

THE STATUS OF THE FUR SEAL POPULATION (*ARCTOCEPHALUS GAZELLA*) AT THE SOUTHERN EDGE OF THE SPECIES RANGE (THE ARGENTINE ISLANDS)

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The status of the fur seal population (*Arctocephalus gazelle*) at the southern edge of the species range (the Argentine Islands). — P. B. Khoyetskyi, D. V. Pishniak. — The study of the population status of *Arctocephalus gazella* (Peters, 1875) in waters of the Argentine Islands was carried out in the period from April 2015 to March 2016 in accordance with the objectives of the State Target Scientific and Technical Research Program of Ukraine in Antarctica for 2011–2020. The aim of the article is to study the population dynamics and distribution of the southern fur seal in waters of the Argentine Islands. Due to the lack of data on the specifics of the seal's dispersal in different periods of the year and the dynamics of the species population at the southern border of the distribution range, the results of the research are relevant and of great importance. In the second half of the 20th century, some publications presented the results of monitoring of pinnipeds at the Argentine Islands and adjacent territories, but the objects of these studies usually were other seal species: *Hydrurga leptonyx*, *Lobodon carcinophagus*, *Leptonychotes weddelli*, and *Mirounga leonina*. In the early 21st century, monitoring of the fauna of the Argentine Islands was carried out by Ukrainian biologists. However, they focused on *Leptonychotes weddelli* and less on other species of pinnipeds. The field material was collected in waters of the Argentine Islands, which is located in the Pacific sector of Antarctica. The fur seal population census and distribution studies were conducted according to the generally accepted methods. After breeding season on the subantarctic islands, during the migration southwards, fur seals reach the Argentine Islands, usually in the third decade of January. In the summer of 2016, the first fur seal was recorded within the archipelago on 31 January. During the study period, the largest number of animals within the archipelago was recorded in March–April and it ranged from 300 to 400 individuals. On the islands of the archipelago, the main resting places of seals were identified. The movement of animals northwards starts in May, consequently a decrease in the number of animals in this region is observed at that time. The last individuals are recorded in the first half of August. In 2015, migration began in May and ended in early August. There are several periods that were characterized by intensive migration of the animals: late June, 5–8 July, and 29 July to 6 August. In winter, one individual was last found within the archipelago on 12 August. The migration is launched by the worsening of weather conditions, formation of a continuous ice cover, reduced availability of food, and other factors.

Key words: *Arctocephalus gazella*, Argentine Islands, abundance, distribution, migration.

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Introduction

The southern or the Antarctic fur seal (*Arctocephalus gazella* Peters, 1875) is a species of the family Otariidae. Its distribution range covers the Atlantic and Indian Ocean sectors of Antarctica from the South Georgia Islands to Macquarie Island (Bonner 1968; Payne 1978; Wynen *et al.* 2000; Bastida & Rodriguez 2009). To the south, the fur seal is distributed from the Antarctic Convergence Zone to about 65° S (Reijnders *et al.* 1993).

In the early 21st century, the total number of the population ranged from 2.75 to 3.0 million individuals; about 95% of the population was on the South Georgia Islands (Boyd 1993; Van Franeker 2002; Bastida & Rodriguez 2009). A small number of fur seals breed on the South Sandwich, South Orkney, and South Shetland Islands, as well as on the Bouvet, Kerguelen, and Heard Islands and others (Shaughnessy & Goldsworthy 1990; Guinet *et al.* 1994; Shaughnessy *et al.* 1998; Hofmeyr *et al.* 2006; Burton & Croxall 2012). The breeding colonies are located on the islands around Antarctica between 61° S and the Antarctic Convergence Zone (Bastida & Rodriguez 2009). The Argentine Islands (65°13'–65°16' S; 64°10'–64°20' W) are located at the southern edge of the species' distribu-

tion range, and the fur seal does not breed within the archipelago. The nearest breeding colonies are located on the Shetland Islands (Wynen *et al.* 2000; Hucke-Gaete *et al.* 2004; Goldsworthy *et al.* 2009). Fur seals were exterminated here in the 19th century. In the 1960s, no animals were recorded on King George Island, the largest of the Shetland Islands (Lesiński 1993).

