Proceedings of the Zoological Institute RAS
Vol. 328, No. 1, 2024, pp. 101–107
10.31610/trudyzin/2024.328.1.101

UDC 598.277: 591.543.43 + 636.061.4

Seasonal migrations and morphometry of the European Nightjar according to long-term (1957–2016) trapping and ringing in the Eastern Baltic

V.A. Payevsky[1]* and A.P. Shapoval[2]

[1] *Zoological Institute of the Russian Academy of Sciences, Universitetskaya Emb. 1, 199034 Saint Petersburg, Russia; e-mail: Vladimir.Payevsky@zin.ru*

[2] *Rybachy Biological Station of the Zoological Institute of the Russian Academy of Sciences, Pobedy St. 32, 238535 Kaliningrad Region, Rybachy, Russia; e-mail: Anatoly.Shapoval@zin.ru*

Submitted March 7, 2023; revised April 12, 2023; accepted May 23, 2023.

ABSTRACT

The results of trapping, measuring the size and weight of the body of the European Nightjar, as well as migration routes according to the data of the ringing in the Kaliningrad region during 1957–2016 are discussed. The annual number of migrating birds has fluctuated significantly for 60 years, and the number of those caught and ringed varied from one to 44 individuals in different years. They were most numerous in May, in the period 1969–1981. Four ring recoveries of Nightjars ringed by us were obtained, which gives the effectiveness of ringing of this species with nocturnal activity of only 0.92%. However, these ringing results indicate that in autumn the migration routes of Nightjar population from the western parts of Scandinavia and from southern Finland run through the eastern coast of the Baltic Sea, and later, on the way to Africa, their azimuth of flight varies from 178° to 203°. The longevity record according to the data from one male of the subspecies *Caprimulgus europaeus zarudny* E. Hartert, 1912 was 15 years. The migration routes of this species are discussed according to the latest literature data.

Key words: body mass, migration routes, Nightjar, population dynamics, wing length

Сезонные миграции и морфометрия обыкновенного козодоя по данным многолетнего (1957–2016) отлова и кольцевания в Восточной Прибалтике

В.А. Паевский[1]* и А.П. Шаповал[2]

[1] *Зоологический институт Российской академии наук, Университетская наб. 1, 199034 Санкт-Петербург, Россия; e-mail: Vladimir.Payevsky@zin.ru*

[2] *Биологическая станция «Рыбачий» Зоологического института Российской академии наук, ул. Победы 32, 238535 Калининградская обл., пос. Рыбачий, Россия; e-mail: Anatoly.Shapoval@zin.ru*

Представлена 7 марта 2023; после доработки 12 апреля 2023; принята 23 мая 2023.

РЕЗЮМЕ

Обсуждаются результаты стандартного отлова, измерения размеров и массы тела, а также путей миграции по данным кольцевания обыкновенного козодоя на Куршской косе в Калининградской области в течение 1957–2016 гг. Ежегодное количество мигрирующих птиц в течение 60 лет значительно колебалось, а число их, пойманных и окольцованных, варьировало в разные годы от одной до 44 особей. Наиболее многочисленны они были весной, в мае, в период 1969–1981 гг. Получено 4 возврата колец

* Corresponding author / Автор-корреспондент

окольцованных нами козодоев, что дает эффективность кольцевания этого вида с ночной активностью лишь 0.92% от числа помеченных. Однако эти результаты мечения свидетельствуют, что осенью через восточное побережье Балтийского моря пролегают пути миграций козодоев из западных частей Скандинавии и из южной Финляндии, а в дальнейшем, на пути в Африку, азимут их разлета варьирует от 178° до 203°. Максимальная продолжительность жизни по данным от одного самца подвида *Caprimulgus europaeus zarudny* E. Hartert составила 15 лет. Обсуждаются пути миграций этого вида по последним литературным данным.

