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Current status of the seabird colony on the Bolshoy Arsky Island, Barents Sea, Russia

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Abstract. Recent decades have seen a significant decline in the abundance of many colonial seabird species throughout their range. Numerous island and continental colonies of colonial seabirds are found on the Murman Coast. One such location, the Bolshoy Arsky Island, underwent assessments only twice: in 1950 and in 1992. As a result of the 2023 assessment, we recorded 10 species of seabirds: *Fratercula arctica, Uria aalge, U. lomvia, Alca torda, Cepphus grylle, Phalacrocorax carbo, P. aristotelis, Larus argentatus, L. marinus and Somateria mollissima*. Of these, a decline in the global population of guillemots and puffins has been noted, while cormorants and eider are already in the Red Book of the Murmansk Oblast. Breeding records were not previously reported for the guillemots, European herring gull and Great black-backed gull. Along with that, the numbers of breeding Atlantic puffins have not change significantly compared to the 1992 counts.

Keywords: Arctic, seabirds, marine colonial birds, Arctic avifauna, Northwest Russia, island populations, Barents Sea

Современное состояние птичьего базара на острове Большой Арский (Мурманская обл., Баренцево Море)

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Аннотация. На протяжении ареала многих морских колониальных птиц наблюдается значительное сокращение численности в последние десятилетия. Многочисленные островные и континентальные колонии морских птиц находятся на побережье Мурмана. Одно из таких мест, остров Большой Арский, исследовалось только в 1950 и 1992 гг. В 2023 г. авторы зарегистрировали здесь 10 видов морских птиц: *Fratercula arctica, Uria aalge, U. lomvia, Alca torda, Cepphus grylle, Phalacrocorax carbo, P. aristotelis, Larus argentatus, L. marinus* и *Somateria mollissima*. Из них резко снижается численность мировой популяции кайр и тупика, а бакланы и гага находятся в Красной книге Мурманской области. В то же время, о размножении встреченных здесь кайр, серебристой и морской чайки — ранее не упоминалось. В ходе исследования выяснилось, что численность гнездящихся тупиков, в сравнении с учетами 1992 г., существенно не изменилась.

Ключевые слова: Арктика, морские птицы, птичий базар, морские колониальные птицы, орнитофауна Арктики, Северо-запад России, островные популяции, Баренцево море

Introduction

Recently, a decline in the numbers of marine colonial birds has been reported for the reported region (Krasnov et al. 2007a; Ezhov 2019; Krasnov, Ezhov 2020). Declines in abundance have also been reported for other parts of the range (Irons et al. 2008; Johansen et al. 2020; Häkkinen et al. 2023). In light of the published data on the current status of seabird colonies, it is most important to perform regular abundance surveys of all the known nesting sites. To elucidate the reasons for the large-scale decline in numbers, it is also necessary to conduct detailed studies of species ecology.

The Murman Coast of the Barents Sea, which includes the Russian and Norwegian parts of the coast, is known for several large breeding sites of marine colonial birds. Among them are 10 colonies of Common guillemots *Uria aalge*, 28 colonies of Brunnich's guillemots *U. lomvia*, 4 to 5 colonies of Atlantic puffins *Fratercula arctica*, 14 colonies of Great cormorant *Phalacrocorax carbo*, and 12 colonies of European shag *P. aristotelis*. Razorbills, guillemots, gulls, and eiders are also identified as breeding along the entire Murman Coast (Anker-Nilssen et al. 2000). At the same time, according to Seabird Colony Databases (Bakken 2002), the number of colonies on the Murman Coast is significantly higher: 25 colonies of both murre (guillemot) species, 22 of Atlantic puffins, 19 colonies of Great cormorant, and 12 colonies of European shag. The first source likely implied habitats that included both large and small colonies, while the second source lists all the known colonies without site-specificity. Among the colonies listed above, the bird seashore colony on the Bolshoy Arsky Island has been known since 1950 (Gerasimova 1962). However, there is still no detailed data on its condition, and the available published data lacks detail. The last population count of nesting birds in the mentioned areas was conducted by Paneva in 1992 (Anker-Nilssen et al. 2000). T. D. Gerasimova (1962) only mentioned the nesting of European shags and Atlantic puffins. In this research, the authors determined the current number and species composition of nesting species on the island and their distribution in the biotope.

