

Migrations of the Long-tailed Duck in the European North-East of Russia

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Abstract

Arctic Russia is home to more than 90 % of all Long-tailed Ducks in the *Clangula hyemalis* species from the Western Siberia/Northern Europe population. The main wintering grounds of Long-tailed Ducks are situated in the Baltic Sea. The principal migratory routes of the Long-tailed Duck between the breeding and wintering grounds are relatively well-studied and follow the so-called Norwegian route along the Barents Sea coastline via the Pomorskiy Strait, over the Kolguyev Island, the Kaninskiy Peninsula and the White Sea. The secondary migration routes are still understudied. It has been determined that a portion of the population regularly migrates through the eastern part of Ukraine and European Russia, including the Komi Republic, the Kirov Region, the Nizhny Novgorod and Perm Regions, and the Republics of Udmurtia, Mari El, and Bashkortostan. Thus, a portion of the population utilises the «Volga-Caspian» migration route. This migration route is not as massive and covers a broad area. Long-tailed Ducks migrate in flocks of 4 to 56 individuals. Sometimes, there may be a higher intensity of migration. It is highly likely that the wintering grounds of these birds are located in the Caspian and Black Seas, where 4-5 thousand Long-tailed Ducks were counted within a relatively small area. A detailed study of all relevant ecological aspects is needed to contribute to the conservation of the Long-tailed Duck.

Ключевые слова:

secondary flyways, southern wintering sites, southernmost breeding area, Komi Republic

Introduction

The Long-tailed Duck breeds predominantly in Arctic tundra habitats, moving to marine areas for the non-breeding season. The species has a high Arctic circumpolar breeding distribution, and within the Eurasian region, it breeds predominantly in Russia, with smaller populations in Finland, Sweden, Norway, Iceland, and Greenland [1]. The key breeding sites are located in the Arctic freshwater habitats between the Kaninskiy and Yugorskiy Peninsulas [2, 3].

The Long-tailed Duck breeds in the European North-East of Russia, occupying the tundra, forest-tundra zones, and

Миграции морянки на европейском Северо-востоке России

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Аннотация

В Российской Арктике обитает более 90 % популяции морянки *Clangula hyemalis*, гнездящейся в Западной Сибири/Северной Европе. Главные места зимовки морянок находятся на Балтийском море. Их основные миграционные пути между местами гнездования и зимовки изучены относительно хорошо и проходят по так называемому «норвежскому миграционному маршруту» вдоль побережья Баренцева моря через Поморский пролив, остров Колгуев, Канинский полуостров и Белое море. Второстепенные пути миграции изучены недостаточно полно. Установлено, что часть популяции регулярно мигрирует через восточную часть Украины и Европейской России, включая Республику Коми, Кировскую область, Нижегородскую и Пермскую области, а также Республики Удмуртия, Марий Эл и Башкортостан. Таким образом, часть популяции использует «Волго-Каспийский» миграционный путь. Этот миграционный путь не столь массовый и охватывает обширную территорию. Морянки мигрируют стаями от 4 до 56 особей. Иногда может наблюдаться более высокая интенсивность миграции. Весьма вероятно, что места зимовки этих птиц находятся в Каспийском и Черном морях, где на сравнительно небольшой территории было учтено 4-5 тыс. морянок. Детальное изучение всех соответствующих аспектов экологии морянки необходимо для сохранения этого вида.

Keywords:

второстепенные миграционные пути, южные районы зимовок, крайне южные места размножения, Республика Коми

extreme-north taiga subzone. It is highly abundant in tundra habitats, where it occupies all water bodies, from puddle-lakes to large lakes, rivers, channels, coastal sea areas, and bays. The Long-tailed Duck is best suited to habitats in coastal tundra areas and large lake systems with tundra areas that are overgrown with small and large dwarf Arctic birch [2, 3, 4].