Ключевые слова: масса тела, миграционные пути, козодой, популяционная динамика, длина крыла

INTRODUCTION

The European Nightjar *Caprimulgus europaeus* Linnaeus, 1758 is a common bird species with moderate populations subject to slight fluctuations, with twilight and nocturnal activity, and with annual seasonal migrations to Africa (Spangenberg 1951; Del Hoyo et al. 1999; Noskov 2016). Until recently, the details of migrations have been little studied. Nightjars have been found in winter throughout some parts of tropical Africa, and as far south as South Africa and Namibia (Cramp 1985). The use of geolocators and loggers on the body of birds made it possible to determine the migration routes and places of wintering of Nightjars much more accurately. It turned out that they make a loop-like migration in autumn and spring, and spend the winter south of the central African tropical rain forests, in two subtropical regions – mosaic savanna forests in the south of the Democratic Republic of the Congo and in forested areas of Zambia (Cresswell and Edwards 2013; Norevik et al. 2016; Evens et al. 2017).

Up to five or six subspecies are distinguished in this species (Stegman 1949; Kovshar 2005), of which the range of the nominate subspecies, the largest and darker in color plumage, covers most of Europe, including the Eastern Baltic. Along with other bird species, the Nightjar is caught for the purpose of ringing to study migrations by the staff of the Biological Station "Rybachy" of the Zoological Institute of the Russian Academy of Sciences, located on the Curonian (= Courish) Spit. The geographical position of this spit separating the Curonian Lagoon from the Baltic Sea coincides with the main direction of bird migration in the Eastern Baltic. To date, there have been no publications on the features of Nightjar migrations in this region, with the exception of a list of data on the findings of ringed birds (Bolshakov et al. 2001).

MATERIALS AND METHODS

Trapping and ringing of birds have been carried out on the Curonian Spit since 1957 to the present time at two main sites: the "Fringilla" field station (55°05' N, 20°44' E) and Rossiten Cape (55°09' N, 20°51' E). At the former site, birds are caught in Rybachy traps, at the latter site in the first years of work they were also caught with the same trap and later with mist nets. The detailed arrangement of Rybachy traps has been repeatedly described (Dolnik and Payevsky 1976, etc.). Traps operate for 7 months of the year, around the clock, from the end of March to the start of November. The work duration of each trap (unchanged design) varied very slightly over the years, within several days at the beginning of trapping in spring and at the end of trapping in autumn. Trapping and ringing of birds of all species is accompanied by their lifetime examination, determination of sex and age, as well as standard measurements of wing length and body weight. In addition, the stage of the sexual cycle and the state of molting are also described (Vinogradova et al. 1976).

The lists of all quantitative data on the birds trapped and the ring recoveries, including materials on the Nightjar, have been published (Payevsky 1973; Bolshakov et al. 2001; Shapoval et al. 2018). The main part of the Nightjars ringed on the Curonian Spit were caught at the "Fringilla" Station. In total, over 60 years, from 1957 to 2016, 433 Nightjars were caught and ringed, and 4 reports were received about distant finds of our rings, i.e. recoveries of ringed birds.

RESULTS AND DISCUSSION

Efficiency of trapping and ringing. Population dynamics

The round-the-clock possibility of catching birds with Rybachy traps made it possible to ring birds

