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SUMMARY

The fauna and ecology of birds of Ayon island in the East Siberian Sea was studied for 1.5 months in the summer of 2015. The number of birds was estimated by the number of sightings per season according to the daily list. Breeding densities were estimated by model plots method. Species status and abundance was compared with numbers obtained by similar single-season studies in 1958 and 1987. Of all 62 species of birds recorded at Ayon island we sighted 51 species in our studies in 2015 and recorded nests of 19 species. Breeding was verified for 13 more species by observing non-flying broods, parents with food or typical behavior of a pair close to a nest or a brood. Density of territorial pairs was estimated for 4 species of loons and 7 nesting (or presumably nesting) species of ducks. We evaluated the nesting density for only those species whose nests were located within the model site: pacific loon, yellow-billed loon, Bewick's Swan, bean goose, king eider, spectacled eider,sandhill crane, red phalarope, Temminck's stint, glaucous gull, and vega gull.

The fauna of nesting waders has drastically changed. Several species (curlew sandpiper, Eurasian dotterel, buff-breasted sandpiper) can be called not just declining in population but actually extinct on breeding grounds. With a generally low densities of birds on Ayon Island, large colonies of glaucous and vega gulls were the "centers of bird life" there. However, all known colonies were destroyed by brown bears. The strategy of waterfowl and loons to seek refuge under the protection of the gull colonies, even though this is effective in reducing predation by fox, does not work for large predators, mainly the brown bear. Data on breeding success of certain species, and measurements of their nests and clutches, are presented.

The referred figures and tables are in the original article in Russian, pp. 13—21

The composition of the avifauna of the mainland coasts and islands of the eastern Russian Arctic is studied quite well, and almost no "blank spots" remained here (Golubev, Suin, 2014). Islands and large river deltas, as the well-defined geographical units, have always been high-priority objects for researchers. Nevertheless, owing to the logistical hardships, researchers' attention focused mainly on specially protected areas and the environs of biological stations. This fact explains the extremely uneven coverage of the avifauna by studies in some regions of the eastern Arctic. For example, several books and numerous articles (Portenko, 1972–73; Stishov et al., 1991; Stishov, 2004) are dedicated to birds of remotely situated Wrangel Island, whereas such relatively easily accessible island as Ayon has been overlooked by ornithologists for many years.

The first data on birds of this island were obtained by the paleoichthyologists V.D. Lebedev and V.R. Filin (1959). In the summer of 1958, they collected carcasses and described the biology of common bird species. The specimens were subsequently identified by G.P. Dementyev, E.P. Spangenberg, and S.M. Uspensky at the Zoological Museum of the Moscow State University. In 1987, M.S. Stishov and P.V. Maryuhnich spent June and July on Ayon Island, where they thoroughly examined the southern and western coasts, as well as the inner part of the island, while studying birds. In their work, the emphasis was done on the study of landscape-related distribution of birds (Stishov, 1990; 1994). In June 1994, a part of the island was inspected during aerial surveys of birds in East Siberia tundras (1993–1995) (Poyarkov et al., 2000). The air routes (nos. 22–24) were laid along its western and northern shores but did not cross the

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inner areas. The results of this air survey contributed quite little to the knowledge of birds of the island: only several common species of large-sized birds were recorded then.

Our short-term journeys to Ayon Island in late July and August 2005, 2007, and 2014 provided data on the post-breeding avifauna and birds' migrations along its coasts, but did not allow us to evaluate the breeding fauna and the current status of most species. For this reason, the dedicated studies in 2015 were conducted during the breeding season (in June and July). In the present work we have used all our materials on birds of the island.