During the breeding season, Long-tailed Ducks can be found in lakes of various sizes within the extreme-north taiga subzone, as well as in large and medium-sized peat-

lands. Our data shows that the southernmost nesting sites of these birds are located in the Usinsk and Inta Regions of the Komi Republic. On June 11-12, 2006, breeding pairs of ducks were repeatedly observed in Usinsk peatland. The meetings will take place at the following geographical coordinates: 65°45'38" N; 57°00'58" E and 65°51'46" N; 57°57'50" E. On July 9, 2017, a pair of ducks exhibiting breeding behaviour were observed in the lower course of the Sharyu River (66°09'37"N; 58°23'06"E). Long-tailed Ducks were observed on lakes in the Inta City area from June 24 to August 31, 1986 (66°03'40" N; 60°09'04" E). Nesting pairs were noted among them, and on June 29, separate broods of 5 and 6 ducklings were observed. During the period of August 11 to 31, joint broods of 5, 65, 41, 18, and 45 ducklings were observed. On June 30, 2007, pair of Long-tailed Ducks were shot in Lake Pagaty, located in the foothills of the Polar Urals at 66°23'36"N; 62°44'44"E. The female had an egg in its oviduct and the male had hypertrophied gonads. On June 25, 2007, a group of nine ducks were observed spending their summer on a mountain lake located in the upper reaches of the Paga River (66°22'12"N; 63°16'48"E). Ducks spending their summer were also recorded in the middle taiga zone of the Komi Republic (64°20'N) in the Shchugor River basin. Long-tailed Ducks were observed nesting in the taiga zone of the Semzha River basin at latitude 66°N in the Arkhangelsk Region in the 1950s [5]. In Churchill, Manitoba, Canada, this species inhabits the forest zone at latitude 58°N with a high population density [6].

The majority of the Long-tailed Ducks belonging to the North European/West Siberian population overwinter in the Baltic Sea [7, 8]. Recent studies, using genetic markers [9] and geolocator tracking [10, 11], confirmed that the Baltic Sea is the main wintering area for Long-tailed Ducks breeding in the tundra zone of European Russia and Western Siberia. The breeding population in European Russia was estimated to be about 5 million birds in the 1960s [12] but decreased to 1 million birds today [4]. Due to the large decline in the number of ducks wintering in the Baltic Sea since the mid-1990s (equivalent to a 59% decline in the global population over three generations), the Long-tailed Duck was classified as 'Vulnerable' on the International Union for Conservation of Nature (IUCN) Red List in 2012 [13]. The decline in the Long-tailed Duck population could be attributed to various anthropogenic and natural factors in both breeding and non-breeding areas. [13, 4]. The redistribution of wintering sites may be a contributing factor for this species.

The Long-tailed Duck is a long-distance migrant. The main migration routes of the species along the Barents Sea coast are well-studied, but alternative migration routes in the European North-East of Russia are poorly covered in the existing literature. The main objective of this study was to examine the migration patterns of the Long-tailed Duck, a species that has declined in Europe [14] and North America [15, 16]. The study focused on the Volga-Caspian flyway and aimed to assess the significance of this route for the entire population of the species. Obtaining data on the annual movements and key breeding, molting, wintering, and stopover sites of the Long-tailed Duck during migrations would help to better understand the reasons for the popula-

tion decline. The study results will serve to provide a reliable assessment of the status of this globally threatened species.

Methods and study areas

This study is based on our own published [2-4; 17-19] and unpublished data, as well as other literature sources. Field material on the migrations of Long-tailed Ducks was collected in the Nenets Autonomous District of the Arkhangelskaya Region (from the Kaninskij Peninsula in the west to the Yugorsky Peninsula in the east) and in the Komi Republic (Figure 1) in May-October from 1973 to 2022. Long-tailed duck movements were observed stationary during targeted waterfowl surveys, as well as on pedestrian and boating routes.



Figure 1. Study site – the Komi Republic and the Nenets Autonomous District where migrating Long-tailed Ducks were observed.