According to the studies, in the 1950s, fur seals did not occur near the American station *Palmer* (64°27'46" S; 64°01'52" W), which is located on Anvers Island and which is the closest to the Argentine Islands (Holdgate 1963; Heimark & Heimark 1984). Only in the 1970s, scientists discovered several small colonies in the Gossler Archipelago, 15 km far from Anvers Island (Parmelee *et al.* 1977). In the 1980s, the abundance of fur seals increased significantly. In particular, several hundreds of individuals were recorded on the Joubin Islands (Heimark & Heimark 1988). The distribution of the fur seal to the southern regions is a result of the reproduction of the population in the main breeding colonies (Aguayo 1978). However, unlike South Georgia, recolonization and reproduction on the Shetland Islands was slower (Payne 1978; Boveng *et al.* 1998). In the second half of the 1980s, about 4000 individuals were recorded on the islands (Boyd 1993). According to the studies, their numbers in the summer at 60° S is more than 50 thousand, and in winter is more than 1.0 thousand individuals (Van Franeker 2004). Within the Argentine Islands, the fur seal usually occurs in the summer–autumn period, and less often in winter.

The aim of the article is to study the population dynamics and distribution of the southern fur seal in waters of the Argentine Islands. Due to the lack of data on the specifics of the seal's dispersal in different periods of the year and the dynamics of the species population at the southern border of the distribution range, the results of the research are relevant and of great importance. In the second half of the 20th century, some publications presented results of monitoring of pinnipeds at the Argentine Islands and adjacent territories, but the objects of these studies usually were other seal species, such as the leopard seal (*Hydrurga leptonyx*), crabeater seal (*Lobodon carcinophagus*), Weddell seal (*Leptonychotes weddelli*), and southern elephant seal (*Mirounga leonina*) (Holdgate 1963; Corner 1972; Stone & Meier 1981; Thomas & Stirling 1983; Heimark & Heimark 1986). Early in the 21st century, monitoring of the fauna of the Argentine Islands was carried out by Ukrainian biologists (Dykyy 2009; Dykyy & Peklo, 2012). However, they mainly focused on the Weddell seal and less so on other pinniped species (Dykyy & Salhanskiy 2013; Dykyy & Salhanskiy 2014; Dykyy & Drongovska 2015; Khoyetskyy 2018; Smagol & Dzhulai 2018).

Material and Methods

The status of the Antarctic fur seal population was studied in April 2015 to March 2016 in accordance with the objectives of the State Target Scientific and Technical Research Program of Ukraine in Antarctica for 2011–2020. The field material was collected within the Argentine Islands, which is located in the Pacific sector of Antarctica. Fur seals were recorded by visual inspection of sites of their suggested occurrence (Rakusa-Suszczewski & Sierakowski, 1993). The movement of the explorers to the islands was carried out by boats (Fig. 1).

Under poor weather conditions (stormy wind, heavy precipitation, etc.) or in case of ice accumulation in the waters, survey was carried out on Galindez Island along the fauna survey routes, and the water area was examined with optical instruments recording animals on other islands. Visual observations were carried out using *PRO Yukon* "16 × 50" binocular. For maximum observance of the archipelago, the explorers climbed to the highest points of Galindez Island. However, the remoteness of Galindez Island from some of the other islands, the roughness of the relief, and the small size of the fur seal did not allow identifying all of the animals. Therefore, there may be some underestimation of the species' abundance on other islands.

Results and Discussion

Within the archipelago, in the first decade of April 2015, the number of fur seals was insignificant. Eight individuals were recorded on 8 April in the eastern part of Galindez Island at the capes Penguin and Pigeon Point, which are permanent resting places for the animals.

Later, the number of fur seals increased. They reached a significant number on 18 April, when more than 100 individuals were recorded on the island's coast, and on 22 April, when 95 fur seals were recorded. On Galindez Island, in addition to the east coast, seals were found in other parts of the island, in places convenient for the animals to move from the ocean to the coast. Such places are small bays with low shores, which allows animals to climb ashore with minimal effort. In other parts of Galindez Island, the numbers were usually low ranging from 1 to 3–4 individuals. In the third decade of the month, the number of seals was thirteen times lower, and the lowest number of animals (eight individuals) was recorded on 30 April (Fig. 2).

Besides Galindez Island, surveys were carried out on other islands of the archipelago. When resting, the animals prefer rocky areas and pebble beaches. Such areas are on the islands of Black, Leopard, and Great Barchan. They are the favourite resting places of the fur seal. On Great Barchan Island (17 April), 114 individuals were identified in the main localities of the animal's distribution. On Black Island, the seals were found only in the eastern part, which is characterized by a gently sloping coast. A total of 170 animals were recorded on Black Island and on the neighbouring Leopard Island. On the unnamed islands, which are located near Black Island, 25 individuals were found.