MATERIALS AND METHODS

Ayon Island is situated off the western coast of Chaun Bay, East Siberian Sea. It is separated from the mainland by the shallow (with the greatest depth of less than 1 m) and quite wide (2 km) Lesser Chaun Strait. The length of the island is 63 km, and the width is 38 km. There are also several smaller islands nearby: Chenkul, Mosey, etc. The island is characterized by a low undulating terrain, with a maximum altitude of up to 64 m, composed of loose sediments. It has several slow flowing rivers and a variety of small and medium-sized lakes of up to 2 km in diameter. The type of vegetation is "non-tussocky, sedge/low-shrub mossy tundra" (G3 by CAVM team on 2003). The average annual air temperature, according to FGBU "Chukotskoye UGMS" (Chukchi Hydrometeorological Bureau), is –11.4°C. In 2015, the average temperature in May was +5.2°C; in June, +4.7°C; in July, +8.7°C. The maximum recorded temperature was +22.1°C (June 21) and +29.4°C (July 4). The frost-free period in 2015 lasted for 56 days, from June 13 to August 9 (www.rp5.ru). The detailed landscape/biotope characteristics, provided by M.S. Stishov (1990), were fully accepted by us.

In spite of the low population density on the island (there is only one village with a population of 200), its terrains have undergone substantial anthropogenic transformation due to reindeer breeding. The Ayon herd in 2015 numbered 3,500 individuals; in the late 1990s (according to reindeer herders), it reached 10,000 individuals. Reindeer stay on the island only for the summer months (from the middle of June to early September); nevertheless, the transformations of natural landscapes here are conspicuous. In our opinion, the damage of the vegetation cover on the gentle slopes of the ridges and the subsequent formation of the extensive sandy horizons of deflation and sand dunes—lifeless "micro-deserts" with an area of several hundred hectares—is a consequence of overgrazing by reindeer for at least a hundred of years.

The Onmatgyr River estuary on the southern coast of the island was selected as the base area of our expedition (Fig. 1). The group was transported by helicopter and landed at the base camp on June 15, 2015, with a 4-day delay after the planned date due to bad weather. The field works were conducted until July 24, when we left the island by a motorboat. Mosey Island was examined on 23 July, after completion of the breeding season in most birds.

Since the modern fauna and the abundance of birds on Ayon Island had not been studied until the season 2015, we used a whole range of techniques, which a group of 3 persons were able to apply, in order to (1) identify the composition of the fauna, (2) assess the status of species and (3) the abundance of birds. The composition of the fauna was studied along the walking routes within two areas (Fig. 1A and B) and the boat trips along the southern coast of the island to the east (3 trips) and west (4 trips). When moving by the walking routes, we also (1) searched for nests, which could be found by flushing out incubating birds (most of geese and ducks, shorebirds, and some ground-nesting passerines), (2) recorded the behavior of breeding birds of prey, cranes, and those species of shorebirds that left their nest long before an observer approached, (3) mapped and identified the pattern of larids' colonies, (4) remotely spotted nests of the species that could be relatively easily identified from a distance by incubating birds (some species of loons, swans, and single gull nests). Gull colonies were visited additionally, usually on the next day after their finding. All active gull nests, as well as active and destroyed nests of waterfowl were registered. The schematic map of daily route and its length were recorded using GPS navigators.

To estimate the abundance of birds, the following approaches were used:

1. Keeping a log of daily bird sightings. Each observer noted the total number of individuals of each species encountered during the day. In the evening, observations were summed up and input into the general form named "daily list of birds".

2. Surveys of territorial pairs (applied to loons and ducks) and nests (applied to the yellow-billed loon, tundra swan, and singly nesting gulls) on 9 model plots with the area of 1 km2 each. To select them, the entire potential study area in the vicinity of the camp (a total of 54 km2) was divided into squares with a side length of 1 km (Fig. 1). Each square was numbered; the plots were selected using a random number generator (selection of 9 random numbers from the sequence of 1–54). Density of pairs was estimated based on the data collected during the period from June 20 to July 1, i.e. at the culmination of territorial behavior and before the departure of male ducks. For ducks, single male was considered a couple.

3. Breeding shorebirds density estimation. For this purpose, 5 model plots with the area of 16 hectares (400 by 400 m) each were selected. For convenience, they were set up within five of the nine model plots used for the assessment of density of pairs (Fig. 1). Each of the smaller plots was thoroughly examined by one of the observers twice a season with an interval of 10–15 days between visits, and completely "tapped" with a rope by efforts of 3 persons once a season.

