



Article

# Features of the fauna and summer bird population of the Ashinsky natural biological reserve (Chelyabinsk region)

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**Abstract.** Based on the results of ornithological research conducted in the Ashinsky State Biological Reserve during several nesting seasons during the period 1990–2021, a preliminary list of bird species was compiled. It includes 107 species, the vast majority of which nest or are expected to nest. To study the bird population, the main types of habitats in the southeastern and southwestern parts of the reserve were examined. The highest indicators of species diversity (42 species) and population density (568.0 ind./km<sup>2</sup>) were found in avian associations of dark coniferous-deciduous forests. The communities of upland meadows were found to be the most impoverished (16 species and 227.5 ind./km<sup>2</sup>). Based on these indices, avian associations of floodplain habitats of the Biyanka River occupied an intermediate position (34 species and 385.5 ind./km<sup>2</sup>). In the communities of the forest biotopes of the reserve, the chaffinch, redwing, tree pipit, willow tit, white wagtail, garden warbler, common rosefinch and greenish warbler prevailed. In the associations of upland meadows, the skylark, tree pipit, whinchat and yellowhammer dominated. Almost half (43 %) of the nesting species were representatives of the European fauna; the proportions of species of the Euro-Chinese, Siberian and Nomadic types are 19, 15 and 10 %, respectively.

**Keywords:** avifauna, avian associations, nesting, dominant, Red Data Book

## Introduction

Specially protected natural areas (PAs) of regional importance in the Chelyabinsk region have experienced significant anthropogenic pressure throughout their existence. Frequent fires covering up to 30 % or more of the area of reserves and natural monuments, large-scale felling, including clearcutting, intensive agriculture with the use of chemical fertilizers and pesticides, changes in the boundaries of reserves, leading to a decrease in their area, construction of capital facilities and others negative processes lead to the degradation of the habitats of many species of animals, including birds, as well as their direct destruction. At present, monitoring the dynamics of the faunal composition, qualitative and quantitative characteristics of the bird population of protected natural areas retains its relevance.

The object of the research was to study the nesting fauna and characteristics of the bird population of the main types of habitats of the Ashinsky natural biological reserve, as well as to determine the degree and nature of anthropogenic impact on the avifauna.

## **Geographical and ecological characteristics of the environmental conditions of the surveyed area**

The Ashinsky state natural biological reserve is located in the Chelyabinsk Region in the northern part of the Ashinsky municipal district on the border with the Republic of Bashkortostan (Fig. 1).

The reserve was established in 1988. Initially, its area was 70 thousand hectares. Based on the results of a comprehensive environmental survey of the reserve, conducted in 2007, the Ministry of Ecology of the Chelyabinsk Region proposed to “optimize its boundaries” for their clear readability on the ground and to withdraw a few settlements and economic entities. For this, changes were made to the configuration of the eastern and southern borders, as a result of which the area of the protected area was to be 62 thousand hectares. But for unknown reasons, by Decree of the Government of the Chelyabinsk Region of December 17, 2009 no. 367-P, it was reduced to 44.35 thousand hectares, by almost 37 % (Gashek and Krasutsky, 2020).

According to the physical-geographical zoning, the territory of the Ashinsky reserve is located in the forest zone of the Chelyabinsk region, in the province of the western foothills of the mountain-forest zone of the Ural Mountainous Country, in the subzone of broad-leaved and spruce-fir forests with a high grass stand (Andreeva and Markova, 2002; Kolesnikov, 1961). The area is characterized by a ridge-hilled relief with average heights of 300–400 m a.s.l. and individual elevations up to 500–600 m. The highest point reaches 608.6 m and is located on the Karatau Ridge near the northern border of the reserve. The lowest, 235.8 m, is located in the channel of the Asha

River at the confluence of Mityushkin Creek (near its southern border). The height difference is 372.8 m. The combination of a dissected ridge-hilled relief with the location of this territory on the western macroslope of the Urals, where the amount of annual precipitation is maximum for the territory of the region is responsible for the well-developed river network of the region.

The surface waters of the reserve are represented by numerous rivers and streams belonging to the Kama river basin. The most significant of these are the Asha rivers (the main tributary is the Malaya Asha River) and the Minyar (the main tributaries are the Upper Biyanka and Lower Minya rivers) (Sim river basin), as well as the Ilek and Ust-Kanda (Yuryuzan River basin).

Due to the high humidity of the area, small raised bogs are characteristic of intermontane basins; in addition, in sections of rivers with a small level of fall, swampy floodplain areas were recorded.

According to the scheme of botanical and geographical zoning of the Chelyabinsk region, developed by Kolesnikov (1961, 1964), most of the territory of the reserve belongs to the Katav-Zlatoustovsky district of the coniferous-broad-leaved and southern taiga coniferous forest subzone of the forest zone, and a small area in the eastern part of the reserve (near the villages of Muratovka and Ilek) belongs to the Mesyagutovo district of the northern forest-steppe subzone of the forest-steppe zone. The territory of the reserve is located in the western foothills and low mountains of the northern part of the South Urals. In the east, it borders on the island Cisuralian Mesyagutovo forest-steppe, in the north and northwest, on the region of broad-leaved-dark-coniferous forests of the Ufa plateau in the territory of the Republic of Bashkortostan. With regard to the nature of the vegetation, the territory of the reserve is somewhat heterogeneous; the most common type of native vegetation is mixed broad-leaved-dark-coniferous forests of Siberian spruce (*Picea obovata*), Siberian fir (*Abies sibirica*), heart-leaved linden (*Tilia cordata*), mountain elm (*Ulmus glabra*) and Norway maple (*Acer platanoides*), as well as silver birch (*Betula pendula*) and aspen (*Populus tremula*), in some places with an admixture of oak (*Quercus robur*). Poaceae, Oxalidaceae, and large-fern forest types predominate with well-developed undergrowth and a significant number of nemoral species in the grass layer (Kulikov, 2005). In the eastern part of the reserve (the basin of the Yuryuzan River) there are pine and birch-pine forests with an admixture of dark coniferous species and linden, among which herbaceous (especially grass-forb) forest types are most common. Significant forest areas of the reserve have suffered from felling (especially in the second half of the 20th century) and were replaced by derived plantations (mainly linden-birch, birch and aspen-birch with an admixture of broad-leaved species, spruce and fir). On the eastern border of the reserve