On 17 April, 360 fur seals were recorded on the islands Great Barchan, Black, Leopard, and Galindez. Taking into account the islands on which no census was carried out, the fur seal population during this period was probably about 400 individuals. In the third decade of April, not only on Galindez Island, but also on other islands of the archipelago, a decrease in the fur seal numbers was recorded. Thus, on 28 April, 12 fur seals were recorded on the Barchans Islands, no animals were found on the islands Winter and Skua, and only 22 individuals were found on the islands Uruguay, Corner, Grotto, Three Little Pigs, and Shelter.

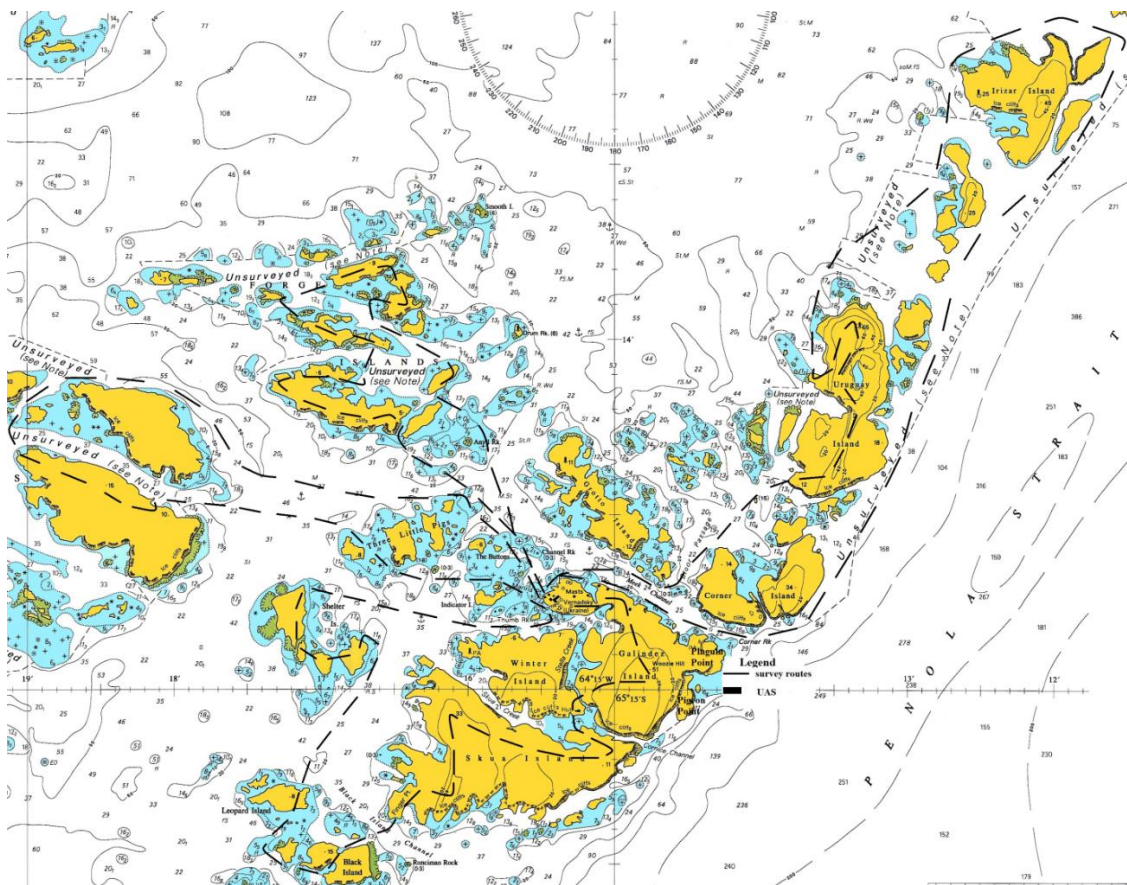


Fig. 1. *Arctocephalus gazelle* survey routes in waters of the Argentine Islands (April 2015–March 2016).