Рисунок 1. Район исследований – Республика Коми и Ненецкий автономный округ. Где наблюдались мигрирующие морянки

Migrations of the Long-tailed Duck

Migrations of the Long-tailed Duck in tundra of the European North-East of Russia

Spring migrations. The Long-tailed Duck's main direction of spring migration route follows along the sea coast and over the sea area of the Barents Sea (Figure 2). Some parts of duck winters annually on sea polynyas (open water areas in sea ice) in the vicinity of the Kolguyev Island and the Khaipudyrskaya Bay [2, 3, 10, 11]. Therefore, estimating the exact start of the spring migration of Long-tailed Ducks on the seashore is difficult. Long-tailed Ducks were observed on April 28 near the mouth of the Velt River. It is likely that these birds were wintering in ice-free areas of the Barents Sea [20]. Migratory birds were first observed on the laidas (coastal lowland marshes) of the lower course of the Velt River on May 25, and on May 27th a mass arrival began here, which continued until the end of the month [20, 21]. In the Sengeisky Island area, numerous flocks of Long-tailed Ducks migrated eastward along the Barents Sea coast on May 15-17, and intensive migration continued from May 22 until 26th in 1979 [2]. On June 9, the first ducks were recorded on the Shchuchaya River in the continental part of the Malozemel'skaya tundra [22]. Long-tailed Ducks appear in the Pechora delta when unfrozen patches of water appear on river wa-

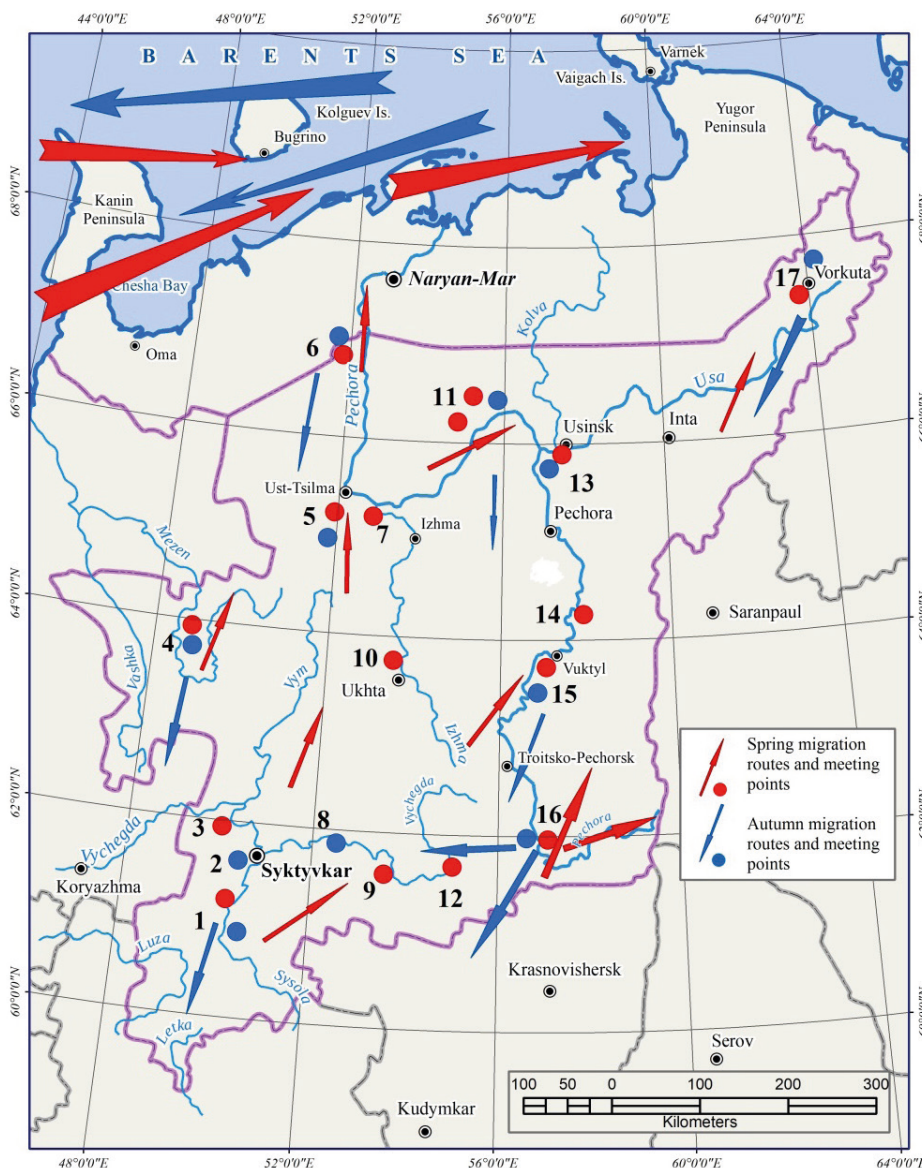


Figure 2. Direction of spring and autumn migration routes of the Long-tailed Duck and points of spring and autumn meetings of the species on the European North-East of Russia.