Materials and methods

In the second half of July 2023, surveys from a vessel moving along the Bolshoy Arsky Island (69°27′31″, 32°55′36″) were conducted (Figure 1). The Bolshoy Arsky Island has an area of 0.39 km^2, its maximum height is 47.8 m. The coast of the island are steep cliffs of various height. The surface of the island is a deep layer of peat with communities of typical tundra plants. Observations from the sea included counts of all birds encountered in flight, on the water, and on land. We used Yagnob 20x40 binoculars and a Canon EOS 60D camera with a Canon EF 70-300mm f/4-5.6 IS USM telephoto lens for species-specific object identification for subsequent accurate counting of bird aggregations. The final identification of bird abundance and distribution was made based on the photographed data. The counting of island birds began with the southern part of the island, then, we moved north along the eastern coast.

The term 'terraces' is used in this paper to refer to flat parts of the island where breeding bird colonies were found. Conventionally, the island was divided into three parts: high, medium, and lower terraces. The height of the island at its highest point is 48 meters above sea level, and each of the three terraces is 16 meters high. The upper terrace has the deepest layer of peat, the lower one comprises rocky ledges, while the medium terrace is a mixture of both.

Results

List of the encountered species. The island was found to house 10 species of birds: Atlantic puffin *Fratercula arctica*, Common guillemot *Uria aalge*, Brunnich's guillemot *U. lomvia*, razorbill *Alca torda*, Black guillemot *Cepphus grylle*, Great cormorant *Phalacrocorax carbo*, European shag *P. aristotelis*, European herring gull *Larus argentatus*, Great black-backed gull *L. marinus*, and Common eider *Somateria mollissima* (Table 1).