Рис. 1. Облікові маршрути *Arctocephalus gazelle* в акваторії Аргентинських островів (04.2015–03.2016)

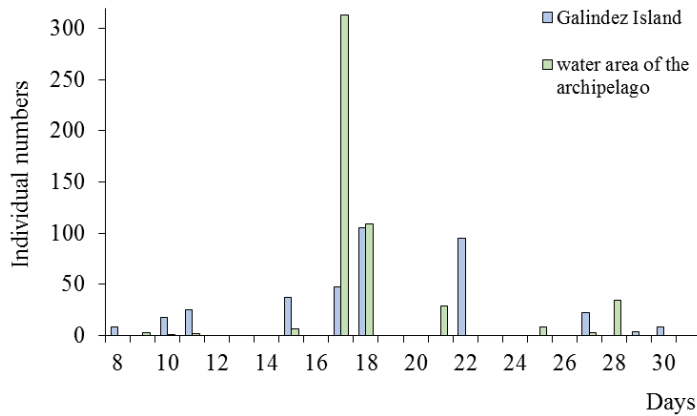


Fig. 2. Abundance of *Arctocephalus gazelle* in the Argentine Islands (April 2015).

Рис. 2. Чисельність *Arctocephalus gazelle* на Аргентинських островах (квітень 2015 р.)

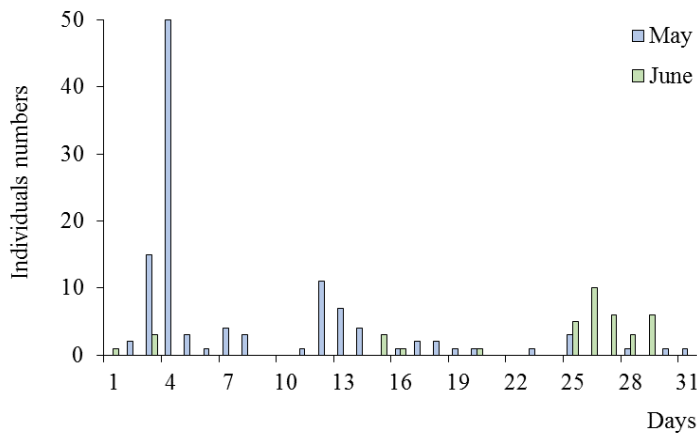


Fig. 3. Abundance of *Arctocephalus gazelle* in the Argentine Islands (May–June 2015).

Рис. 3. Чисельність *Arctocephalus gazelle* на Аргентинських островах (травень–червень 2015 р.)

A decrease in the fur seal abundance in waters of the archipelago was recorded in May. On 4 May, 23 seals were found on Galindez Island. On other islands of the archipelago (Three Little Pigs, Corner, Grotto, Shelter, and Skua), 27 individuals were found on this day. Thus, on 4 May, the total number of fur seals on the islands of the archipelago was at least 50 animals (Fig. 3).

On the following days, the number of fur seals in waters of the archipelago continued to decrease. Thus, on 12 May, four seals were recorded on the Barkhans Islands, two on the island Three Little Pigs, and five on Galindez Island. On 14 May, three fur seals were recorded on Leopard Island, no animals were found on the neighbouring Black Island, and only one individual was recorded on Grotto Island. On 25 May, two fur seals were found on the Barkhans Islands, and one individual on one of the Forge Islands. There were no seals on Skua Island (28 May). No seals were found during surveys on Galindez Island on 23, 25, and 29 May. The decrease in the fur seal numbers from mid-May is due to weather conditions, probably because of the accumulation of ice floes and growlers in the water, which fur seals avoid.

In June, unlike April and May, groups of fur seals of more than 10 individuals were not found during the daylight period. On Galindez Island, fur seals were found only on the capes Pigeon Point and Penguin Point, while in other parts of the island they were absent. After 3 June, the subsequent records of animals took place only in the second decade of the month (15 June). Two male seals were found at Penguin Point, and only one individual was recorded on the following day.

The increase in the number of fur seals in late June was due to changes in the weather conditions. In particular, on 25 June in the Penola Strait, which is the natural border between the Antarctic Peninsula and the Argentine Islands, the ice conditions changed significantly. Ice floes, pieces of icebergs that densely covered the strait, after several days with winds of more than 10 m/s with gusts

of up to 15 m/s and more, left the Penola Strait opening access to the Penguin and Pigeon Point capes, which are the main resting places of fur seals. On 25 June, five seals were recorded here, and on the next day (26 June) the maximum number of animals was found, which was eight individuals. On the same day, on the Three Little Pigs Islands, two fur seals were recorded. On Galindez Island, four fur seals were found on 27 June, three on 28 June, and only two on 29 June. In addition to land, fur seals were recorded in the water. In particular, on 29 June, apart from one individual found on Shelter Island, another was recorded near Galindez Island in the Meek Strait, and two more individuals when moving along the Mick Strait towards Grotto Island.