4. Additionally, we managed to perform a total search for nests (except for shorebirds' ones) within two one-kilometer plots (nos. 35 and 38).

When a nest was found, the size of clutch was determined, the stage of incubation was evaluated using the water test (Westerskov 1950), and the eggs were measured.

Two mist nets for catching passerines were installed in the thermal-erosion gullies along the high precipice of the island at a distance of 50 m off the camp. In total, the efforts with the use of these nets amounted to 34 traps/day. Besides birds, we recorded all sightings of mammals, their tracks and burrows, described behavior of predators, and counted lemming nests under snow along the linear routes.

The average length of daily routes for the three observers was, respectively, 10.7 ± 4.6 km, 11.7 ± 3.0 km, and 14.2 ± 2.2 km. The linear routes with nest searches (except for the distances within the smaller plots) covered a total of 324.8 km. The number of found nests was 103; the number of bird species, 19 (excluding the gull nests in colonies destroyed before our visit).

RESULTS

Current Breeding Fauna and Population Density

Among the 62 species of birds known for Ayon Island, 35 have the status of breeding (category B, Table 1). In 2015, nests of 19 species were identified; breeding of another 13 species was confirmed by sightings of non-flying broods, adults with food, or by the specific behavior of parents at their nests or broods. Nests of peregrine falcon (in 2007 and 2014), snowy owl (2005), and common raven (2014) had been observed by us on Ayon Island previously.

Three species (northern pintail, greater scaup, and redpoll Acanthis sp.) presumably nested in 2015 (category U). Four species migrated and spent summer off the coast of the island: Brent goose and red-breasted merganser (in mass), as well as pomarine and long-tailed jaegers. Transient flocks of Steller's eider were noted by us off the eastern and northern shores of the island only since the middle of July, whereas in previous years they occurred earlier: on June 24, 1994, they reached the coast of the island (Poyarkov et al., 2000). The latter 5 species were referred by us to the category of migrants; the other 4 species, to vagrant birds (categories M and V, respectively; Table 1).

The nesting density was estimated for 11 species based on the results of the survey of territorial pairs: for all the 4 loon species, inhabiting the island, and all the 7 species of nesting or supposedly nesting ducks (Table 2). Thus, a random sample from the nine model plots proved to be enough representative: it provided 100% coverage of the breeding population of birds all over the study area on the southern coast of the island (54 km^2).

The nesting density was assessed based on actually found nests only for those 11 species that bred on the smaller model plots selected for nest surveys (Table 3). Outside of these plots, we identified also nests of black-throated and red-throated loons, greater white-fronted goose, common

eider, long-tailed duck, rough-legged buzzard, Sabine's gull, Arctic tern, and Parasitic jaeger. In our opinion, the density of pairs and nests of yellow-billed loon may appear somewhat overestimated, because we observed 3 territorial pairs of this species for the entire period of studies; nests were found in two of them, and they both were within the plots (Tables 2 and 3). Most species were characterized by similar density of counted pairs and detected nests: Pacific loon, 0.556 pairs/km^2 and 0.806 nests/km^2; king eider, 0.778 and 0.806; and spectacled eider, 0.333 and 0.403, respectively. The exception was the long-tailed duck, which showed the highest density of pairs, 1.889, and the zero density of nests. In the season 2015, we could find only one long-tailed duck nest (beyond the plots), which indicates that almost all the pairs skipped breeding.

The nesting density of shorebirds appeared to be low. Inside the shorebird plots, there were only 1 red phalarope nest and 2 Temminck's stint nests. Searches for shorebird nests beyond the "shorebird" plots were not carried out, as they are labor- and time-consuming. We accidentally found only 3 Temminck's stint nests along the linear routes, which is an evidence of a low nesting density in shorebirds.