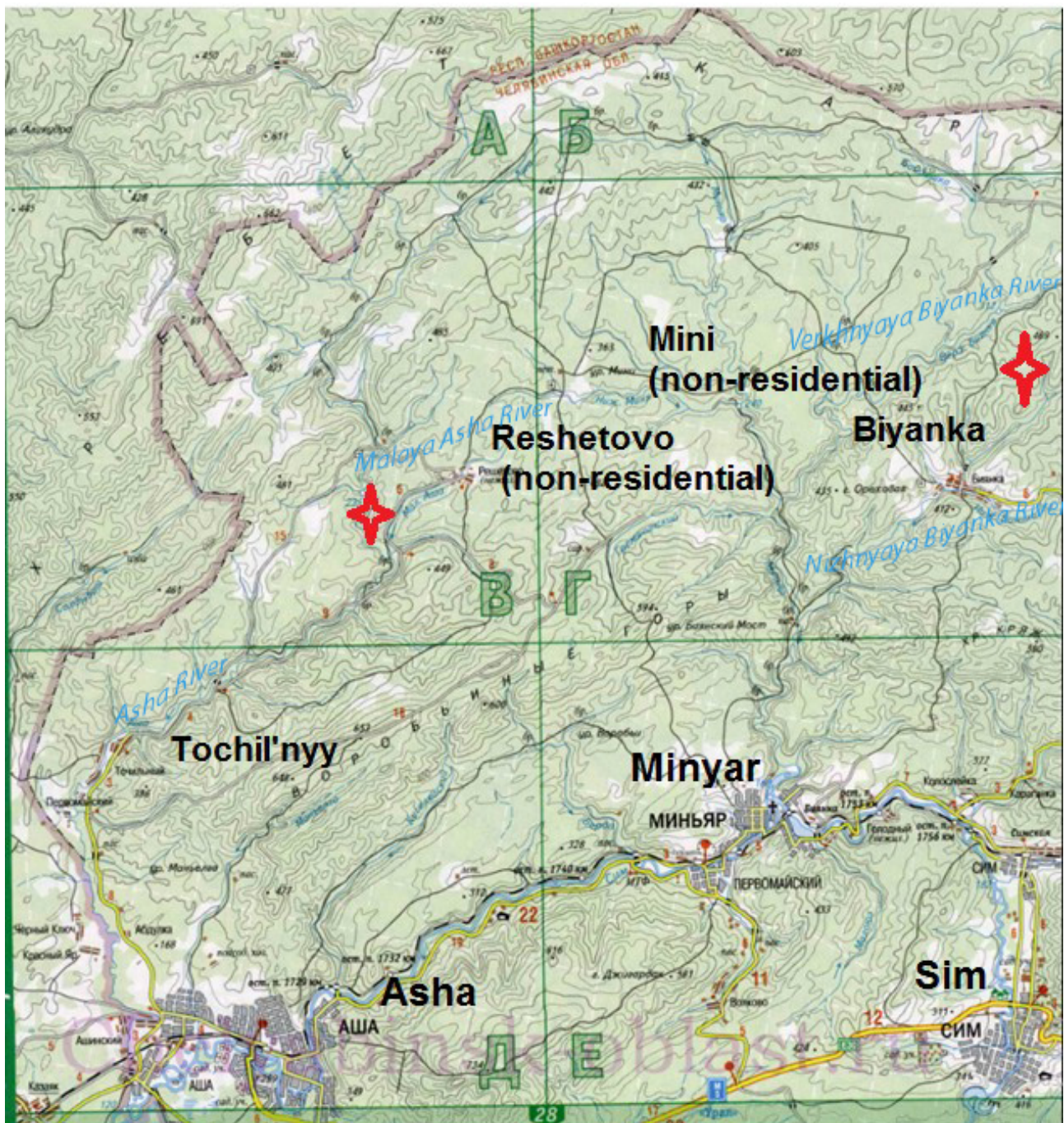


Fig. 1. Map of the study area. Places marked by signs.

(near the villages of Muratovka and Ilek), vegetation of the Mesyagutovo forest-steppe is fragmentarily represented, consisting of steppe meadows and birch, pine-birch and oak-birch groves.

Forests of the State Forest Fund on the territory of the reserve belong to forests of I (56.6%) and II (43.4%) groups (Fig. 2). In the forests of group I, only maintenance felling and sanitary felling are allowed. In the forests of group II, all types of logging are allowed, including clear cutting, contrary to the environmental legislation of the Russian Federation

and the Chelyabinsk region, as well as the Regulations on the Ashinsky State Reserve (Vlasova et al., 2019).

## Materials and methods

In the first ten days of June 1990 and the first ten days of July 1996, ornithological research was carried out in the southeastern part of the Ashinsky reserve, in the vicinity of the village of Biyanka. Quantitative route counts of birds without limiting the counting band according to the method of Ravkin (1967) was performed in 1996 in a broad-leaved-dark-coniferous

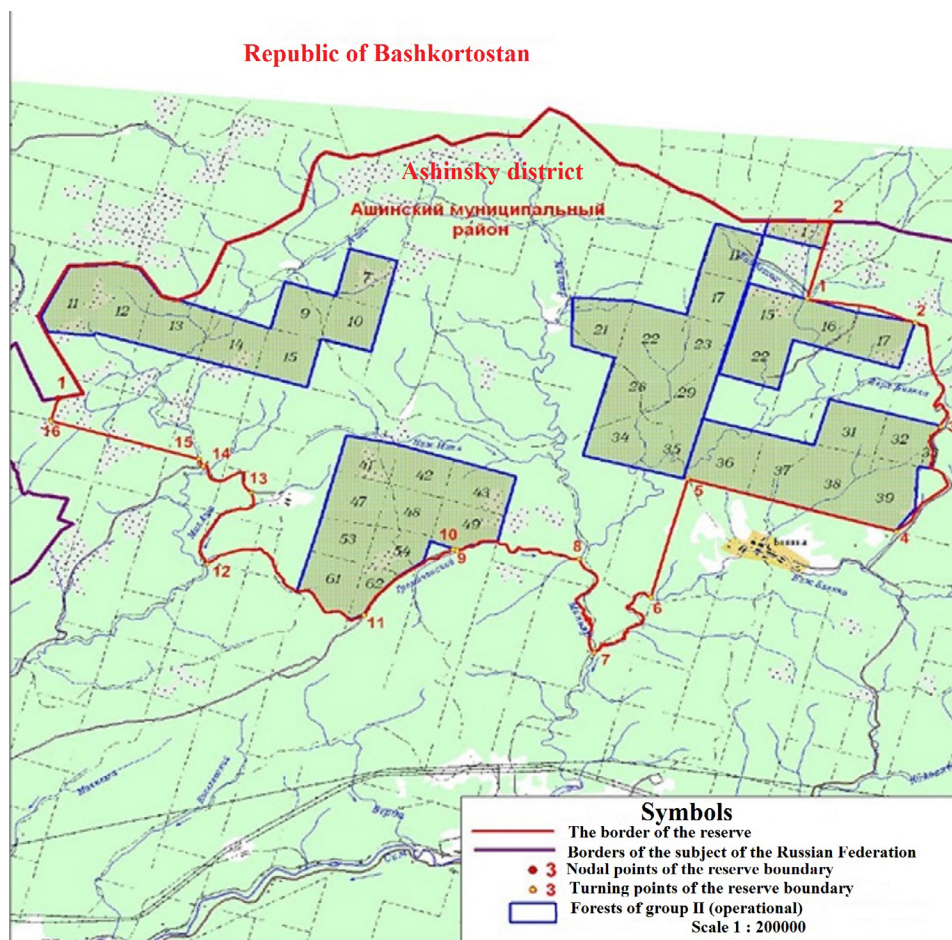


Fig. 2. Map-scheme of the Ashinsky State Reserve with functional zoning of forest plantations.

forest, in the floodplain of the Biyanka River, and upland meadows with shrub clumps. From June 5 to June 12, 2019 and from July 6 to July 25, 2021, the field camp was located in the southwestern part of the reserve, at the confluence of the Malaya Asha River with the Asha River. From there we made hiking trails in different directions. On the routes, all the birds encountered were recorded, and we searched for nests and broods. During the same periods of 2019 and 2021, several times we visited the central parts of the reserve by car, where we examined the tracts of Mini, Ivanovka, Kalinovaya Polyana, etc. Birds were observed visually on walking tours, using binoculars, as well as studied using calls, nests and remains.