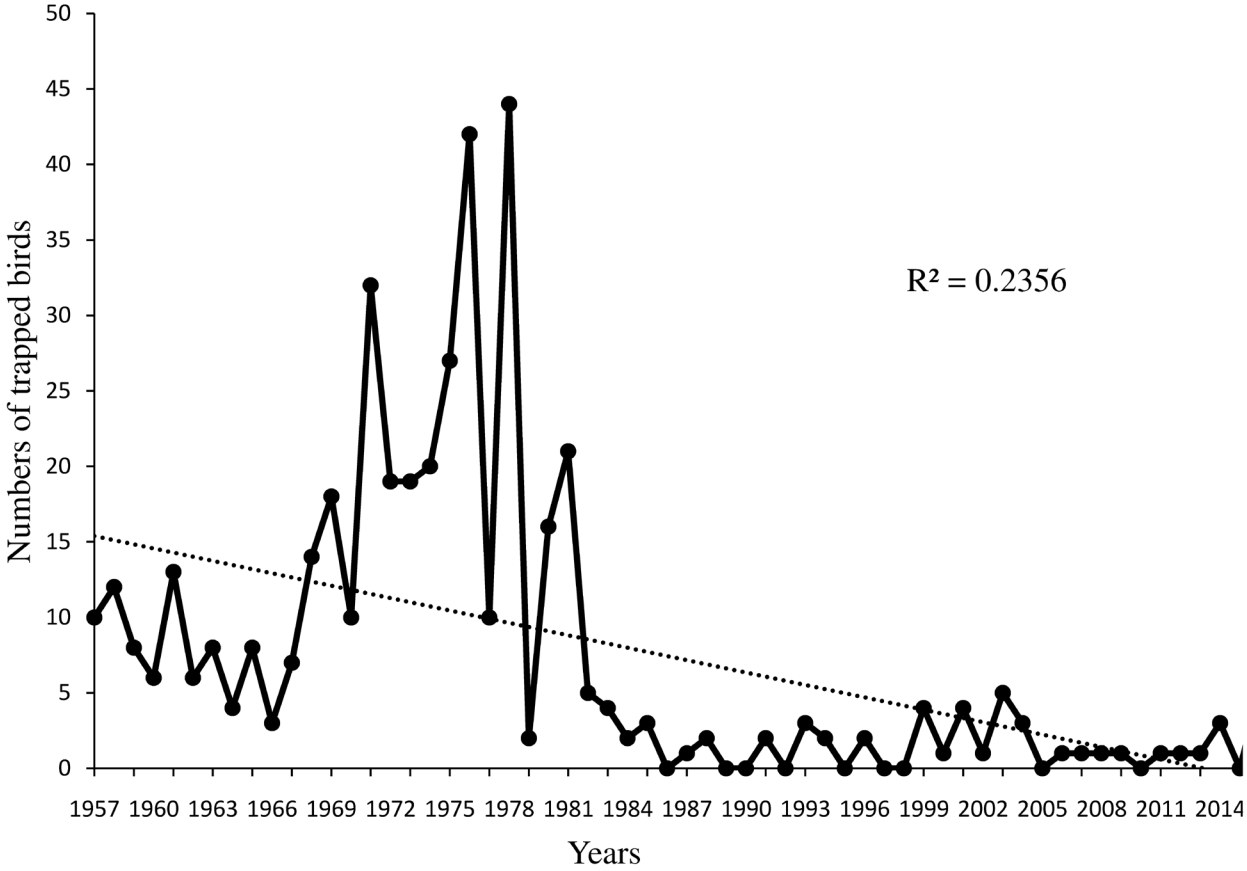

Fig. 1. The number of Nightjars trapped and ringed on the Curonian Spit in different years.

with a nocturnal and twilight lifestyle, including Nightjars. A small number (four recoveries) of the Nightjars ringed by us is 0.92% of the number ringed. Such effectiveness of ringing turned out to be close to the effectiveness of ringing small songbirds, despite a much larger body size of Nightjar, which, apparently, may be due to the rarity of accidental contact of this species with a human due to its activity in the darkness.

The annual number of Nightjars caught on the Curonian Spit for 60 years ranged from 0 to 44 individuals. They were most numerous in the period 1969–1981. After this period the differences in the annual number of the Nightjars caught were accompanied by its gradual decline, with the coefficient of determination R^2 equal to only 0.24 (Fig. 1). Apparently, this was due to a gradual change in the structure of the biotope habitats of the Curonian Spit. In the first years of the work on the Biological Station "Rybachy", the territory of the "Fringilla" field station, where the main trapping of birds was carried out, consisted of sandy areas with low grass, willow bushes, plantings of ordinary pine aged 3–5 years, and separate birch groves. This biotope was inhabited by different species of nesting birds, including the Nightjar. During these years, two incubated clutches of Nightjar were found at the edges of small birch forests. By the mid-1980s, dense pine plantings, reaching a height of 3–4 m, formed the main formation of plantings of the described territory. Probably, by this time, the local population of Nightjars near the traps no longer existed, and only some migrating birds were caught in the traps. The same change in the number of Nightjars taken into account occurred approximately in the same years in southwestern Sweden due to the growth of dense stands (Aronsson 1995).