In July, the number of fur seals within the Argentine Islands was small. During 6–8 July, 17 individuals were recorded on the islands Grotto, Galindez, and Three Little Pigs. However, outside the archipelago, six times more animals were recorded during 5–8 July (Fig. 4).

The main concentration of fur seals was observed in the Penola Strait and to the south of the archipelago. In particular, on 5 July, 11 fur seals were recorded in the Penola Strait at a distance of 250–300 m from Skua Island. A characteristic feature of their behaviour was movement northwards along the Penola Strait, as well as through the waters of the archipelago. The causes for the mass migration of fur seals to the south were the deterioration of weather conditions, the establishment of a continuous ice cover, which limited the access of the animals to food.

Their migration on 7 July was monitored during the daylight period. Usually the animals moved alone or in pairs, they accounted for about 70% of the total number of the recorded animals. The largest group was recorded on 7 July and it consisted of seven individuals. At 2 p.m., 38 animals were recorded in the Penola Strait within the archipelago by optical instruments from the highest point of Galindez Island (Fig. 5). On 8 July, the fur seal migration northwards continued. At 2 p.m., 58 seals were recorded; more than 50% of the animals moved alone or in pairs.

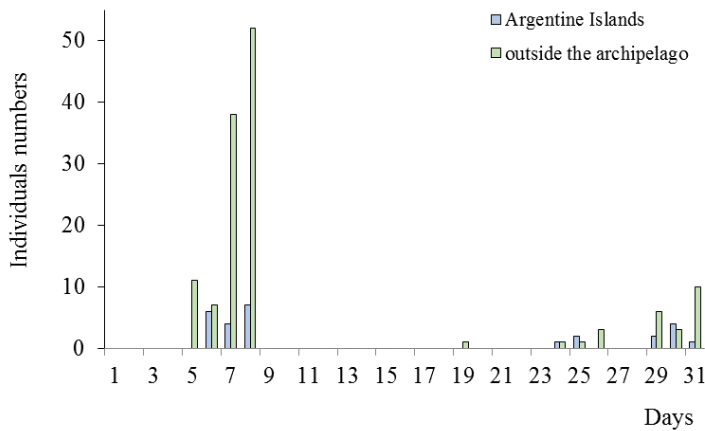


Fig. 4. Abundance of *Arctocephalus gazelle* in the Argentine Islands (July 2015).

Рис. 4. Чисельність *Arctocephalus gazelle* на Аргентинських островах (липень 2015 р.)

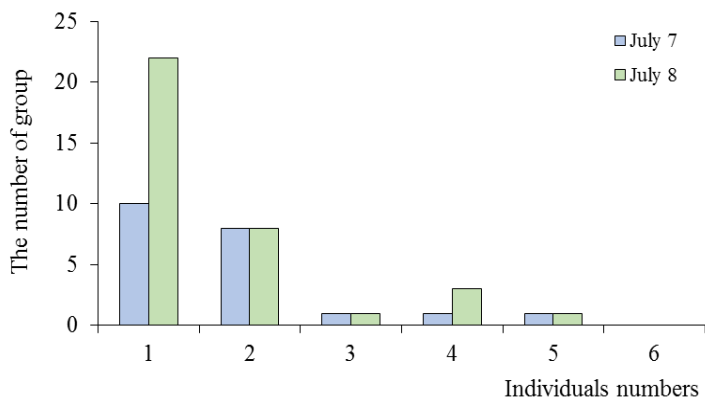


Fig. 5. Abundance of *Arctocephalus gazelle* in the Penola Strait (7–8 July 2015).

Рис. 5. Чисельність *Arctocephalus gazelle* в протоці Пенола (7–8 липня 2015 р.)

On 9 July, unfavourable weather conditions (wind speed exceeding 20 m/s with gusts up to 30 m/s, snow, and low temperatures) did not allow tracing further migration. On the following days, no seals were found, except for 19 July, when one individual was recorded in the Penola Strait.