The abundance or density of a species meant the number of individuals per unit area. Under the population density of birds, we understand the number of individuals of all species counter as per the unit of the area (Yudkin, 2002). Species were considered dominant if their proportion was 10 % or more of the total population density (Kuzynin, 1962). Subdominants are species which ranged in proportion from 7 to 9 %. For the distribution of bird species by categories of relative abundance, the scale by V.P. Belik (2000) in our modification with the following species categories:

- rare – encountered 1–2 times during the research period;
- small – encountered 3–5 times during the research period;
- few – encountered regularly, but not every day;
- common – observed 1–10 times per day tour;
- numerous – encountered more than 10 times per day excursion.

The reliability of nesting was determined in accordance with the criteria proposed by the Committee of the European Ornithological Atlas – EOAC (The EBCC Atlas..., 1997). Nesting was considered proven by finding nests, eggs, broods, or observing birds with food for chicks. Nesting was considered probable when observing birds demonstrating elements of nesting behavior (lekking, mating, restlessness at nests). Nesting was considered possible when observing birds during the nesting period in permanent areas in suitable conditions for nesting.

The names of bird species and the order in which they are listed correspond to the List of Birds of the Russian Federation (Koblik et al., 2006).

**Table 1.** Preliminary list of summer avifauna of the Ashinsky Reserve. The nature of the stay: ne – nesting; ne? – probably nesting; ? – status unknown; mig – species occurs on migration; vis – visits the territory from the surrounding area during the nesting period. Abundance: num – numerous; com – common; few – few in numbers; small – small in numbers; rare – rare.

| Species  | Presence           | Abundance |
|--|--------------------|-----------|
| Grey heron <i>Ardea cinerea</i> L., 1758                   | ne?                | com       |
| Mallard <i>Anas platyrhynchos</i> L., 1758                 | ne                 | small     |
| Eurasian teal <i>A. crecca</i> L., 1758                    | ne                 | small     |
| Gadwall <i>A. strepera</i> L., 1758                        | ne?                | rare      |
| Common merganser <i>Mergus merganser</i> L., 1758          | ne                 | rare      |
| European honey buzzard <i>Pernis apivorus</i> (L., 1758)   | ne?                | few       |
| Black kite <i>Milvus migrans</i> (Boddaert, 1783)          | ne                 | com       |
| Northern harrier <i>Circus cyaneus</i> (L., 1766)          | ne?                | rare      |
| Montagu's harrier <i>C. pygargus</i> (L., 1758)            | ne?                | rare      |
| Northern goshawk <i>Accipiter gentilis</i> (L., 1758)      | ne?                | rare      |
| Eurasian sparrowhawk <i>A. nisus</i> (L., 1758)            | ne?                | com       |
| Common buzzard <i>Buteo buteo</i> (L., 1758)               | ne                 | com       |
| Golden eagle <i>Aquila chrysaetos</i> (L., 1758)           | ?                  | rare      |
| Steller's sea-eagle <i>Haliaeetus albicilla</i> (L., 1758) | vis?               | rare      |
| Peregrine falcon <i>Falco peregrinus</i> Tunstall, 1771    | ne                 | rare      |
| Eurasian hobby <i>F. subbuteo</i> L., 1758                 | ne?                | rare      |
| Common kestrel <i>F. tinnunculus</i> L., 1758              | ne?                | rare      |
| Black grouse <i>Lyrurus tetrix</i> (L., 1758)              | ne                 | small     |
| Western capercaillie <i>Tetrao urogallus</i> L., 1758      | ne                 | com       |
| Hazel grouse <i>Tetrastes bonasia</i> (L., 1758)           | ne                 | com       |
| Common crane <i>Grus grus</i> (L., 1758)                   | ne?                | rare      |
| Corncrake <i>Crex crex</i> (L., 1758)                      | ne                 | com       |
| Green sandpiper <i>Tringa ochropus</i> L., 1758            | ne                 | few       |
| Common sandpiper <i>Actitis hypoleucos</i> (L., 1758)      | ne                 | com       |
| Eurasian woodcock <i>Scolopax rusticola</i> L., 1758       | ne                 | com       |
| Common wood-pigeon <i>Columba palumbus</i> L., 1758        | ne                 | small     |
| Stock pigeon <i>C. oenas</i> L., 1758                      | ne                 | small     |
| Rock dove <i>C. livia</i> J.F. Gmelin, 1789                | ne in the vicinity | com       |
| European turtle dove <i>Streptopelia turtur</i> (L., 1758) | ne?                | rare      |
| Common cuckoo <i>Cuculus canorus</i> L., 1758              | ne                 | com       |
| Oriental cuckoo <i>C. (saturatus) optatus</i> Gould, 1845  | ne                 | few       |
| Long-eared owl <i>Asio otus</i> (L., 1758)                 | ne?                | rare      |
| Short-eared owl <i>A. flammeus</i> (Pontoppidan, 1763)     | ne?                | rare      |
| Common scops-owl <i>Otus scops</i> (L., 1758)              | ne?                | rare      |