According to observations on anxious birds, the following species nested within 9 one-kilometer plots: black-bellied plover, 1 pair; Pacific golden plover, 3; ringed plover, 15–20; ruddy turnstone, 4; red-necked phalarope, 8–10; long-billed dowitcher 1; dunlin, 8–10 pairs; and pectoral sandpiper, 6–8 females.

The lack of nests of red-necked phalarope surprised us. In another area (the delta of the rivers Chaun–Palyavaam, 115 km southwest of our study area), a team of 4 persons accidentally found 8 nests of this species over an area of 40 km^2 within the same time period (V.Y. Kokhanova, pers. comm.).

Among passerines, breeding (by direct and indirect evidences) was confirmed for red-throated pipit, white wagtail, redpoll (Acanthis sp.), wheatear, Lapland longspur, and snow bunting. The lack of longspur nests on the linear routes indicates the low nesting density of this species, whose abundance in tundras of East Asia has declined dramatically in recent years (Andreev et al., 2015; Solovyeva, 2012).

Against the background of the generally low density of birds on Ayon Island, the colonies of large gulls—Vega and glaucous—proved to be "focuses of bird life". The composition and the locations of the six colonies within the study area are provided in Table 4. Unfortunately, all the colonies of large gulls, examined by us, had been destroyed by predators, and thus we provide only data on the number of adult birds (in pairs) observed in the colony. Estimating the number of destroyed nests was impossible because, in addition to freshly built nests, long-term constructions with an unclear status for the current breeding season constituted a significant proportion in the colonies. In the colony no. 1, there were only 1 active nest of Vega gull and 1 nest of glaucous gulls; in the colonies nos. 2, 3, and 6, only glaucous gull nests remained (4, 1, and 5 nests, respectively); and in the colony no. 5, all nest were destroyed. A noteworthy composition of species was noted in the colony no. 3, where 9 red-throated pairs and 2 black-throated loon pairs nested in the lake with an area of 0.373 km^2. Neighboring pairs were separated by borders of grass, so that each pair occupied a separate mirror of the overgrown alas lake. Semi-colonial nesting of red-throated loon (monospecific, up to 17 pairs per lake) has been described only for Iceland (Petersen et al. 2013), while mixed colonies of both species are unknown. Breeding of all three species of eiders, genus Somateria, was recorded from two colonies.

Variations in the Composition of Breeding Fauna with Time

The composition of the fauna and the status of species and their relative abundance in different years are indicated in Table 1. The last column of the table (2015) shows the total number of recorded individuals according to the "daily list"; in case the same bird was observed during several days, we summarized the number of its sightings. This approach somewhat distorts the actual pattern of abundances of birds, particularly passerines, which nested in the vicinity of the camp, but it allows us to compare them with the abundance values from other points, where ornithological observations were carried out in the same season and by the same methods, or it is applicable for subsequent comparisons for this area.

The list numbers 62 species of birds, of which 46 were recorded in 1958, 50 species in 1987, and 51 species in 2015 (Table 1). Some gaps in the list

of 1958 could be explained by the specifics of works conducted by non-ornithologists, when the authors only collected birds, and their species were identified later, in Moscow (Lebedev, Filin, 1959). In some cases, the authors probably could not distinguish between species (for example, Pacific and black-throated loons) and believed that a certain species was already present in their collection. Such abundant and common for the island species as glaucous gull, Pacific loon, and northern pintail were absent from their list. Therefore, we adduce the data of 1958 only as an evidence of the apparent decline in abundance or the complete vanishing of some species by 2015: we compare mainly between the data published by M.S. Stishov (1990, 1994) and our observations. Unfortunately, the works by M.S. Stishov do not provide any information on the status of species, and thus we cannot conclude what species appeared or vanished at their breeding grounds on Ayon Island for the period from 1987 to 2015.

Ayon Island is characterized by high nesting density values for all the four loon species, which are probably stable over time. As M.S. Stishov did not note black-throated loon, we associate this fact with the difficulties of field-based identification of species within the superspecies Gavia arctica. Since it was the black-throated loon, not Pacific one, noted by Lebedev and Filin (1959), we believe that all the four species nested on the island in all the observation periods.

