups occurs in October – November. The first pups appeared mainly in the first or second decade of October (Table 5). Pregnant females occurred until mid-October (in 2015 – October 16). The most frequent date of birth of the first pups is October 12, (n=5). Females with pups were recorded until early December (Mawson 1915), in 2012 until December 7, (S. Golubev, unpublished data). The latest record of a pup that had embryonic cover is November 21, 2015.

Each female had only one pup. During the historical period, one dead pup (2006) was found (Mizin 2007). Overall, the Haswell archipelago is a place of stable breeding of Weddell seals.

№	Date	Source
1	6.10.1958	Makushok 1959
2	21.10.1960	Korotkevich 1961
3	Mid-October 1966	Dubrovin 1967
4	14.10.1999	Mizin & Chernov 2000
5	17.10.2009	Mizin 2010
6	4.10.2010	Dorofeev 2011

Table 5. Dates of newly born pups of the Weddell seals (*Leptonychotes weddellii*) in the Haswell archipelago, 1958-2010.

Population. The first estimate of the number of Weddell seals was given in 1912, when members of the expedition of D. Mawson observed many seals off Haswell Island in late November – early December (Mawson 1915). Estimates of abundance from 1999 – 2015 varied widely (Table 6). Pryor (1965) rightly assumed that the number of Weddell seals on the archipelago varies greatly from year to year and seasonally in a given year.

№	Pups	Adults	Pregnant females	Study area (km²)	Date	Source
1	≤ 10	≈ 20-25		10	1999	Mizin & Chernov 2000
2			15	12	2006	Mizin 2007
3	2	≤ 25			2009	Mizin 2010
4	5	24			21.11.2010	Dorofeev 2011
5	8	61		12	23.1.2012	Author's unpublished data
6	6	14		12	3.1.2016	Author's unpublished data

Table 6. Estimates of the abundance of Weddell seals (*Leptonychotes weddellii*), which hauled out on the ice during the breeding season in the Haswell archipelago, 1999-2015. *Note:* Total pup production in the 2012 and 2016 breeding seasons included newly born, weaned pups with or without a female. The table also shows the maximum values of hauled out on fast ice adult Weddell seals recorded by the author.

The data for the annual cycle of the Weddell seals in the Haswell archipelago is based on the author's observations collected in 2015. The minimum monthly mean values of abundance (hereinafter abundance) of Weddell seals that hauled out onto the fast ice are shown below (*see* Fig. 1).

During the year, individuals of different age haul out on fast ice. Cracks 3-5 km long, which form in the fast ice and persist throughout the winter (Shesterikov 1959), provide an almost year-round presence of Weddell seals on ice within the archipelago. In February 2015, the water area in the vicinity of the Mirny was as free from fast ice as possible, and Weddell seals were not recorded. However, some of them could be found in the study area according to similar observations by the author in 2012. The first adult Weddell seals hauled out onto sea ice on March 23, 2015 (March 17, in 2012), when it was able to support their weight. The first records of seals on fast ice coincided with the spread of nilas (sea ice, up to 10 cm thick) and the appearance of gray-white ice. In April, most of the water area was covered with fast ice, and the abundance of seals on the ice decreased. In May, the water area was completely covered with sea ice, and the abundance of seals exceeded similar numbers observed in March and April. Throughout the winter, Weddell seals regularly hauled out on the ice, but their abundance was minimal. A slight increase in seal abundance was observed in September, when the air temperature slightly increased. With an increase in air temperatures and an increase in cracks in the fast ice, a noticeable increase in the abundance of seals was observed in October – December. The maximum mean abundance of Weddell seals was recorded in January 2016, when fast ice covered the entire area of the archipelago and was at the stage of intensive destruction. The maximum abundance of seals on the ice coincides with strong insolation, light winds (Starck 1980a) and the highest temperatures of the year. It could also be a consequence of the destruction of the fast ice and the reduction of its area, which leds to a greater concentration of animals in the counting area and forced them to move to the coast of the mainland and compact. In January 1979, when fast ice breakup was unusually early, the density of Weddell seals on the surface of the sea ice was 0.92 ind/km² and was markedly inferior to that of crabeater seals (Starck 1980a).

In general, the abundance and population density of Weddell seals on the fast ice surface were minimal in winter and maximal in summer in 2015. In spring, these values increased by the factor of two (*see* Table 7). The general trend in the abundance of Weddell seals from February 2015 to January 2016 showed an increase (Fig. 1).

№	Season, month/months, year	min	max	m	SD	Median	Ind/km²	n
1	Summer (February 2015)	0	0	0	0	0	0	1
2	Autumn (March-May 2015)	0	5	1.8	1.3	1	0.2	16
3	Winter (June-August 2015)	0	3	1	0.7	1	0.1	13
4	Spring (September-November 2015)	1	10	4	2.4	4	0.5	40
5	Summer (December-January 2015/2016)	1	14	6.3	3.7	6	0.8	17

Table 7. Year-round change in the abundance (individuals) and population density of Weddell seals (*Leptonychotes weddellii*) on fast ice of the Haswell archipelago, 8 km², 2015/2016.