| Species  | Presence           | Abundance |
|--|--------------------|-----------|
| Ural owl <i>Strix uralensis</i> Pallas, 1771                   | ne?                | rare      |
| European nightjar <i>Caprimulgus europaeus</i> L., 1758        | ne                 | com       |
| Common swift <i>Apus apus</i> (L., 1758)                       | ne?                | com       |
| Eurasian wryneck <i>Jynx torquilla</i> L., 1758                | ne?                | rare      |
| Grey-headed woodpecker <i>Picus canus</i> J.F. Gmelin, 1788    | ne?                | few       |
| Black woodpecker <i>Dryocopus martius</i> (L., 1758)           | ne?                | few       |
| Great spotted woodpecker <i>Dendrocopos major</i> (L., 1758)   | ne                 | com       |
| White-backed woodpecker <i>D. leucotos</i> (Bechstein, 1803)   | ne?                | rare      |
| Lesser spotted woodpecker <i>D. minor</i> (L., 1758)           | ne?                | rare      |
| Three-toed woodpecker <i>Picoides tridactylus</i> (L., 1758)   | ne?                | rare      |
| Sand martin <i>Riparia riparia</i> (L., 1758)                  | ne                 | rare      |
| Barn swallow <i>Hirundo rustica</i> L., 1758                   | ne in the vicinity | com       |
| Eurasian skylark <i>Alauda arvensis</i> L., 1758               | ne                 | rare      |
| Tawny pipit <i>Anthus campestris</i> (L., 1758)                | mig                | rare      |
| Tree pipit <i>A. trivialis</i> (L., 1758)                      | ne                 | com       |
| Grey wagtail <i>Motacilla cinerea</i> Tunstall, 1771           | ne                 | com       |
| White wagtail <i>M. alba</i> L., 1758                          | ne                 | com       |
| Red-backed shrike <i>Lanius collurio</i> L., 1758              | ne                 | com       |
| Eurasian golden oriole <i>Oriolus oriolus</i> (L., 1758)       | ne                 | small     |
| Common starling <i>Sturnus vulgaris</i> (L., 1758)             | ne in the vicinity | small     |
| Eurasian jay <i>Garrulus glandarius</i> (L., 1758)             | ne                 | com       |
| Common magpie <i>Pica pica</i> (L., 1758)                      | ne                 | мал       |
| Hooded crow <i>Corvus (corone) cornix</i> L., 1758             | ne                 | small     |
| Common raven <i>C. corax</i> L., 1758                          | ne                 | com       |
| White-throated dipper <i>Cinclus cinclus</i> (L., 1758)        | ne                 | few       |
| Hedge accentor <i>Prunella modularis</i> (L., 1758)            | ne                 | small     |
| River warbler <i>Locustella fluviatilis</i> (Wolf, 1810)       | ne                 | com       |
| Blyth's reed warbler <i>Acrocephalus dumetorum</i> Blyth, 1849 | ne                 | com       |
| Marsh warbler <i>A. palustris</i> (Bechstein, 1798)            | ne                 | small     |
| Blackcap <i>Sylvia atricapilla</i> (L., 1758)                  | ne                 | com       |
| Garden warbler <i>S. borin</i> (Boddaert, 1783)                | ne                 | com       |
| Common whitethroat <i>S. communis</i> Latham, 1787             | ne                 | few       |
| Lesser whitethroat <i>S. curruca</i> (L., 1758)                | ne                 | few       |
| Willow warbler <i>Phylloscopus trochilus</i> (L., 1758)        | ne                 | few       |
| Common chiffchaff <i>Ph. collybita</i> (Vieillot, 1817)        | ne                 | com       |
| Greenish warbler <i>Ph. trochiloides</i> (Sundevall, 1837)     | ne                 | num       |
| Goldcrest <i>Regulus regulus</i> (L., 1758)                    | ne                 | few       |

| Species   | Presence           | Abundance  |
|---|--------------------|------------|
| European pied flycatcher <i>Ficedula hypoleuca</i> (Pallas, 1764) | ne                 | com        |
| Red-breasted flycatcher <i>F. (parva) parva</i> (Bechstein, 1794) | ne                 | com        |
| Spotted flycatcher <i>Muscicapa striata</i> (Pallas, 1764)        | ne                 | few        |
| Whinchat <i>Saxicola rubetra</i> (L., 1758)                       | ne                 | com        |
| Common stonechat <i>S. torquata</i> (L., 1766)                    | ne                 | com        |
| Northern wheatear <i>Oenanthe oenanthe</i> (L., 1758)             | ne                 | com        |
| Common redstart <i>Phoenicurus phoenicurus</i> (L., 1758)         | ne                 | com        |
| European robin <i>Erithacus rubecula</i> (L., 1758)               | ne                 | com        |
| Thrush nightingale <i>Luscinia luscinia</i> (L., 1758)            | ne                 | rare       |
| Fieldfare <i>Turdus pilaris</i> L., 1758                          | ne                 | com        |
| Eurasian blackbird <i>T. merula</i> L., 1758                      | ne                 | com        |
| Redwing <i>T. iliacus</i> L., 1766                                | ne                 | com        |
| Song thrush <i>T. philomelos</i> C.L. Brehm, 1831                 | ne                 | com        |
| Mistle thrush <i>T. viscivorus</i> L., 1758                       | ne                 | small      |
| White's thrush <i>Zoothera varia</i> (Pallas, 1811)               | ne                 | rare       |
| Long-tailed tit <i>Aegithalos caudatus</i> (L., 1758)             | ne                 | com        |
| Marsh tit <i>Parus palustris</i> L., 1758                         | ne                 | small      |
| Willow tit <i>P. montanus</i> Baldenstein, 1827                   | ne                 | com        |
| Coal tit <i>P. ater</i> L., 1758                                  | ne                 | few        |
| Blue tit <i>P. caeruleus</i> L., 1758                             | ne                 | few        |
| Great tit <i>P. major</i> L., 1758                                | ne                 | com        |
| Eurasian nuthatch <i>Sitta europaea</i> L., 1758                  | ne                 | small      |
| Eurasian treecreeper <i>Certhia familiaris</i> L., 1758           | ne                 | rare       |
| House sparrow <i>Passer domesticus</i> (L., 1758)                 | ne in the vicinity | com        |
| Eurasian tree sparrow <i>P. montanus</i> (L., 1758)               | ne in the vicinity | com        |
| Chaffinch <i>Fringilla coelebs</i> L., 1758                       | ne                 | num        |
| Brambling <i>F. montifringilla</i> L., 1758                       | ne                 | rare       |
| European greenfinch <i>Chloris chloris</i> (L., 1758)             | ne                 | small      |
| Eurasian siskin <i>Spinus spinus</i> (L., 1758)                   | ne                 | com        |
| European goldfinch <i>Carduelis carduelis</i> (L., 1758)          | ne                 | few        |
| Common rosefinch <i>Carpodacus erythrinus</i> (Pallas, 1770)      | ne                 | num        |
| Red crossbill <i>Loxia curvirostra</i> L., 1758                   | ne                 | com        |
| Eurasian bullfinch <i>Pyrrhula pyrrhula</i> (L., 1758)            | ne                 | few        |
| Hawfinch <i>Coccothraustes coccothraustes</i> (L., 1758)          | ne                 | com        |
| Yellowhammer <i>Emberiza citrinella</i> L., 1758                  | ne                 | few        |
| Ortolan bunting <i>E. hortulana</i> L., 1758                      | ne                 | rare       |
| <b>Total</b>  |                    | <b>107</b> |

**Table 2.** Density of bird species (ind./km<sup>2</sup>) of the main avian associations of the southeastern part of the Ashinsky reserve according to the results of surveys in 1996. “–” – the species was not found.