The relative abundance and species composition of geese and swans also have not changed since the middle of the 20th century (in the absence of data on their nesting density for previous years, we can evaluate the abundance of these birds in the past only indirectly). Snow goose is absent from our list, but, according to reports of our colleagues and local residents, it nested on the island and in the vicinity of the town of Pevek in the 2000s (I.I. Tynevgi, pers. comm.; A.G. Dondua, pers. comm.). We sometimes encountered this goose on the Kyttyk Peninsula, which is adjacent to Ayon Island, in 2002–2012. A sporadic nesting of black brant is possible, because the number of birds spending summer off the southern coast amounts to hundreds, but we could not find their nest. The duck fauna increased by four species, which had previously been distributed more southerly: greater scaup, Baikal teal, northern shoveler, and red-breasted merganser. Greater scaup nests were not found, but the birds occurred in pairs and displayed signs of territorial behavior, often in colonies of gulls, on islets of deep lakes, which is a typical breeding habitat for this species (a total of 47 sightings; density, 0.111 pairs/km^2; Tables 1, 2, and 4). The emergence of Baikal teal (with possible nesting) is associated by us with the climate change and the growth of population of this species, observed at its overwintering grounds (Lee et al., 2011). The sighting of a single female northern shoveler can be considered as vargant. Pre-molt flocks of red-breasted merganser off the coasts of Ayon Island were recorded by us regularly in 2005, 2007, 2014, and 2015; the major aggregations were observed off the southeastern corner of the island. Being abundant in Chaun Bay, molting flocks of merganser can reach a size of 3,000 birds (according to our observations from a helicopter in 2014). Apparently, large concentrations like this are a relatively new phenomenon that originated in the 2000s, as no flocks of this size had been registered in the Chaun Bay for the entire period of observations at the Chaun biological station (1971–1990) (Krechmar, Kondratyev, 2006).

The fauna of breeding shorebirds has changed dramatically. Some species can be confidently considered as vanished from their breeding grounds, rather than simply reduced in number. In 1958, curlew sandpiper was abundant in the "swampy maritime tundra" in the southern part of the island; in 1987, it was also common; in 2015, we did not encounter a single individual, despite the survey plots were located in the lacustrine tundra in the southern part of the island. We could not find bar-tailed godwit, which had been common in previous years, and also the previously rare but regularly observed Eurasian dotterel. The abundance of long-billed dowitcher and both phalarope species substantially decreased: the status of these species changed from abundant to rare (Table 1). A reduction in abundance and the resulting unevenness (focal pattern) in distribution of long-billed dowitcher are observed also in the Low-Kolyma tundra (Andreev et al., 2015). Similar to the observations by A.V. Andreev with co-authors (2015), on Ayon Island we recorded this species only from alas depressions, and only near seagull colonies. The sighting of buff-breasted sandpiper on Ayon Island

(Stishov 1990) has remained an unresolved puzzle. We did not inspect the western (adjacent to the village of Ayon) part of the island, but the "nesting" model plots nos. 35, 42, and 49 covered substantial portions of "undulating sandy-loam plains", in which buff-breasted sandpiper had been observed nesting by M.S. Stishov (1994). We could not find also jack snipe and spotted redshank: both species are probably irregular visitors on the island. Only a few shorebirds retained their status of common breeding species: black-bellied plover, Pacific golden plover, ringed plover, ruddy turnstone, dunlin, pectoral sandpiper, and Temminck's stint.

Among the 3 species of jaegers, only parasitic one had always nested on the island; pomarine and long-tailed jaegers had previously been common during summer migrations; in 2015, both species were rather rare (4 and 15 sightings, respectively). The abundance of large gulls on the island is unlikely to have changed, although the abundance of Vega gull in Chukotka shows a tendency to increase. We assume population declining in the Sabine's gull on Ayon Island (3 nests were found in the only colony) and in the Chaun tundras (Solovyeva, Zelenskaya, 2015). Arctic tern in 2015 nested in two colonies; in 1958, it was evaluated as an abundant bird, despite there were also only two colonies described then.