The timing distribution of Nightjars caught on the Curonian Spit in 1960–1988 shows (Fig. 2) that

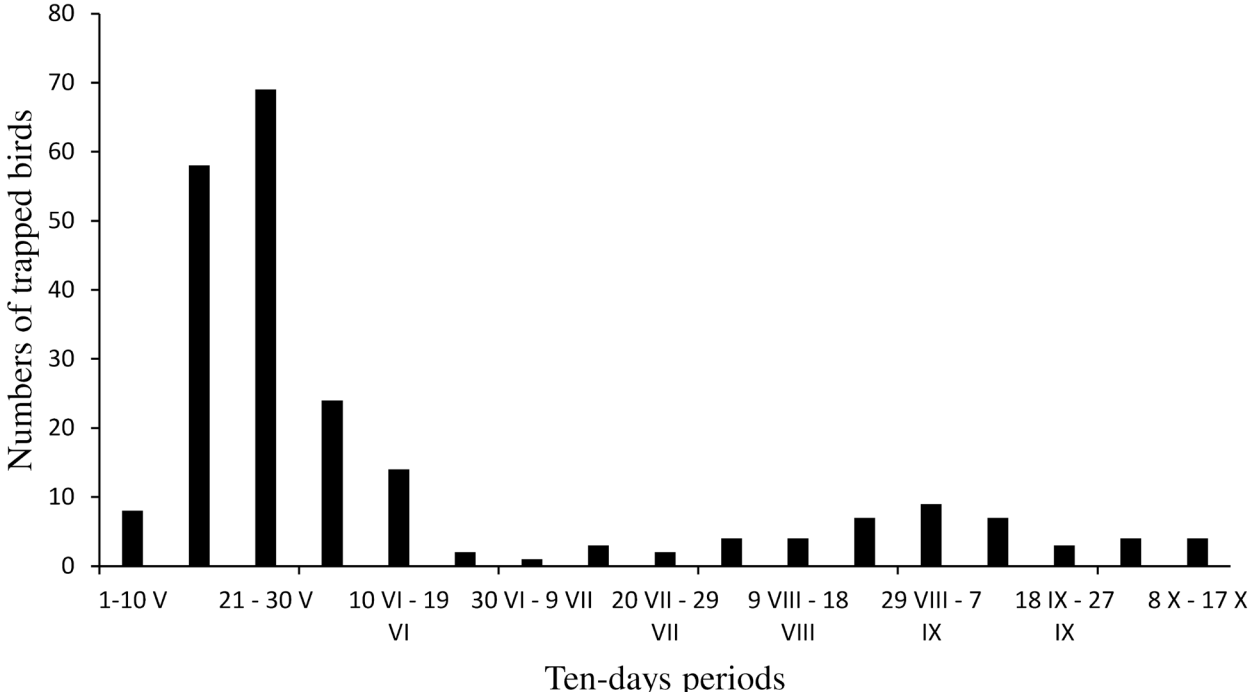

Fig. 2. Dynamics of Nightjar trapping during the spring, summer and autumn.

the peak of their migration movements in the spring was in May. The total number of males caught during these years (114) significantly exceeds the number of females caught (81). Autumn migration according to trapping data is poorly expressed. In spring, the first Nightjars were caught starting from May 3–5 and in autumn the last ones were caught on October 12–17. In another part of the area of the European Nightjar, in northwestern Italy, their capture for ringing purposes is also most successful in spring, starting in May, and at the same time as on the Curonian Spit males are caught in greater numbers than females, and the overall survival rate without sex is 70% (Fabrizio and Boano 2012). It is known that in most of the studied bird species and populations, despite the equal sex ratio at birth, the quantitative predominance of males in populations most often depends on their increased survival compared to females (Payevsky 2021).

The size and body mass of the captured Nightjars

In Table 1 the results of measurements of Nightjars during the periods of their regular trapping, from 1960 to 1988, are presented. Comparison of their wing length and body mass with those from other populations given in review publications (Del Hoyo et al. 1999; Kovshar 2005; Noskov 2016) showed some differences. It should be emphasized that the number of measured Nightjars on the Curonian Spit is several times greater than those indicated in the literature. In this regard, it is possible to believe that the data given in the table are more consistent with the actual size of Nightjars, at least birds from Eastern Europe. It is usually indicated that there are no sexual differences in the size and body weight of Nightjars (Cramp 1985; Kovshar 2005). According to our data (Table 1), the indicators of the average wing size of males and females were, according to the Student's t-test, at the minimum limit of significant differences ($t=1.96$, $df=193$, $P=0.05$) with a slightly longer wing in males, and there were really no significant differences in body mass of individuals that belonged to different sexes ($t=0.86$, $df=152$, $P=0.39$).