| Species                  | Habitat                             |                |                                |
|--------------------------|-------------------------------------|----------------|--------------------------------|
|                          | Broad-leaved-dark-coniferous forest | Upland meadows | Floodplain of the Bianca River |
| Common buzzard           | 1.0                                 | 2.0            | –                              |
| Eurasian hobby           | 0.5                                 | –              | –                              |
| Common kestrel           | –                                   | 5.0            | –                              |
| Common crane             | –                                   | –              | 0.5                            |
| Corncrake                | –                                   | –              | 2.0                            |
| Common sandpiper         | –                                   | –              | 5.0                            |
| Eurasian woodcock        | 1.0                                 | –              | –                              |
| Common wood-pigeon       | 1.5                                 | –              | 5.0                            |
| Common cuckoo            | 6.0                                 | –              | 3.0                            |
| Oriental cuckoo          | 1.5                                 | –              | –                              |
| Common scops-owl         | –                                   | –              | 1.5                            |
| European nightjar        | –                                   | 0.5            | 1.5                            |
| Common swift             | 5.0                                 | –              | –                              |
| Grey-headed woodpecker   | –                                   | –              | 1.5                            |
| Great spotted woodpecker | 7.5                                 | –              | –                              |
| Three-toed woodpecker    | 2.5                                 | –              | –                              |
| Eurasian skylark         | –                                   | 50.0           | –                              |
| Tawny pipit              | –                                   | 20.0           | –                              |
| Tree pipit               | 40.0                                | 40.0           | 10.0                           |
| Grey wagtail             | –                                   | –              | 25.0                           |
| White wagtail            | –                                   | –              | 30.0                           |
| Red-backed shrike        | 1.5                                 | 2.0            | –                              |
| Eurasian golden oriole   | 4.0                                 | –              | –                              |
| Common raven             | 0.5                                 | –              | –                              |
| White-throated dipper    | –                                   | –              | 0.5                            |
| Hedge accentor           | 5.0                                 | –              | 2.0                            |
| River warbler            | –                                   | –              | 10.0                           |
| Blyth's reed warbler     | 5.0                                 | –              | 30.0                           |
| Blackcap                 | 5.0                                 | –              | –                              |
| Garden warbler           | 25.0                                | –              | 25.0                           |
| Common whitethroat       | 5.0                                 | 10.0           | 10.0                           |
| Lesser whitethroat       | 3.0                                 | 5.0            | –                              |
| Willow warbler           | 5.0                                 | –              | 10.0                           |
| Common chiffchaff        | 15.0                                | –              | 10.0                           |
| Greenish warbler         | 15.0                                | –              | 10.0                           |
| European pied flycatcher | 25.0                                | –              | 10.0                           |
| Red-breasted flycatcher  | 20.0                                | –              | 10.0                           |

| Species                   | Habitat                             |                |                                |
|---------------------------|-------------------------------------|----------------|--------------------------------|
|                           | Broad-leaved-dark-coniferous forest | Upland meadows | Floodplain of the Bianca River |
| Spotted flycatcher        | 5.0                                 | –              | –                              |
| Whinchat                  | –                                   | 30.0           | –                              |
| Northern wheatear         | –                                   | 10.0           | –                              |
| Common redstart           | 15.0                                | –              | 20.0                           |
| European robin            | 12.5                                | –              | 10.0                           |
| Thrush nightingale        | –                                   | –              | 3.0                            |
| Fieldfare                 | 7.5                                 | –              | 20.0                           |
| Eurasian blackbird        | 10.0                                | –              | –                              |
| Redwing                   | 51.5                                | –              | 10.0                           |
| Song thrush               | 27.5                                | –              | 10.0                           |
| Mistle thrush             | 12.5                                | –              | –                              |
| Scaly thrush              | 3.0                                 | –              | –                              |
| Willow tit                | 15.0                                | –              | 35.0                           |
| Great tit                 | 10.0                                | –              | 5.0                            |
| Chaffinch                 | 110.0                               | –              | 20.0                           |
| European greenfinch       | 10.0                                | 3.0            | –                              |
| Eurasian siskin           | 15.0                                | –              | 15.0                           |
| Goldfinch                 | –                                   | 10.0           | –                              |
| Common rosefinch          | 25.0                                | 5.0            | 15.0                           |
| Common bullfinch          | 15.0                                | –              | –                              |
| Hawfinch                  | 3.0                                 | –              | –                              |
| Yellowhammer              | 20.0                                | 25.0           | 10.0                           |
| Ortolan bunting           | –                                   | 10.0           | –                              |
| <b>Number of species</b>  | <b>42</b>                           | <b>16</b>      | <b>34</b>                      |
| <b>Population density</b> | <b>568.0</b>                        | <b>227.5</b>   | <b>385.5</b>                   |

## Results and discussion

The list of species of the summer avifauna of the Ashinsky Reserve and its immediate environs, indicating the nature of their stay and occurrence, compiled based on the entire period of research, is presented in Table 1.

In total, during the years of research on the territory of the reserve and its vicinity, 107 species of birds belonging to 13 orders and 34 families were registered during the nesting period. More than half of all recorded species (63 species, or 59 %) belong to the order Passeriformes; 11 % of the species belong to Falconiformes, 7 % to Woodpeckers, about 5 % to Anseriformes; about 5 % each are Charadriiformes and Columbiformes. The proportion of other groups is less than 3 %.

Data on the number of species obtained on the basis of quantitative surveys carried out in three types of habitats in the southeastern part of the reserve in 1996 are presented in Table 2.

As can be seen from Table 2, the highest species diversity (42 species) and the highest bird population density (568.0 ind./km<sup>2</sup>) are observed in the avian associations of broad-leaved-dark-coniferous forests. The number of dominants and subdominants in the forests of the southeastern part of the reserve in the 1990s included species, the high abundance of which is characteristic of the entire forest zone of the South Urals, the largest proportion was the chaffinch, the proportion of which in the total population density was 19 %. Subdominants included the redwing (9 %) and the tree pipit (7 %).

Upland meadows in the vicinity of the Biyanka village, formed on the site of old clearings. Relatively large open spaces favor the penetration of typical meadow and steppe species into the forest zone: skylark, tawny pipit, whinchat, common wheatear and Ortolan bunting. The presence of shrubs and individual clumps of trees in the meadows attracts common buzzard, common kestrel, red-backed shrike, goldfinch, European greenfinch, common rosefinch, garden warbler, lesser whitethroat, Ortolan bunting. Indicators of species diversity (16 species) and total bird population density (227.5 ind./km<sup>2</sup>) in upland meadow communities turned out to be the lowest among the surveyed habitats. These meadows were dominated by terrestrial non-traveling birds. The skylark was the most numerous species, its proportion in the bird population was 22 %. The tree pipit (18 %), whinchat (13 %), and Yellowhammer (11 %) participated significantly in the population.

The avian associations of floodplain habitats occupied an intermediate position: 34 species and 385.5 ind./km<sup>2</sup>. The bird population of the floodplain of the Biyanka River includes species that nest in tree and shrub layers, and on the ground and in coastal cliffs. No dominant species were identified here, but willow tit (9 %), white wagtail and Blyth's reed warbler (8 % each) dominated in abundance.