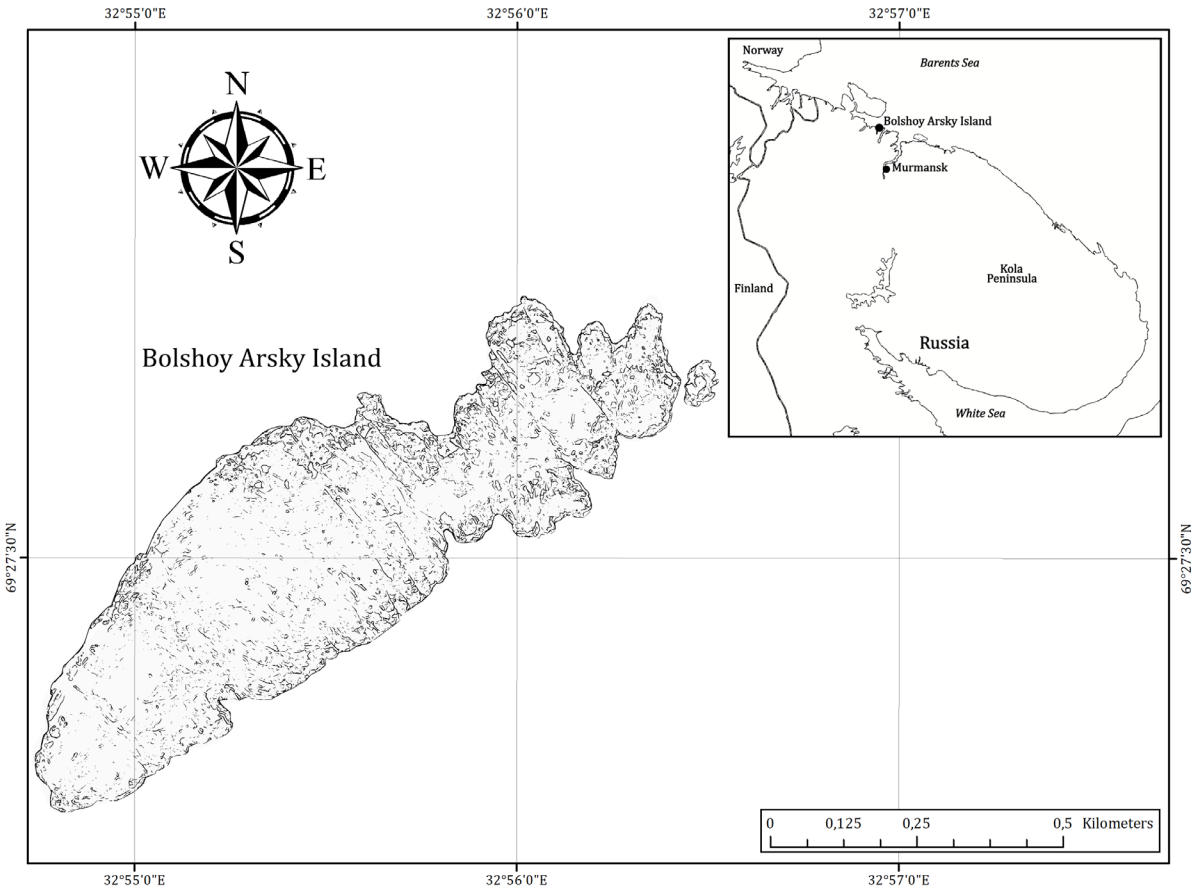

Fig. 1. The Bolshoy Arsky Island and its location on the Murman Coast. Seabird colonies (Atlantic puffin and other species) were found along the entire east coast of the island

Рис. 1. Изображение острова Большой Арский и его расположение на побережье Мурмана. Колонии морских птиц (атлантических тупиков и других видов) находятся вдоль всего восточного берега острова

Location of puffin and guillemot colonies. In addition to identifying the total amount of these species (Table 1), 1,122 entrances to puffin burrows have been found. They have been nesting on the Bolshoy Arsky since at least the 1950s (Gerasimova 1962). We found six overgrown nesting sites with characteristic relief damage: traces of burrow entrances and overgrown typical vegetation (Skokova 1962). Another salient feature is the absence of adult and juvenile birds in the immediate vicinity.

All the colonies were located on the eastern shore of the island. Recent colonies with no signs of overgrowth were predominantly located in the southeast of the island. In recent colonies, the total number of adult puffins was as follows: Max — 97, Min — 7, Me — 36, SD±30 (n_{colony}=8); in intermediate condition: Max — 55, Min — 4, Me — 11, SD±17.9 (n_{colony}=9). By correlating the number of adult birds with the location of the colony on the island, it was found that the closer the colony was to the northern part of the island, the fewer nesting puffins there were.

A total of five large and small colonies of guillemots were found. Small colonies of guillemots were located within the colonies of puffins, while large colonies nested independently. The colonies were located on the high, medium, and lower terraces of the island. The highest abundance of guillemots was observed in independent colonies on lower and middle terraces. Aggregations of the two species were observed on rocky surfaces of the island with exposed rock and suitable rock ledges for nesting. Colony numbers of Common guillemots

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Table 1
List of birds found on the Bolshoy Arsky Island with the indication of terraces
Таблица 1
Аннотированный список орнитофауны острова Большой Арский с указанием террас, где вид был обнаружен

Species	Quantity	Location
Common Eider Somateria mollissima	12 ♀ ad	LT
Great cormorant *Phalacrocorax carbo*	6 ad, 2 juv	MT, LT
European shag *P. aristotelis*	59 ad, 6 sad, 6 juv	LT
European herring gull *Larus argentatus*	89 ad, 28 juv	HT, MT, LT
Great Black-backed Gull *L. marinus*	14 ad, 9 juv	LT
Razorbill *Alca torda*	55 ad	HT, MT, LT
Common guillemot *Uria aalge:* • unbridled morph • bridled morph • sad Uria sp.	• 2,715 ad • 1,110 ad • 99 sad	HT, MT, LT
Brunnich's guillemot *U. lomvia*	386 ad	HT, MT, LT
Black guillemot *Cepphus grylle*	31 ad	LT
Atlantic Puffin *Fratercula arctica*	1,079 ad, 3 juv	HT, MT

Age: ad — mature adult bird, sad — immature bird, juv — young bird. Location: HT — high terrace, M — medium terrace, LT — lower terrace. Обозначения возраста: ad – взрослая половозрелая птица, sad – неполовозрелая птица, juv – молодая птица. Обозначение местоположения: HT – высокая терраса, MT – средняя терраса, LT – нижняя терраса.

(both morphs) at similar sites: Max — 394, Min — 241, Me — 309, SD±80.5, and Brunnich's guillemots: Max — 135, Min — 100, Me — 117.5, SD±24.7 (n_{colony}=3). An aggregation of breeding guillemots was also observed among a colony of puffins, where kites were located in concaves of the island surface. Colony numbers of Common guillemots (both morphs) at these sites: Max — 59, Min — 1, Me — 17, SD±27.7, and Brunnich's guillemots: Max — 24, Min — 2, Me — 13, SD±15.5 (n_{colony}=2). The number of guillemots here was eight times fewer than in the independent colonies.