Рисунок 2. Направления весенних и осенних миграционных путей морянки и места встреч вида осенью и весной на европейском Северо-востоке России.

tercourses. The transit migration of ducks in tundra habitats often lasts until the end of the first decade of June.

In the continental part of the Bolshezemelskaya tundra, Long-tailed Ducks appear in the presence of unfrozen patches of water on rivers and lakes. Flocks of Long-tailed Ducks were observed from 26 May to 11 June, on average ($n=9$ years) on 2 June. In the continental part of the Yugorskiy Peninsula, Long-tailed Ducks were recorded from 24 May to 8 June, mostly ($n=4$ years) on 29 May. The increase in the number of ducks in the Bolshezemelskaya Tundra lasted from 5 to 15 June, and on the Yugorskiy Peninsula from 12 to 19 June.

Summer migrations of Long-tailed Ducks are not pronounced. In the Malozemelskaya tundra, duck migration from the breeding grounds was recorded from 4 to 24 July, with an average of 14 July. At this time, flocks of Long-tailed Ducks, consisting of drakes or females, appeared on lakes and sea bays. Pre-moult concentrations of Long-tailed Ducks were observed on lakes, lower reaches and mouths of rivers,

coastal waters and sea bays from 1 July to 1 August, with an average of 12 July. Duck flocks can be numerous, the number of birds in them varying from 10 to 150, rarely up to 300 individuals. It is likely that the majority of birds are concentrated at sea, far from the coast. From the end of July to the first ten days of August, most of the ducks in the flocks moulted intensively.

Between June 21 and July 7, on average on July 1, non-breeding Long-tailed Ducks, mostly males, in the Bolshezemelskaya tundra migrated to the molt. During this period, drakes and female ducks gather in flocks on the lakes, and males of these flocks usually migrate in small groups of up to 20 individuals or, more commonly, float downstream into the lower courses of rivers that flow into the Barents Sea. Ducks flying away were recorded on the Yugorskiy Peninsula between June 23 and July 3. After the females have finished laying eggs, the drakes (flocks of 5-6 individuals) concentrate on rivers and lakes. The mass departure of drakes occurred between June 29 and July 14.

Autumn migrations have not been extensively studied. The main channel of the autumn migration passes over the Barents Sea [2, 3, 10, 11]. The departure of Long-tailed Ducks from the

Malozemelskaya tundra to wintering grounds occurs in the second half of August - early September. Small flocks and groups of ducks flying towards the northwest and west at this time. From mid-September, migration intensifies, and most Long-tailed Ducks fly to the Barents Sea. In the water areas of Korovinskaya and Kolokolkovaya bays and lakes, broods and some adult birds remain until the onset of freeze-up.

Long-tailed Ducks depart the Bolshezemelskaya tundra in mid to late September, in some years in early October. During this time, it was most common to observe migrating broods and small flocks of ducks. The autumn migration of Long-tailed Ducks on the Yugorskiy Peninsula starts in September, and finishing at the end of the freeze-up on lakes and the appearance of ice fields on the sea. On the Yugorskiy Shar Strait, flocks, groups and single ducks were observed until the second decade of October. Flocks of Long-tailed Ducks flying over the sea to the west were numerous on September 18-27 and October 2-8. At the same time, migratory bird

flocks were observed on lakes and rivers. Since October 8, numerous drakes in winter plumage have been appeared on the sea.

Migrations of the Long-tailed Duck in the Komi Republic

During the spring-autumn migration, Long-tailed Ducks are regularly observed in various regions of the Komi Republic (Figure 2). During spring migration, ducks typically fly in a northerly, northeasterly, or easterly direction. Autumn bird migration is observed in the same areas as spring migration. During autumn migration, ducks fly in a southerly, southwesterly, or westerly direction.