Willow ptarmigan was noted on the island neither by us nor by M.S. Stishov, although it occurred in 1958. As a result of long-term observations, we could establish the facts of breeding of three species of diurnal birds of prey and owls: rough-legged buzzard (2015), peregrine falcon (2007 and 2014), and snowy owl (2005). This was not done by our predecessors, probably, because their observations lasted for only one season. If we had relied only on the data of the season 2015, the list of confirmed breeding birds would have been shorter by 2 rare species: peregrine falcon (2 sightings) and snowy owl (1 sighting).

The identified differences in the fauna of passerines are rather surprising than natural. Thus, we did not encounter a single bluethroat and Siberian accentor, observed by M.S. Stishov (1990) on the island, although our camp was located on the southern shore, the gullies of which were overgrown by bushes, and we regularly conducted observations and catches with mist nets here. If a shy accentor can easily hide from observer, it is very hard to overlook a vocalizing male bluethroat. The warming of climate in the Beringean sector of the Arctic was expected to facilitate the northward distribution of shrub-dwelling species, as it has occurred in the lower reaches of the Kolyma River, rather than their vanishing (Andreev et al., 2015). On the other hand, none of our predecessors found raven, which proved to be a common bird during all of our visits to the island (15 sightings only in 2015). In August 2014, we observed a brood of 3 fledgling ravens near a nest built on the highest ice-sandy precipice on the eastern coast of the island, 250 meters off a whale carcass washed up on the beach.

Among the ornithological curiosities of the season 2015, we should note the sightings of common blackbird. A bird having a size of blackbird, absolutely black, with an orange beak, was recorded by us three times from a deep sandy gully at a distance of 5 km east of the camp. We supposed that it had escaped from a cage owned by some of local bird lovers in the town of Pevek, which is 70 km off the sighting locality.

Breeding Phenology, Clutches and Eggs Size, and Reproductive Success of Certain Species

The quantitative data provided in this section are quite poor, but they can be helpful for some subsequent reviews. Table 5 presents data on sizes of full clutches. Some nests were found at the stage of egg-laying, and for them the clutch size is not indicated. In some cases, we did not flush out incubating birds from their nests and, accordingly, have no idea about the size of their clutches. Eggs were measured not in all found nests (Table 5). Breeding success was determined as the ratio of the number of nests, in which at least one chick hatched out, to the number of nests with known fate. The fate of some of the nests was not investigated, as they remained active by the time of our last visit in the middle of July. The nesting success in some of the species requires special discussion in the context of abundance and behavior of predators and abundance of murine rodents. Within the area of nest searches (rectangle A, Fig. 1) we recorded 4 winter lemming nests over the entire observation period that, in terms of linear density based on the total linear route length, constitutes 0.012 nests/km.

Visually, neither lemmings nor voles were observed in the area. Consequently, we can state about the almost complete lack of lemmings and other murine rodents. That time the only survey of precocial birds on the eastern coast of the island (July 19, rectangle B; Fig. 1) allowed one observer to count 56 winter lemming nests, the linear density of which was 4.06 nests/km. Thus, there was an extreme heterogeneity between different parts of the island in the abundance of lemmings within the same year. This could not but affect the nesting success of myophagous species: a rough-legged buzzard nest with 3 chicks (4–8 days of age) was recorded from the bank of one of the lakes in the area B; the only successful glaucous gull nest with 2 chicks at 3–4 weeks of age was found also here.