It was not always possible to identify guillemots to species in both larger and smaller colonies. In this case, the total number and location of birds was taken into account. Based on the data obtained, the most massive aggregations of guillemots were found on the lower terraces of the island (925 and 1,346 guillemots on medium and lower terraces, respectively).

Discussion

As mentioned above, information on the status of the avifauna of the Bolshoy Arsky Island is available only in separate publications of a wide range of dates. The number of Atlantic puffin was about 500 pairs in the 1950s (Skokova 1962), 2,500 pairs in 1992 (Paneva 2006), and 1,079 adult puffin in 2023. However, the counting only included birds

outside the burrows. Therefore, a certain degree of inaccuracy in the recorded bird numbers is possible. A possible reason is that, according to Bianki et al., the second half of July marks the end of hatching and the start of the emergence of chicks in other colonies on the Murman Coast (Bianki et al. 1993).

The number of burrows on the island has also undergone some change, with 2,500 of them registered on the island in 1992 (Anker-Nilssen et al. 2000) — 5 times more than in the 1950s and 2.2 times more than today. The unstable condition of Atlantic puffin colonies is ubiquitous for the reported area. The largest colony of this species on the Murman Coast is located on the Ainovy Islands (69°50′1″, 31°34′52″). During the 1960s, the species numbers here declined by 80 percent due to predation pressure by European herring gull and great black-backed gull. The Kandalaksha Nature Reserve, to which the Ainovy Islands belong, conducted gull shooting in spring near the largest puffin colony. After that, puffin population stabilized in the 1960s. The number of puffins continued to decline in other colonies on the Ainovy Islands, where no attempt to regulate the gull numbers was made (Anker-Nilssen et al. 2000). However, the gull population declined by 1995, leading to the stabilization of the puffin population by the late 1990s. The same source mentions a possible emigration of puffin from the Ainovy Islands to the Bolshoy Arsky Island, which may also explain a significant increase in the abundance of puffin between the 1950s and 1992.

At the same time, an increase in the number of guillemots is evident on the Bolshoy Arsky Island. In 1992, both guillemot species numbered 125 pairs (Paneva 2006), and by 2023 the number of guillemots was at least 4,211 birds. In the 1950s, there was no mention of nesting or presence of guillemots on the Bolshoy Arsky Island. Both declines and increases in numbers have been observed in the known colonies of Brunnich's and Common guillemots along the coast of the Kola Peninsula (Krasnov et al. 2007a; 2007b; Ezhov 2009; 2015). The authors of the aforementioned studies found a correlation between declining numbers of guillemots and foraging instability due to overfishing.

There was also a change in the number of European shag. In the 1950s, 160 pairs of European shag were identified by Gerasimova on the Bolshoy Arsky Island (Gerasimova 1962). In 2023, there were 59 adult birds — a 5.4 times decrease. Reduced numbers and loss of European shag colonies is observed along the entire coast of the Kola Peninsula (Ezhov, Gurba 2022). In June 2023, we found a previously unknown colony of 166 breeding pairs of European shag (between Ura-Guba and Kola Gulf). This also indicates a periodic change in the nesting habitat of the species in the reported area.

Razorbills are not numerous on the island; however, they occur everywhere. More than two birds were observed only in puffin and guillemot colonies. The low abundance of razorbills is generally typical of the entire Murman Coast (Bakken 2002; Cherenkov et al. 2016). Their numbers have changed little since 1992 when 20 pairs were found (Paneva 2006). The abundance of Black guillemot has not changed in 30 years. At the same time, a small colony of black-legged kittiwake disappeared from the island and was replaced by small colonies of European herring gulls and great black-backed gulls.

Populations of colonial seabirds on the Murman Coast have been unstable for more than half a century. The changes in colony numbers or losses of colonies can be attributed to both anthropogenic factors, e.g., overfishing of prey fish (Krasnov et al. 1995; Anker-Nilssen et al. 2000; Spiridonov et al. 2011; Hunt et al. 2016), and natural factors, e.g., emigration and predation pressure. It is also possible that some of the factors are currently unknown. A complete picture of the status of colonial seabirds on the Murman Coast requires the development of unified methodology to conduct regular long-term surveys, including, at a minimum, counting species numbers in all the known colonies and their species.

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