In the Sysola River basin, in the Vizinga village area, ducks are rare and are registered not every year in late May and early October. (Figure 2, Point 1). In September 2009, three Long-tailed Ducks were observed migrating along the Sysola River in the Vylgort village area [23] (Figure 2, Point 2).

In the Vychegda River basin, Aikino village area (Figure 2, Point 3), ducks are very rare, meetings were registered on May 8, 2007. In the Mezen River basin, Koslan village area (Figure 2, Point 4), ducks are rare, but are found every year on May 24-25. In autumn, small numbers of them are regularly found annually from September 28 to October 7. In the lower course of the Izhma River (Figure 2, Point 7), pairs and groups of long-tailed ducks are usually seen between May 25th and 30th. They are also recorded in small numbers every autumn, between September 28th and October 7th.

In the Lower Pechora, at the mouth of the Kharyaga River (Figure 2, Point 6), they are common in the third decade of May - first decade of June, as well as in the third decade of September - first decade of October. In the Middle Pechora River, in the mouth of the Laya River (Figure 2, Point 11), ducks occur annually in small numbers in late May - early June and in small groups in autumn. On the Pizhma River, near the village of Zagrivochnaya (Figure 2, Point 5), pairs and small flocks usually meet every year on 20-25 May. The Long-tailed Duck was observed in various locations within the Vychegda River basin. Ducks were registered in September 1969 in the Kortkeros village area (refer to Figure 2, Point 8) [24]. Several ducks were observed in the Ust-Kulom village area on May 21, 2018 (Figure 2, Point 9). Ducks are registered in small numbers in the Yugyd-Yag village area (Figure 2, Point 12) on May 18-21, but not every year. Small groups of Long-tailed Ducks are recorded annually on May 10-20 in the Ukhta River basin (Figure 2, Point 10). In the Upper Pechora River basin, ducks are regularly observed in the Sherdino village area (Figure 2, Point 15). Pairs and small flocks of ducks are seen in the third decade of May, and with a small number they are seen in the second decade of October. In the third decade of May, small numbers of Long-tailed Ducks were observed in the Podcherye village area (Figure 2, Point 14). The largest migration was observed in the Yaksha village area (Pechora-Ilychsky Nature Reserve) (Figure 2, Point 16).

Ducks are registered annually from May 16-24, and are relatively numerous, with groups ranging from 3-55 individuals. Their flight directions are typically northern, northeastern, and eastern. They are also regularly observed every year in autumn, from September 25 to October 22, in flocks of 5-56 individuals [25, 26]. In the Usy River basin, in the Usinsk city area (Figure 2, Point 13), pairs and groups of ducks migrate annually at the end of May at spring, and in the first decade of October in autumn. In the Vorkuta River basin (Figure 2, Point 17), the migration of numerous flocks of Long-tailed Ducks is typical every year during the periods from May 21-25 in spring and September 14-20 in autumn.

Occurrence of Long-tailed Ducks on migration in the Sysola River basin, in the Pechora-Ilychskij Nature Reserve and at the mouth of the Northern Dvina River, in % of all recorded *Anseriformes*

Встречаемость морянки на пролете в бассейне р. Сысола, в Печоро-Илычском заповеднике и в устье Северной Двины, в % от всех отмеченных гусеобразных

Lower course of the Sysola River 2008-2011 (our data)		Pechora-Ilychskij Nature Reserve 1956-1960 [25]		Pechora-Ilychskij Nature Reserve 1998-2008 [26]		Severnaya Dvina River mouth 1983-2001 [27]	
Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn
-	0.03	0.5	0.6	0.1	0.02	0.6	0.7

Discussion

The Long-tailed Duck remains the most numerous sea duck species in tundra of European North-East of Russia. It mainly inhabits grassy tundra close to the sea coast with numerous small, shallow freshwater lakes and marine marshes. The highest population densities are presented in the coastal areas of Malozemelskaya and Bolshezemelskaya tundra and Yugorskij Peninsula.