Migration movements and longevity

Nightjars ringed on the Curonian Spit were found (Fig. 3) in Norway in June (the third year after ringing), in Finland in August (82 days after ringing), in Slovenia in April (the next year after ringing) and in Serbia in November (26 days after ringing). Despite

Table 1. Wing length (mm) and body mass (g) of trapped European Nightjars.

Sex, age	Wing length			Body mass		
	n	range	mean ± SE	n	range	mean ± SE
Males	114	186–227	199.1 ± 0.7	91	61–96	75.3 ± 0.7
Females	81	182–210	197.3 ± 0.6	63	50–96	76.5 ± 1.2
Young	20	178–206	191.2 ± 1.6	19	53–81	54.1 ± 2.4

only four ring recoveries, they give a clear picture of which populations Nightjars may belong to, flying during migrations through the Eastern Baltic States, and through which places in Europe Nightjars pass on their way to Africa. It turned out that in autumn their routes run through the eastern coast of the Baltic Sea, both from the western parts of Scandinavia and from southern Finland, and then the azimuth of the spread varies from 178° to 203°.

A comparison of our results with the results of Nightjar ringing in other places in Europe and Asia showed a more complete picture of the migrations of this species. Firstly, a large number of ringed Nightjars in southern and western Finland yielded many re-catches at the ringing site, and only 4 ring recoveries indicated migration routes through Latvia, Lithuania and Bulgaria, as well as wintering in Zambia (Valkama et al. 2014). Secondly, according to the data obtained from geolocators and loggers on birds from Western Europe (England, Belgium and northern France), the beginning of autumn migration fell on the period from August 24 to September 11. The crossing of the Mediterranean Sea occurred in a wide front in different places of the coastline of France and Italy, and after that the Nightjars made long stops, up to three weeks, in north, west and central Africa (Evens et al. 2017). Thirdly, similar data were obtained from Nightjars equipped with geolocators from Northern Jutland (Denmark): they migrated to the southwestern part of central Africa and back in the spring over a distance of 13993 to 18200 km; their wintering lasted from 135 to 174 days. They spent from 21 to 44 days at migration stops (Jacobsen et al. 2017).

Thanks to the kind assistance of Sergey Kharitonov, we also received all information about the results of Nightjar ringing from the Bird Ringing Centre of Russia, starting from the day of the beginning of the activities of this Center in the USSR. In addition to our four ring recoveries, there were eight more, of which four testified to the spring and autumn migration of the European Nightjar through European countries (Greece, Ukraine, Bulgaria and Hungary). From the remaining data of ring recoveries, information on one of them is apparently erroneous: a bird ringed in July 1981 in Karelia was shot in France on January 12 (?!) 1984. The most interesting is the ring recovery from a Nightjar of subspecies *Caprimulgus europaeus zarudny* E. Hartert, 1912: a male ringed on September 3, 1971 on a mountain pass Chokpak in the Dzhambul region of Kazakhstan, was found dead on November 28, 1986 in Mali, West Africa. The western direction of migration of this bird within Africa is surprising, as well as its age – 15 years! This record is in the first position according to the EURING longevity list. The second and third positions are occupied by a British bird of twelve years and a Finnish bird of ten years (Valkama et al. 2014).

According to our data, the migration speed could be set only for one bird: it overcame 1238 km in 26 days, which gives only 47 km per day. However, according to the data collected from birds equipped with loggers and geolocators, when crossing environmental barriers, such as the Mediterranean Sea and the Sahara Desert, Nightjars fly at a speed of 500–530 km per night in autumn and 250–500 km per night in spring (Cresswell and Edwards 2013; Evens et al. 2017).

ACKNOWLEDGEMENTS

We are deeply grateful to all our colleagues – staff members of the Biological Station “Rybachy” of the Zoological Institute, Russian Academy of Sciences, for friendly assistance at all stages of work and for the opportunity to use collective materials – the results of catching and ringing birds, in which we were directly involved. The study was carried out within the framework of state assignments for the projects “Phylogeny, morphology, ecology and systematics of terrestrial vertebrates” (No. 122031100282-2) and “Animal migrations: physiology, orientation and parasitic load during climate change” (No. 122031100261-7).