The next migration of seals northwards was recorded on 29 July; it was less intense than the previous one. In total, only 34 individuals were recorded during 24–31 July. The animals (singles seals or pairs) moved in the French (northern border of the archipelago) and Penola straits in a northerly direction. During the migration period in August, nine animals were recorded on the islands of the archipelago. In August, a fur seal was recorded on Grotto Island (1 August), three on the islands Shelter and Barkhans (3 August), and one on Galindez Island (6 August). On 2 August, four animals were found outside the archipelago in the Penola and French straits. The last fur seal was recorded on 12 August at Penguin Point (Galindez Island).

The studies carried out by the American station Palmer (64°46' S, 64°05' W), which is located north of the Argentine Islands, indicated the presence of fur seals in the vicinity of the station from January to September (Heimark & Heimark 1984; Heimark & Heimark 1988). Probably, single individuals (immature young and old, sick animals) can occur here during winter and spring under favourable weather conditions, when continuous ice cover is absent and a sufficient amount of food is available in waters of the archipelago. According to the biologists of the station, single animals were found in previous years during August and early spring.

Thus, during April–August 2015 on the islands of the archipelago, the main resting places of fur seals were identified, which was testified by further observations of them during January–March 2016 (Fig. 6).

The first record of a fur seal in 2016 took place on 31 January at Pigeon Point of Galindez Island. The appearance and behaviour of the fur seal indicated that it had just climbed ashore. Usually, young individuals are the first to appear. In general, the animals begin to take up their temporary residence in January, and they can move a considerable distance from the natal site (De Bruyn *et al.* 2007). They are known to move thousands of kilometres (Wilson *et al.* 2006; Wilson *et al.* 2012).

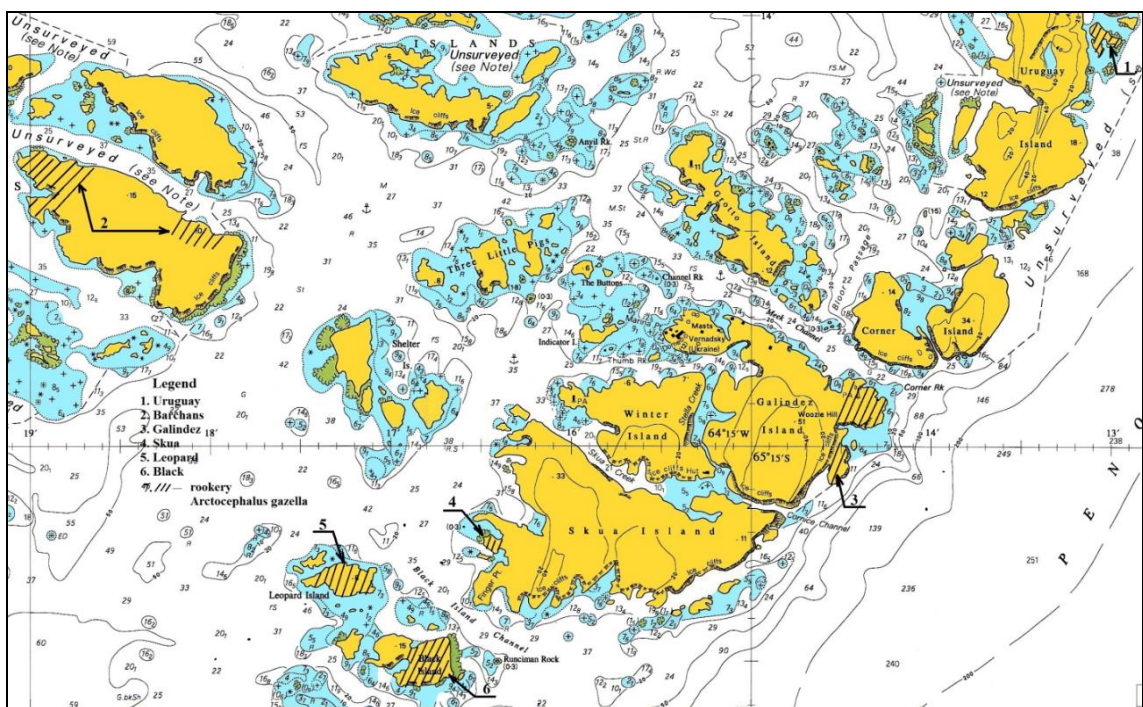


Fig. 6. Distribution of *Arctocephalus gazelle* in waters of the Argentine Islands.

Рис. 6. Поширення *Arctocephalus gazelle* в акваторії Аргентинських островів.