The primary spring-autumn migration route of Long-tailed Ducks passes along the coast of the Barents Sea, through the Pomorskij Strait, across Kolguev Island, the Kaninsky Peninsula, and the White Sea.

The spring-autumn migration route of Long-tailed Ducks in the Komi Republic may have formed historically long time ago (Figure 2), however, the current volume of this migration is low. Long-tailed Ducks are observed in small numbers every spring in various river basins including Mezen River basin (in the Koslan village area), the lower reaches of the Izhma River, and the basins of the Pizhma, Ukhta, Vychegda, Sysola, Kharyaga, Laya, Usa, Vorkuta and Pechora rivers. The Pechora River's upper course (Pechora-Ilychsky Nature Reserve) experiences the highest levels of mass migration, with annual sightings of groups ranging from 3 to 55 birds. It should be noted that in recent years the number of migratory Long-tailed Ducks on this migration route has decreased. Based on studies conducted in the Pechora-Ilychsky Nature Reserve, the proportion of migratory birds among *Anseriformes* was found to be 0.5 % in spring (Table) and 0.6 % in autumn in 1964 [25]. In the years 1998-2008, the proportion decreased to 0.1 % in spring and 0.02 % in autumn [26].

The Long-tailed Duck is likely to use this migration route to reach alternative wintering sites. In addition to the traditional wintering sites of Long-tailed Ducks in the Baltic and Norwegian Seas, several wintering sites are known in the Caspian and Black Seas, where wintering a small part of the population.

Small wintering concentrations of Long-tailed Ducks in the Caspian Sea were described already by [28]. Currently (in January 2015), during helicopter surveys conducted on a short section of the route in the northern part of the Caspian Sea (near the Bautino village, Figure 3, Point 1), at least 3.7 thousand Long-tailed Ducks were observed 3 km from the coast. They are kept in monospecific flocks of 1500, 1000, and 500 individuals. In addition, flocks of 30-150 Long-tailed Ducks were observed among large flocks of Goldeneyes *Bucephala clangula*. In January 2013, in the same area, among a concentration of Goldeneyes, flocks of Long-tailed Ducks up to 150 individuals in size were recorded. A total of 800 birds were counted [29].

In addition to the Caspian Sea, the wintering grounds of Long-tailed Ducks are also known in other southern regions. In January 1970, a large concentration of Long-tailed Ducks was noted in Kazakhstan at the Chardarinskoe reservoir east of the Caspian Sea, where about 600 individuals were counted [30]. Wintering grounds of the Long-tailed Duck in the northern part of the Black Sea is described by Z. O. Petrovich and K. O. Redinov [31]. During field work on the Dnieper-Bugskij liman (Fig. 3. Point 2) in 2000-2009 Long-tailed Ducks were recorded annually in winter in the area of Berezan Island. Recorded flocks have varied in size from 40 to 500 individuals. The authors believe that this species of duck has wintered in this location previously, but it was not discovered due to the complexity of the surveys. Meetings of the species in winter in the Northern Black Sea region were recorded in the 19th and early 20th centuries. In the early 20th century, it was observed that ducks were migrating in significant numbers during the spring. Autumn migration has been observed since mid-October. More than 500 Long-tailed Ducks were registered in the southern part of the Dnieper-Bugskij liman in late autumn in the 1950s, and in February 1961 about 100 individuals were recorded. Birds have been recorded in the area in small numbers almost every year between 1975 and 1984, with a maximum of 48 individuals. In January 1977, there were 15 individuals counted, and in January 1986, there were 70 individuals [31].

Long-tailed ducks are periodically found in the upper Dniester valley. The species' earliest records date back to March 1879 and January 1914. From 1993 to 1998, single birds and pairs of female Long-tailed Ducks were recorded annually

from November to March at a reservoir near Burshtyn town in the Ivano-Frankovskij region (Figure 3, Point 3). In previous years, there were registered groups consisting of 4-5 individuals and 13 individuals [32]. Wintering Long-tailed Ducks have been recorded in Dagestan (from the mouth of the Manas-Ozen River to Derbent, Figure 3, Point 4), in Kalmykia (Lake Manyč-Gudilo, Figure 3, Point 5), in the Krasnodar region (in the Azov region in the area of Yeisk, Figure 3, Point 6), in the Kuban delta, Figure 3, Point 7, in the Novorossiysk area, Figure 3, Point 8) and in Abkhazia (Pitsunda Bay, Figure 3, Point 9) [33].