In the riverine forests of the southwestern part of the reserve, according to the results of research in 2019, the most numerous were common rosefinch (14 % of all birds encountered) and common chaffinch (11 %). Somewhat lower in frequency were greenish warbler (9 %) and tree pipit (8 %).

The analysis of the avifauna showed that the variety of lands of the reserve, combining forests, floodplain thickets and open spaces, creates favorable conditions for the habitat of birds of various ecological groups.

Distribution of nesting (and presumably nesting) bird species of the Ashinsky Reserve by fauna types proposed by Belik (1992, 2000, 2006, 2013, 2017), revealed a significant predominance of the European type – 43 % of the total number of recorded species (Fig. 3), which is explained by the position of the reserve on the western macroslope of the Ural Range. Further, in descending order, follow the Euro-Chinese (19 %), Siberian (15 %) and Nomadic (10 %) types. The proportion of cosmopolitans, together with species of unclear origin, was 6 %. The so-called Tropical group – 5 %. Species of the Chinese type of fauna account for 2 % of all species.

Such a distribution indicates that the reserve belongs to the European subregion of the Palearctic in terms of avian geography. The predominance of species of the European, Euro-Chinese and Siberian types of fauna characterizes the general forest appearance of its avifauna. Most non-traveling species belonging to these fauna types are dendrophiles.

At the same time, the proportion of species of the Nomadic type of fauna can often indicate a deep anthropogenic transformation of native forest habitats and, accordingly, the loss of some typical forest bird communities.

Below we provide an annotated list of species found by us in the reserve and its immediate vicinity before and after the “optimization” of its boundaries in 2009 and deserving special attention. This includes rare species listed in the Red Data Book of the Chelyabinsk Region and Appendix 3 to it (Krasnaya..., 2017), the current edition of the list of animals<sup>1</sup> and the Red Data Book of the Russian Federation (Krasnaya..., 2021). In addition, species that have declined in numbers in recent decades, uncommon in this landscape zone and are located on the borders of their ranges.

### ***Bird species of the Ashinsky Reserve, deserving special attention***

**Common merganser** *Mergus merganser*. The abundance of the species in the south of Western Siberia has been declining in the last decade (Tarasov, 2009). Previously, we expressed an opinion that it should be included in the regional Red Data Book as category III (Gashek and Krasutsky, 2021; Gashek et al., 2022). A brood of four or more chicks was encountered on July 12, 2021 at the confluence of the Asha and Malaya Asha rivers, on the southwestern border of the reserve. A pair without a brood was observed in June 1996 at the Minyar Pond (at that time, the southern vicinity of the reserve).

**European honey buzzard** *Pernis apivorus*. A rare species on the territory of the Chelyabinsk region, listed in the regional Red Data Book (category III). In the period of July 6–25, 2021, from one to three birds were observed almost daily in the vicinity of the field camp at the confluence of the Malaya Asha and the Asha River at the southwestern border of the reserve, which indirectly indicates the probable nesting of 1–2 pairs of this species in the reserve and adjacent areas (Gashek and Krasutsky, 2021).

**Montagu's harrier** *Circus pygargus*. A rare species on the territory of the Chelyabinsk region, listed in the regional Red Data Book (category III). A single male circling over the meadows was encountered on June 4, 1990 in the vicinity of Biyanka village. Later, this species was not recorded.

**Northern goshawk** *Accipiter gentilis*. Included in Appendix 3 of the Red Data Book of the Chelyabinsk region as a species that needs special attention to its state in the natural environment. A single bird was met on June 5, 1990 on the river Upper Biyanka in the vicinity of the Biyanka village. Subsequently, the species was not recorded.

<sup>1</sup> Order of the Ministry of Natural Resources and Ecology of the Russian Federation of March 24, 2020 No. 162 “On approval of the List of wildlife objects listed in the Red Data Book of the Russian Federation”.

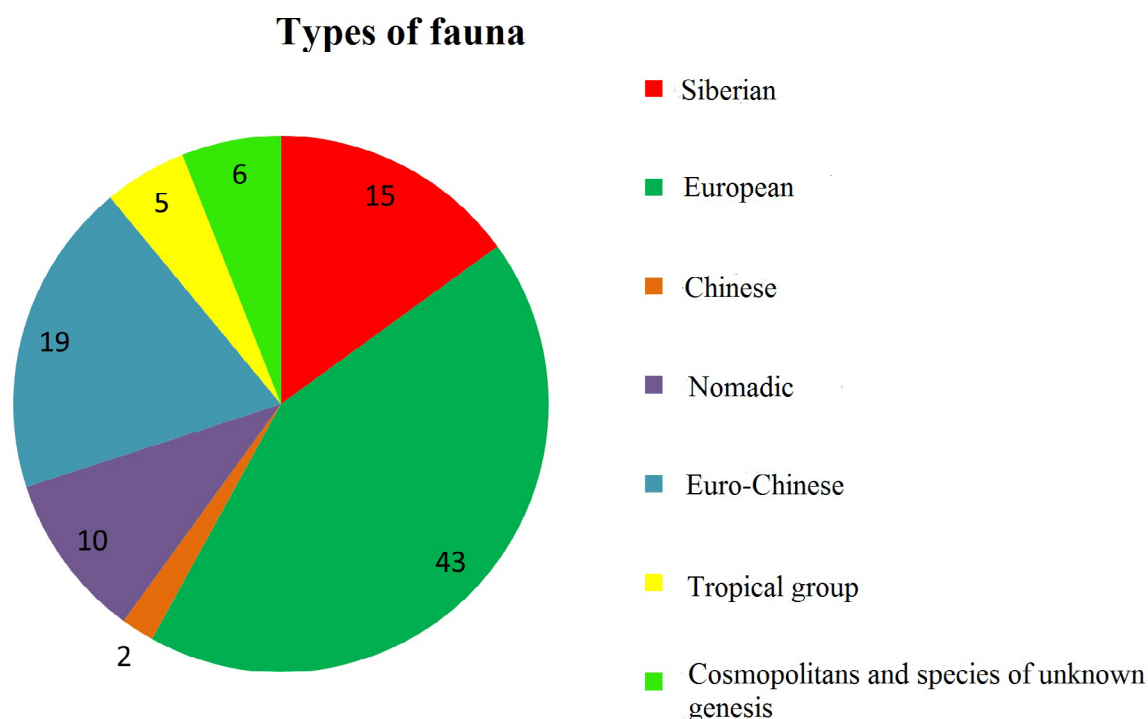


Fig. 3. Faunogenetic structure of the nesting avifauna of the Ashinsky Reserve.

**Golden eagle** *Aquila chrysaetos*. Assigned to category III status (rare species) in the Red Data Book of the Chelyabinsk Region, and is in the current version of the list of animals listed in the Red Data Book of the Russian Federation (Krasnaya..., 2021). A single circling bird was observed on June 4, 1990, 1 km north of the Biyanka village. Details of the occurrence of this species remained unclear.