In the area A, all the early gull nests in the large colonies were depredated. All the inhabited nests were evidently re-nests, as they each contained 1 egg laid after June 20. From June 16, a pair of glaucous gulls occupied a territory on an islet located 1.6 km off the camp, and their eggs (or probably 1 egg, as the islet was not accessible) were laid only on July 4. A poorly incubated (no longer than 10 days) clutch of glaucous gulls with one egg was found on July 10 in the lake that had been repeatedly inspected to date (previously, the nest had not been noted there). Of five glaucous gull nests in the colony on Mosei Island, recorded on July 23, each contained 1 egg incubated for 18–22 days. The egg-laying by glaucous gulls in early July and the one-egg clutches are the clear evidences of re-nesting after destroying of first clutches. The destroyer of the gull colonies was a brown bear: on June 26, an adult male was observed going towards the islets of the colony no. 1, which had been almost destroyed by that time and numbered only 4 active nests. The colony no. 3 was found on June 25, when a substantial part of nests of large gulls had already been destroyed (of 95 gulls, only 8 were incubating), while small gulls (Sabine's and terns), ducks, and loons just started breeding (some birds kept in pairs, and others were hatching). On July 2, all the nests in the colony, except for 1 glaucous gull nest and 4 nests of red-throated loons, were destroyed. Bear droppings were found on the islets of the colony, and there were also tracks of a female with cub on the bank. In addition to these animals, we noted tracks of another single young bear in the area A. Thus, the study area was inhabited by a total of at least 4 brown bears that regularly visited the colony and eventually destroyed all nests of gulls and waterfowl, as well as the most of loon nests. Polar bears were not observed on the island in 2015, but they occurred in a large number in August 2011. Probably, this predator arrives here only in late summer and cannot cause damage to birds' nests.

Besides bears, the study area "A" was regularly attended by a wolf (tracks along the Onmatgyr River, 1 sighting) and numerous Arctic foxes, which occurred sometimes in groups of up to 3 adult individuals (42 sightings). No burrowing activity of Arctic foxes was noted in 2015: we examined 5 burrows, but all of them were without pups. All the found nests of geese and eiders were destroyed by Arctic foxes; one swan nest, by wolf. In another swan nest, the hatching bird was killed probably by a wolf. We did not encounter wolverines, but, according to reindeer herders, they are common on the island.

Ayon Island is inhabited by mammalian predators so abundantly that any successful reproduction of tundra-dwelling birds here is possible only during the years (or at sites) of high density of murine rodents. The strategy of waterfowl and loons to seek for a refuge under the protection of colonies of large gulls, which appears to be advantageous in case of exposure to predation by Arctic fox, does not work in areas attended by large-sized predators such as, mainly, brown bear. The observations on the behavior of a big male bear showed that it visits a colony of gulls as if it were a "dining room", seeing it from a distance. As a result, all gull nests in the colonies were destroyed. Solitary nesting gulls, cranes, large waterfowl, and loons avoided this fate.

CONCLUSION

A reconstruction of the breeding fauna of such a vast and geographically isolated area as Ayon Island is not quite correct when based on data of one field season. However, the previous data for the middle and the end of the 20th century were obtained in a similar way, within single field seasons, and, for this reason, the comparative aspect of the present work is justified. Following the accidentally formed schedule, the next ornithologists' visit to Ayon Island should be no earlier than in 2042.

Over the past 30 years, the fauna of breeding shorebirds on the island has been depleted substantially, which is consistent with the trends of this group observed along the East Asian-Australasian Flyway (www.eaafp.com).

The Ayon Island can serve as a perfect base for the study of differentiation of closely related species by their niches. For the four species of the genus *Gavia*, similar sites can be found also on other plains of eastern Yakutia and northern Chukotka. For species of the genus Somateria, this island is the only place in the world where three of them occur at a quite high density.

In open tundra, gull colonies, seen from a distance of several kilometers and attended by bears, become rather a trap than a refuge for other species of birds. In this situation, solitary nesting loons and waterfowl have some advantage: this way they get a chance to hatch out their clutch without being found by large predators and successfully defending it from Arctic fox. We explain the high abundance of predators on Ayon Island by two factors: (1) the global warming that causes brown bear to penetrate deeper into the tundra zone and (2) the presence of a herd of domesticated reindeer (wolves and numerous Arctic foxes) on the island

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