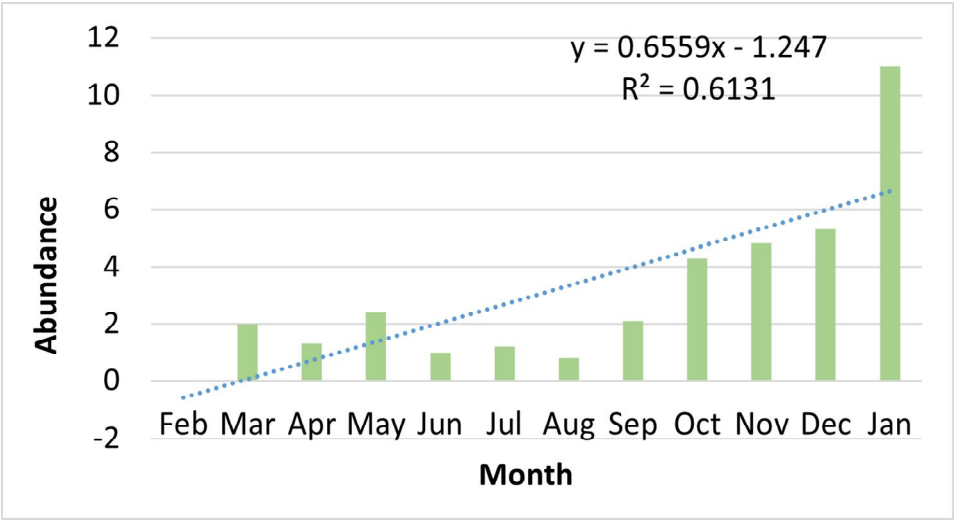

Fig. 1. Changes in the average monthly abundance of Weddell seals (*Leptonychotes weddellii*) in the study area (8 km²), Haswell archipelago, 2015-2016.

Leopard seals are seasonal residents of the archipelago. They are rare and few in numbers. Single seals are found, apparently annually and almost all year round. They prey on Adélie penguins (*Pygoscelis adeliae*) near the Haswell Island when the sea is free from fast ice (Gollerbach and Syroechkovsky 1958, Syroechkovsky 1958, 1960, 1966; Korotkevich 1959a; Starck 1980a, b; S. Golubev, unpublished data). These predators inhabit the archipelago between late January and April, as indicated by the analysis of digital images and sightings of macaroni (*Eudyptes chrysolophus*), Adélie and emperor (*Aptenodytes forsteri*) penguins with fresh wounds on their bodies (Golubev 2016, S. Golubev, unpublished data), which were presumably the result of unsuccessful predation attempts by leopard seals. This is a period of intensive fast ice destruction, subsequent clearing of the water area from ice and the beginning of its formation. With the spread of fast ice in autumn, they leave the archipelago, when the Adélie penguins that have finished molting go to sea, and the number of adult emperor penguins that came from the sea to the colony to breed is at its peak on fast ice. There is no evidence of record of leopard seals between the onset of intensive fast ice growth in early May and the near maximum northward expansion of fast ice in mid-September. This is indirectly confirmed by the absence of injured adult emperor penguins in the colony during the winter (S. Golubev, unpublished data).

Conclusion

This is the first faunal review of marine mammal records of the Haswell archipelago collected during the historical period. Of the 8 mammal species living in or visiting the area, Ross seals and sei whales were very rare. Killer whales, southern elephant seals and leopard seals were rare and few in number. Crabeater seals were generally rare but more common during the rare seasons of early fast ice breaking.

Weddell seals are common throughout the year, Antarctic minke whales are seasonally common. Weddell seals and Antarctic minke whales are recorded annually. Weddell seals are found year-round, leopard seals are seasonal residents, the remaining 6 species visit the study area seasonally. Only Weddell seals breed annually in the archipelago.

The information presented in this report is of limited value given the meager amount of historical and recent data collected. In the course of many years of monitoring, a single agreed-upon data collection protocol was not established. The lack of a unified methodological framework has led to the fact that most of the information was obtained as a result of random observations and, in general, did not allow one to judge changes in marine mammal populations during the historical period. With this in mind, the status of each marine mammal species encountered in this work should be regarded as preliminary. However, the review may be useful as a basis for the development of further research programs.

At the Mirny Station, I propose to count marine mammals, if possible, on a daily basis from the tops of the Komsomolsky and/or Radio nunataks within a radius of 3 km from the observer, using binoculars, a spyglass, a telescope, a digital camera. The use of unmanned aerial vehicles can improve the quality of observations. On fast ice, daily seal counts should be carried out from 12:30 to 13:00 local time, when the maximum number of seals can be observed on the ice. Between April and December, seal counts from the shore should be combined with walking tours on the sea ice. In October-November, a total count and mapping of females with pups of Weddell seals within the archipelago is required. During the period of intensive destruction or formation of fast ice, as well as ice-free water area, daily observations are required at 8:30, from 12:30 to 13:00 and at 18:00 local time. Any documented animal records from polar explorers should also be recorded. The protocol of observations can be modified by the curator of the monitoring of marine mammals and birds of the Russian Antarctic stations.

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