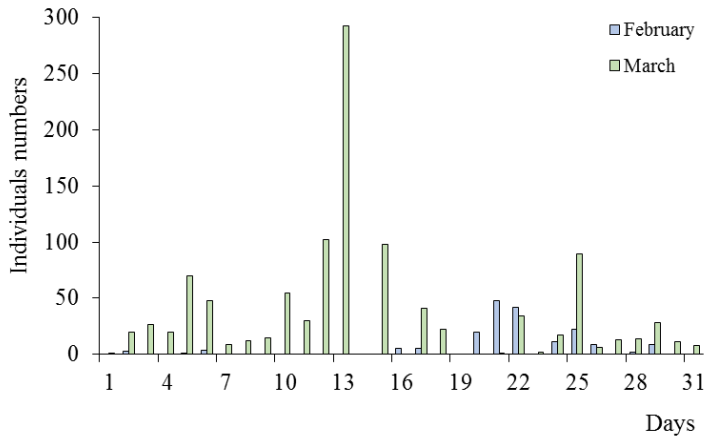


Fig. 7. Abundance of *Arctocephalus gazelle* in the Argentine Islands (August–September 2016).

Рис. 7. Чисельність *Arctocephalus gazelle* на Аргентинських островах (лютий–березень 2016 р.)

Cases of appearance of young individuals (1.5-year old) near the Argentine Islands were reported. In particular, on 25 February 2016, when surveying Mut Island (65°12'38 S, 064°04'65 W), a fur seal pup was found resting on a rise on the stones. There were no other fur seals nearby. Juveniles were also recorded in waters of the archipelago on 5 March on Black Island (two fur seals). They differed significantly in size from other fur seals.

During February, an increase in population abundance was recorded in waters of the archipelago (Fig. 7). In early February, single individuals or no more than two animals were recorded on the islands Barkhans and Leopard. In the second half of February, besides the Barkhans and Leopard islands, fur seals were found on other islands of the archipelago, in particular on Galindez, Black, Winter, and Forge islands. During February, 181 individuals were recorded in waters of the archipelago. The largest number (over 60%) was recorded during 20–22 February.

The number of fur seals increased significantly during March compared to February. The main places of their concentration in waters of the archipelago were the Black, Leopard, Galindez, Barkhans, and other islands. In particular, on 5 March, 39 fur seals were recorded on Black Island, and 27 individuals on Leopard Island. On other islands (Indicator, Shelter), four animals were recorded.

Thus, during the day, at least 70 individuals were present within the water area. On 10 March, 55 individuals were recorded on the islands Grotto, Shelter, Uruguay, Corner, and Galindez. Seventeen fur seals were found near Uruguay Island (10 March), and 50 seals were found on 12 March. A significant number of fur seals was observed on 13 March, when 75 individuals were found on Black Island and 39 seals on Leopard Island. The islands Barkhans, Forge, Galindez, and Skua were also surveyed. Taking into account the islands on which no census was carried out (Grotto, Korner, Skua, and Winter), the number of fur seals within the archipelago was more than 300 individuals.

Three days later (15 March), the census showed a slight decrease in the number of fur seals: 53 individuals were recorded on Black Island and 30 on Leopard Island. On the following days, a slight decrease in the numbers was recorded, and in the third decade of March, the weather conditions did not allow conducting a survey on other islands of the archipelago, thus it was impossible to estimate the total number of the seals within the archipelago.

Conclusions

During the period April 2015–March 2016, in waters of the Argentine Islands, the largest number of fur seals (300–400 individuals) was recorded in April 2015. In May 2015, the numbers decreased by about seven times and was 50–60 individuals. A further decrease in abundance (6–7 times) was recorded in June. The number of fur seals was no more than 10 individuals. In 2015, migration began in May and ended in early August. There are several periods that were characterized by intensive migration of the animals: late June, 5–8 July, and 29 July–6 August. In winter, one individual was last found within the archipelago on 12 August.

The beginning and duration of migration northwards is influenced by weather conditions, the conditions of the ice cover, the availability of food, and other factors.

In the summer of 2016, the first fur seal was recorded within the archipelago on 31 January. In February, the number of fur seals was insignificant and is was about 50 individuals. In March, a significant increase in the number of fur seals (over 300 individuals) was observed. The distribution of fur seals on the islands of the archipelago is influenced by the relief of the coast, the local concentration of ice, which can block the access of the animals to resting places, and other factors.

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