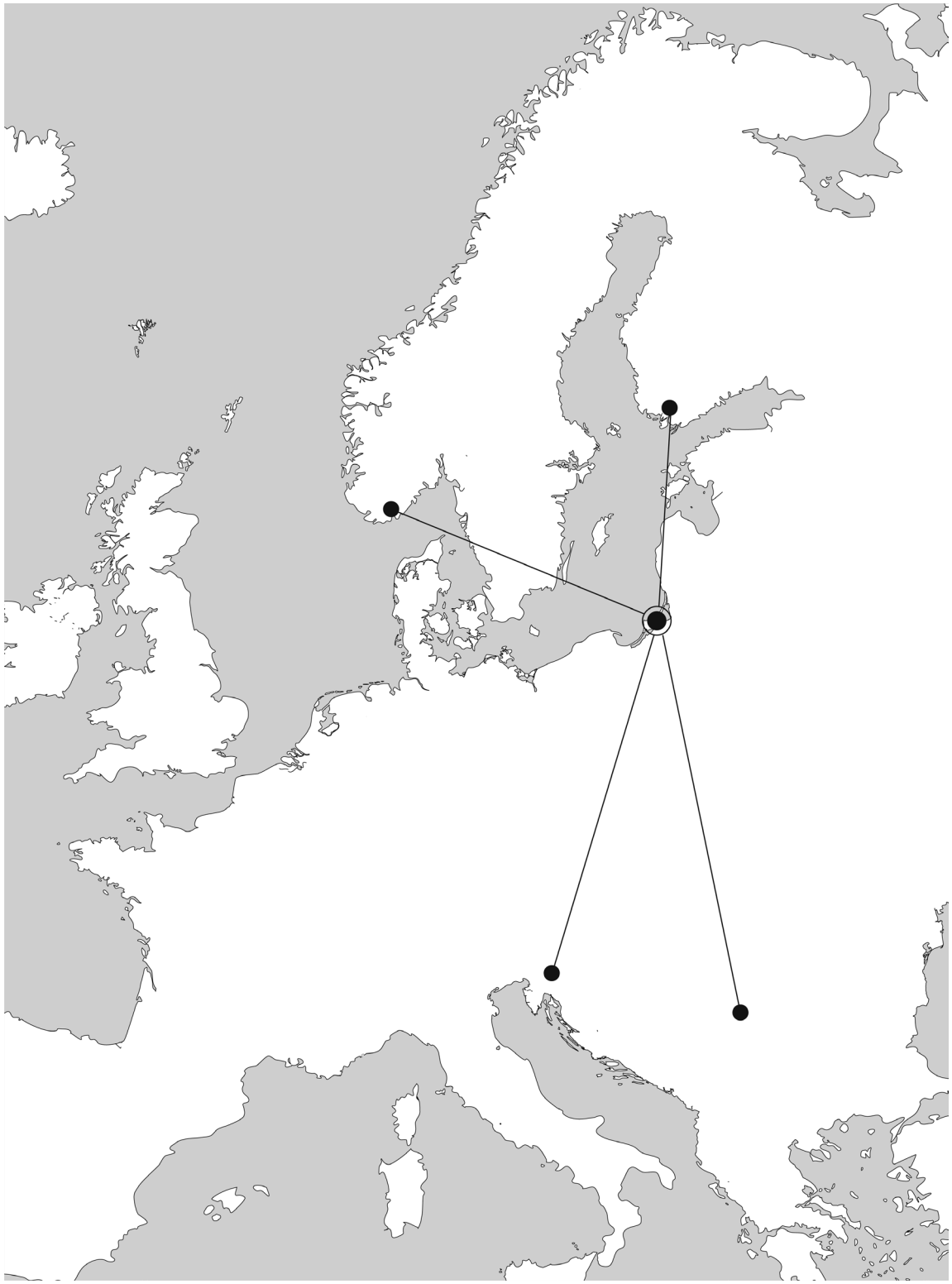

Fig. 3. Distribution of four Nightjars ringed on the Curonian Spit.

REFERENCES

Aronsson A. 1995. Nattskarrans *Caprimulgus europaeus* antalsforandring under tjugoett ar i Ale och Vattle fjall nordost om Goteborg. *Ornis svecica*, **5**(3–4): 161–164. https://doi.org/10.34080/os.v5.23004

Bolshakov C.V., Shapoval A.P. and Zelenova N.P. 2001. Results of bird ringing by the Biological Station "Rybachy" on the Courish Spit: long-distance recoveries of birds ringed in 1956–1997. Part 1. *Avian Ecology and Behaviour*, Suppl. **1**: 1–126.