The birds registered are probably part of the population of Long-tailed Ducks that wintering on the Black Sea. Ducks wintering on the Black and Caspian Seas migrate along the riverbeds of the Volga and other rivers in the Rostov (Figure 3, Point 10), Astrakhan (Figure 3, Point 11), Volgograd (Figure 3, Point 12), Voronezh (Figure 3, Point 13) and Saratov regions (Figure 3, Point 14) [33]. Then follow the Kama and Volga riv-



Figure 3. Migration routes and wintering sites of the Long-tailed Duck on the European part of Russia. Рисунок 3. Пути пролета и места зимовок морянки на европейском Северо-востоке России

er beds in Tatarstan (Figure 3, Point 15), where a massive migration was observed in the autumn of 1892. At the end of the 20th century, the species was not numerous during migrations in this area. The Long-tailed Duck is also a migratory bird in the Nizhny Novgorod (Figure 3, Point 16) and Perm regions (Figure 3, Point 17), Republics of Mari El (Figure 3, Point 18) and Udmurtia (Figure 3, Point 19). On the territory of the Kirov region (Figure 3, Point 20), Long-tailed Duck is meets in spring and autumn during migration. Evidence of meetings of this species is sparse. Long-tailed Ducks were observed on migration almost every year during the 19th and 20th centuries [34]. In 1988, 1989, 1992, 1995, 1997, 1998 Long-tailed Duck was registered only in the spring in the Kirov city area ("Filippovka" fish farm). Long-tailed Ducks were recorded migrating on this location during the autumns of 1927, 1928, 1936, 1940, 1955, and 1956. Flocks of up to 30 Long-tailed Ducks have been observed [34]. Birds from the Kirov region migrate to the Komi Republic (Figure 2) by flying along river beds to the north and east until they reach their breeding grounds. In the north-western part of Kazakhstan, autumn and spring migrations of Long-tailed Ducks have been regularly recorded [35].

We believe that stable flyways of Long-tailed Ducks in the continental part of European Russia have existed historically considerable period. The data presented on the Long-tailed Duck's flyways in mainland of European Russia allows us to conclude that they connect the breeding grounds of the species in the European North-East of Russia with the southern wintering grounds on the Black and Caspian Seas. A part of the duck population has always used these areas for wintering, and depending on natural conditions, it can periodically winter there in greater numbers.

Conclusion

Based on the data obtained, it can be concluded that the breeding grounds of birds that winter in the Black and Caspian Seas are located in the forest-tundra zone and the extreme northern taiga of the Komi Republic and the Arkhangelsk region. It is possible that their breeding grounds are also located in Western Siberia, but there is insufficient data for a final conclusion. Furthermore, it is reasonable to assume that long-tailed ducks may have altered their customary wintering sites in the Baltic Sea and started to winter in larger quantities in the Black and Caspian Seas. For instance, a comparable situation arose with the Ruff *Philomachus pugnax*. In recent decades, this species has changed its important stopover sites during migration in the Netherlands to stopover sites in Belarus, in the Pripyat River basin [36].

Thus, it is likely that the flight routes of Long-tailed Ducks in the eastern and northeastern parts of European Russia along the Volga-Caspian migration route have developed historically and exist for a considerable time, been quite stable. Further study of them is required. To clarify the number of Long-tailed Ducks in wintering grounds and their annual dynamics in the waters of the Black and Caspian Seas, regular and large-scale studies are necessary. This includes regular aerial visual surveys and the development of special pro-

grams such as duck ringing and the use of satellite telemetry. These programs should involve not only ornithologist specialists but also volunteers. Furthermore, a study should be conducted to identify genetic variations between the European and Siberian Long-tailed Duck populations.

The authors declare no conflict of interests.

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