**Steller's sea-eagle** *Haliaeetus albicilla*. Assigned to category III status (rare species) in the Red Data Book of the Chelyabinsk Region and category V (recovering species) in the current edition of the list of animals listed in the Red Data Book of the Russian Federation (Krasnaya..., 2021). A single adult eagle flying southeast was observed on June 24, 2021 at the confluence of the Asha and Malaya Asha rivers. The status of the species has not been clarified.

**Peregrine falcon** *Falco peregrinus*. Assigned to category III status (rare species) in the Red Data Book of the Chelyabinsk Region, and in the current version of the list of animals listed in the Red Data Book of the Russian Federation (Krasnaya..., 2021). The nesting of a pair was discovered in 2021 near the southwestern border of the reserve (Gashek and Krasutsky, 2021). Throughout the field season, half a kilometer upstream from the mouth of the Malaya Asha River, a fledgling was observed sitting on a rock with a grotto on the left bank of the Asha River, which probably recently left the area, and adult birds

flying to it with prey. Local residents have been aware of the peregrine falcons traveling at this point since the 1950s. In 2011, a pair of peregrine falcons was nested to the town of Asha, about 30 km south of the pair we found (Muradov and Mamatov, 2011).

**Stock pigeon** *Columba oenas*. The display of one bird was heard on June 5, 1990 on the Upper Biyanka River. The species was not recorded later. In our opinion, the species deserves to be included in Appendix 3 of the Red Data Book of the Chelyabinsk Region (Gashek and Krasutsky, 2021).

**European turtle dove** *Streptopelia turtur*. Assigned to category II status (species with a declining population) in the Red Data Book of the Chelyabinsk Region and in the current version of the list of animals listed in the Red Data Book of the Russian Federation (Krasnaya..., 2021). The display was heard on July 9, 1996 in a mixed forest northeast of the Biyanka village. The species was not seen later.

**Grey-headed woodpecker** *Picus canus*. Found by call on July 9, 1996 in a mixed forest northeast of village of Biyanka. Later, adults were recorded (in 2019, singly, in 2021, repeatedly during the entire period of research), visually and by call in the southwestern part of the reserve. The species undoubtedly nested in small numbers. In our opinion, it deserves to be included in Appendix 3 of the regional Red Data Book (Gashek and Krasutsky, 2021).

**White-backed woodpecker** *Dendrocopos leucotos*. A solitary bird was observed on July 10, 1996 in a mixed forest northeast of village of Biyanka. Not found later. In the last decade, the species has greatly declined in abundance in the Chelyabinsk Region (our own data).

**Three-toed woodpecker** *Picoides tridactylus*. Included in Appendix 3 of the Red Data Book of the Chelyabinsk Region. For all the years of research in the reserve, it was recorded only once: on July 10, 1996, a single bird stayed in a pine forest to the north of the village of Biyanka. For five years of expedition research (2017–2021) in the forest zone of the Chelyabinsk region, we recorded the three-toed woodpecker only on the territory of the Serpievsky reserve (Gashek and Krasutsky, 2021). We consider it necessary to include this species in the regional Red Data Book at category III.

**White-throated dipper** *Cinclus cinclus*. A rare species in the Chelyabinsk Region, listed in the regional Red Data Book (category III). A single bird was recorded on a stream north of the village of Biyanka on July 9, 1996. Based on repeated sightings of disturbed birds and juveniles in 2021 on the Asha river and its tributaries in the southwestern part of the reserve, we assume the presence of at least three pairs of dipper (Gashek and Krasutsky, 2021). According to survey data, in non-freezing areas of the Asha River in the reserve and its environs, wintering birds are regularly encountered.

**Hedge accentor** *Prunella modularis*. Species with European distribution, rare in the Transuralia; the eastern border of nesting has not been clarified (Ryabitsev, 2008). Based on the results of many years of ornithological research in 1982–2005 in the Chelyabinsk Region, it was characterized as a relatively common species in the mountainous regions of the Southern Urals, living in pine, pine-birch and fir-spruce forests; to the east of the Ilmensky Reserve during the non-driving period is not found. A nest with a heavily incubated clutch was found on the western shore of the lake. Turgoyak in 1995 (Zakharov, 2006). In the Ashinsky Reserve, the singing of single males was recorded on July 9, 1996, north of the village of Biyanka and July 11, 2021 near the confluence of the Asha and Malaya Asha rivers. We expect nesting in small numbers.

**Marsh warbler** *Acrocephalus palustris*. European species, spreading eastward to Central Siberia (Ryabitsev, 2008). Based on research data from 1982–2005 in the South Urals, this warbler is relatively common; it travels in broad-leaved forests, in overgrown clearings, meadows, in open spruce forests, and in floodplain thickets (Zakharov, 2006). Was found common in the floodplain of the Uy River in the vicinity of Uyskoye, Chelyabinsk Region (Muradov and Mamatov, 2011). According to other

data, it is rare for the southern and southern Middle Urals (Korovin, 2004). The singing of several males during the nesting period was recorded during the examination of the southern forest-steppe regions of the Chelyabinsk Region in 2014, Kharlushevsky and Sanarsky reserves – in 2016 (Gashek, 2016; Tarasov et al., 2014). In 2018, a singing male was observed in the Verkhneural'sky district and a pair with nesting material in the Uisky reserve (Gashek et al., 2019).

In the Ashinsky reserve, two singing males were counted on June 8, one more, on June 11, 2019 in its southwestern part in floodplain bushes on the Asha River. The species undoubtedly breeds in small numbers.

**Blackcap** *Sylvia atricapilla*. In the Urals, in the Urals and Western Siberia, it is not numerous or rare, in some places a common bird of the forest-steppe and the southern half of the forest zone with poorly studied distribution boundaries (Ryabitsev, 2008). In the mountainous regions of the Southern Urals, it was noted in broad-leaved, spruce-birch forests, in riverside bush and overgrown clearings. Not numerous in the pine-birch biotopes of the eastern foothills. It is relatively rare in the forest-steppe of Transuralia (Zakharov, 2006).

In the southeastern part of the Ashinsky Reserve in a mixed forest north of the village of Biyanka a male was recorded on July 10, 1996. In the southwestern part of the reserve, the blackcap was shown to be a common nesting species, somewhat less abundant than the garden warbler; in 2019 in riverine forests along the Asha River and its tributaries, singing males and restless birds were observed everywhere in the area; in 2021, adult birds and unseparated broods were recorded.

**Red-breasted flycatcher** *Ficedula (parva) parva*. In the Urals, Cisuralia, and Western Siberia, this is a species with an uneven distribution. In most areas, it is not numerous and rare, in some places it is common (Ryabitsev, 2008). Relatively rare in fir-spruce forests and overgrown clearings in the mountainous regions of the South Urals. It is also not numerous in pine and pine-birch forests of its eastern foothills. Relatively common during the nesting period in broad-leaved, dark coniferous-broad-leaved and riverside habitats of the western slope of the South Urals. Extremely rare in the Transuralian forest-steppe; singing males are observed in aspen-birch forests only in the northwest of the forest-steppe (Zakharov, 2006). On the territory of the Nyazepetrovsky nature reserve and “The section of the Ufa River between Timofeev and Zaikin Kamen” natural monument was recorded by us as a rare, undoubtedly nesting species (own data).