Cramp S. (Ed.) 1985. The birds of the Western Palearctic. Vol. 4. Oxford University Press, Oxford–London–New York, 960 p.

Cresswell B. and Edwards D. 2013. Geolocators reveal wintering areas of European Nightjar (*Caprimulgus europaeus*). *Bird Study*, **60**: 77–86. https://doi.org/10.1080/00063657.2012.748714

Del Hoyo J., Elliott A., Sargatal J. and Christie D.A. (Eds). 1999. Handbook of the birds of the world. Vol. 5. Barn-Owls to Hummingbirds. Lynx Edition, Barcelona, 360 p.

Dolnik V.R. and Payevsky V.A. 1976. Rybachy trap. In: V.D. Ilyichev (Ed.). Ringing in the study of avian migration in the USSR. Nauka, Moscow: 73–81. [In Russian].

Evens R., Conway G.J., Henderson I.G., Cresswell B., Jiguet F., Moussy C., Senecal D., Witters N., Beenaerts N. and Artois T. 2017. Migratory pathways, stopover zones and wintering destinations of Western European Nightjars *Caprimulgus europaeus*. *Ibis,* **159**: 680–686. https://doi.org.:10.1111/ibi.12469

Fabrizio S. and Boano G. 2012. Survival rates of adult European Nightjars *Caprimulgus europaeus* breeding in northwestern Italy. *Ringing and Migration*, **27**: 13–19. https://doi.org/10.1080/03078698.2012.691346

Jacobsen L.B., Jensen N.O., Willimoes M., Hansen L., Desholm M., Fox A.D., Tottrup A.P. and Thorup K. 2017. Annual spatiotemporal migration schedules in three larger insectivorous birds: European Nightjar, Common Swift and Common Cuckoo. *Animal Biotelemetry*. **5**(1): 1–11. https://doi.org/10.1186/s40317-017-0119-x

Kovshar A.F. 2005. European Nightjar *Caprimulgus europaeus* Linnaeus, 1758. Birds of Russia and adjacent regions. Vol. 6. Owls–Woodpeckers. KMK Scientific Press, Moscow: 116–128. [In Russian].

Norevik G., Akesson S. and Hedenstrom A. 2016. Migration strategies and annual space-use in an Afro-Palaearctic aerial insectivore – the European nightjar *Caprimulgus europaeus*. *Journal of Avian Biology*, **48**(5): 738–747. https://doi.org/10.1111/jav.01071

Noskov G.A. 2016. European Nightjar *Caprimulgus europaeus*. In: G.A. Noskov, T.A. Rymkevich and A.R. Gaginskaya (Eds). Bird migration in the Nord-West of Russia. Non-Passeriformes. Anola, Saint-Petersburg: 553–554. [In Russian].

Payevsky V.A. 1973. Atlas of bird migration according to banding data from the Curonian spit. In: D.E. Bykhovskii (Ed.). Bird migration – ecological and physiological factors. Halstead Press of John Wiley and Sons, New York: 1–124.

Payevsky V. 2021. Sex ratio and sex-specific survival in avian populations: a review. *Biology Bulletin Reviews*, **11**(3): 317–327. https://doi.org/10.1134/S2079086421030099

Shapoval A.P., Leoke D.Yu. and Zelenova N.P. 2018. Results of bird trapping and ringing by the Biological Station "Rybachy" on the Courish Spit in 2015. *The Russian Journal of Ornithology*, **27**(1712): 6191–6215. [In Russian].

Spangenberg E.P. 1951. The order of Nightjars Caprimulgi, or Caprimulgiformes. Birds of the Soviet Union. Vol. 1. Sovetskaya Nauka, Moscow: 466–485. [In Russian].

Stegman B.K. 1949. Natural variability of the nightjar *Caprimulgus europaeus*. *Nature Protection*, **6**: 103–114. [In Russian].

Valkama J., Saurola P., Lehikoinen A., Piha M., Sola P. and Velmala W. 2014. The Finnish bird ringing atlas. Vol. 2. Finnish Museum of Natural History, Helsinki, 784 p.

Vinogradova N.V., Dolnik V.R., Yefremov V.D. and Payevsky V.A. 1976. Identification of sex and age in birds of the USSR fauna. Nauka, Moscow, 192 p. [In Russian].