In the Ashinsky reserve on July 9, 1996 in a mixed forest north of village of Biyanka we recorded a brood. In 2019, in the southwestern part of the reserve, we found red-breasted flycatcher to be rather common:

singing males, including local ones, were regularly found in the surveyed areas of the dark coniferous-broad-leaved forest.

**Eurasian blackbird** *Turdus merula*. A species of European origin and distribution, spreading to the north and east (Ryabitsev, 2008). It was not numerous in nesting in dark coniferous-deciduous forests, more common in the broad-leaved forests of the South Urals (Zakharov, 2006). The most eastern nesting records are cited for the Ilmensky Reserve (ibid.). On the territory of the “Section of the Ufa River between Timofeev and Zaikin Kamen” natural monument was found to be a nesting species but not numerous (own data).

In 2021, in the southwestern part of the Ashinsky Reserve along the Asha river and its tributaries this species was common: everywhere we recorded restless adult birds and unseparated broods.

**White's thrush** *Zoothera varia*. Included in the Red Data Book of the Chelyabinsk Region, with a category V status (recovering species). During nesting time, singing males are observed in fir-spruce and spruce-birch forests from the city of Yurma in the north to the Iremel Massif in the south. In mountainous areas, it inhabits broad-leaved-dark-coniferous habitats and floodplain forests. Fledglings were observed in the vicinity of the city of Miass on the Malyu Ural Ridge (Zakharov, 2006). During the nesting period, we recorded this species in the Nyazepetrovsky, Serpievsky and Arshinsky reserves (Gashek and Krasutsky, 2021).

In the Ashinsky Reserve, during the nesting period of 1996, we repeatedly recorded the singing of the this thrush to the north of the village of Biyanka. The species was not recorded later. We expect nesting in small numbers.

**Marsh tit** *Parus palustris*. At the eastern limit of its distribution, the subspecies *P. p. stagnatilis* C.L. Brehm, 1855 reaches the western slopes of the Urals, where its abundance is low (Ryabitsev, 2008). There are few publications testifying to the occurrences of the species in the Urals and Transuralia. In the Shchuchansky District of the Kurgan Region, single bird was observed in May of the late 1990s (Shepel and Lapushkin, 1999). In the Sverdlovsk Region the species was noted at the end of March 2000 in the Shali District (Alekseeva, 2002), in the winter of 2017 on the territory of the “Olenii Ruchii” natural park (Polyakov et al., 2017), in the nesting season of 2016 in the vicinity of the town of Revda (Lyakhov and Korovin, 2017). In the Chelyabinsk Region, marsh tit were recorded during the nesting period in the broad-leaved forests of the Ashinsky District (Zakharov, 2006), about 40 km south of the Ashinsky Nature Reserve. In 2006, the marsh tit was found (for the first time on the territory of the Chelyabinsk Region) many times in the Nyazepetrovsky District in the floodplain

of the Ufa River, and a nest was found in the Verkhne-Ufaleisky urban area (Ryabitsev et al., 2006).

In 2021, during the survey, we observed several broods of these tits in the southwestern part of the Ashinsky Reserve, and also heard their singing. Each time the birds kept in the floodplain bushes on the Asha River with a well-developed undergrowth of willow, bird cherry and alder. The external signs, calls and song of the tits we observed clearly differed from those of the willow tit, which is common in the reserve.

**Ortolan bunting** *Emberiza hortulana*. The species is common or numerous in the steppe and southern forest-steppe regions, the northern boundary of the distribution of the species reaches the forest-steppe and subtaiga (Ryabitsev, 2008; Stepanyan, 1990). A singing male and a female next to him were observed at the edge of the forest on June 4, 1990, north of village of Biyanka. We do not exclude the possibility nesting of single pairs in steppe meadows in the vicinity of the reserve.

The Ashinsky reserve is undoubtedly very valuable for conservation, reproduction and restoration of economically, scientifically and culturally important species of birds, as well as rare bird species. In general, it fully meets the goals of its creation and the tasks set. At the same time, the fact that almost half of the reserve's forest area belongs to the exploitation category, threatens the existence of indigenous forest ecosystems with all their structural components, including bird communities. Thus, it is necessary to transfer all the forests of the reserve into the protected category in accordance with the Forest Code of the Russian Federation.

## Conclusions

Over the entire period of research, 107 species of birds were registered on the territory of the Ashinsky reserve. According to quantitative surveys conducted in the 1990s in the southeastern part of the reserve, the broad-leaved-dark-coniferous forest communities are distinguished by the highest species diversity (42 species) and the maximum bird population density (568.0 ind./km<sup>2</sup>). The minimum values of these indicators (16 species and 227.5 ind./km<sup>2</sup>) were typical for avian communities of upland meadows formed on the sites of old clearings. Taking into account the significant proportion of commercial forests in the reserve (43.4 % of the total forest area) and the difficult reforestation in clear-cutting areas under conditions of excessive moisture and dissected-ridge relief, one can predict a significant depletion of species diversity and the total number of birds on its territory in the process forest exploitation. An intermediate position is occupied by communities of floodplain habitats (34 species and 385.5 ind./km<sup>2</sup>). The most numerous species in the surveyed types of habitats in the southeastern part of the reserve were the chaffinch,

the redwing and the tree pipit (in the forests); skylark, tawny pipit, whinchat (in upland meadows) and yellowhammer; willow tit, white wagtail and Blyth's reed warbler (in floodplains).

In the riverine forests of the southwestern part of the reserve, according to the results of research in 2019, the most numerous were common rosefinch, chaffinch, greenish warbler, and tree pipit.

Species of the European type of fauna prevail in the fauna of nesting birds of the reserve (43 %). The proportion of species of Euro-Chinese, Siberian and Nomadic types is 19, 15 and 10 %, respectively. Other types of fauna are insignificantly represented (less than 6 % of all species). The predominance of species of the first three types indicates the general forest appearance of the avifauna of the reserve.

Recent studies (2019 and 2021) have revealed relatively healthy populations of the regionally rare European honey buzzard and dipper in the reserve. However, some species noted in the 1990s were not found; meadow harrier, golden eagle, European turtle dove, three-toed and white-backed woodpeckers, spotted thrush. A new peregrine falcon nesting site has been found. The blackcap, the red-breasted flycatcher and the blackbird, which are rare for the Chelyabinsk region as a whole, were found to be common in the reserve. Marsh warbler and marsh tit are few in number.

The Ashinsky reserve is undoubtedly important for conservation of many, primarily forest, species of birds, including rare and protected ones. However, the fact that almost half of its forest area belongs to the exploitation category threatens the existence of both forest bird species and their habitats. Therefore, it is necessary to transfer all the forests of the reserve into the category of protected ones.

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