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Dynamics of summer bird population in coniferous-deciduous forests of Seryozha River valley at the beginning of 21st century

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We studied changes in the summer population of birds in coniferous-deciduous forests of Seryozha river valley in the period from 2003 to 2017. Surveyed five main areas of habitat – mixed and pine forests, meadows-coppices, long fallow lands and settlements. A marked reduction in the species composition of birds of pine forests in the nesting period was noted, while at the same time, during cluster analysis, their bird communities are combined together with the population of birds of intact mixed forests. The nature of summer dynamics of total abundance and the composition of leaders in most habitats, especially in mosaic meadows and fallow lands, changed. The territorial distribution of birds over the past decade and a half is determined by practically similar factors – the naturalness of the habitat appearance, the build-up and the degree of afforestation of the habitat. The interannual similarity of the appearance of bird communities is most pronounced in mosaic meadows-coppices and minimally in fallow lands.

Keywords: rare species, species richness, total abundance, interannual similarity.

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Introduction

Unique landscape features of the valley of Seryozha river – right tributary of Oka River (Arzamas district) have been attracting the attention of ornithologists in the Nizhny Novgorod region for two centuries. A massif of old-aged mixed forests, almost intact, barely affected by cuttings – one of the largest not only in the region, but in the entire Russian Plain is situated here. State natural biological (hunting) reserve “Pustynsky” was organized here in 1930’s. Its territory is located in the subzone of coniferous-deciduous forests, it is distinguished by a large variety of habitat types, including river floodplain and lakes. The reserve is a part of the key ornithological territory (KOT) of international importance. Currently,

the creation of a national park is recommended here (Bakka and Kiseleva, 2009; Bakka et al., 2014).

Over almost 100 years of observations, 222 species of birds from 47 families of 12 orders were found, which is 76% of all species found in the area (Bakka and Kiseleva, 2007). The main results of ornithological research of the Seryozha river valley are presented in more than 50 publications, most of which were published in the last two decades. Thus, a spatial-temporal classification of bird communities was compiled, their territorial heterogeneity was analyzed and the main factors determining it were identified based on year-round surveys in nine main types of habitats at the beginning of the century (Noskova, 2007, 2012; Noskova and Kolesova, 2017).

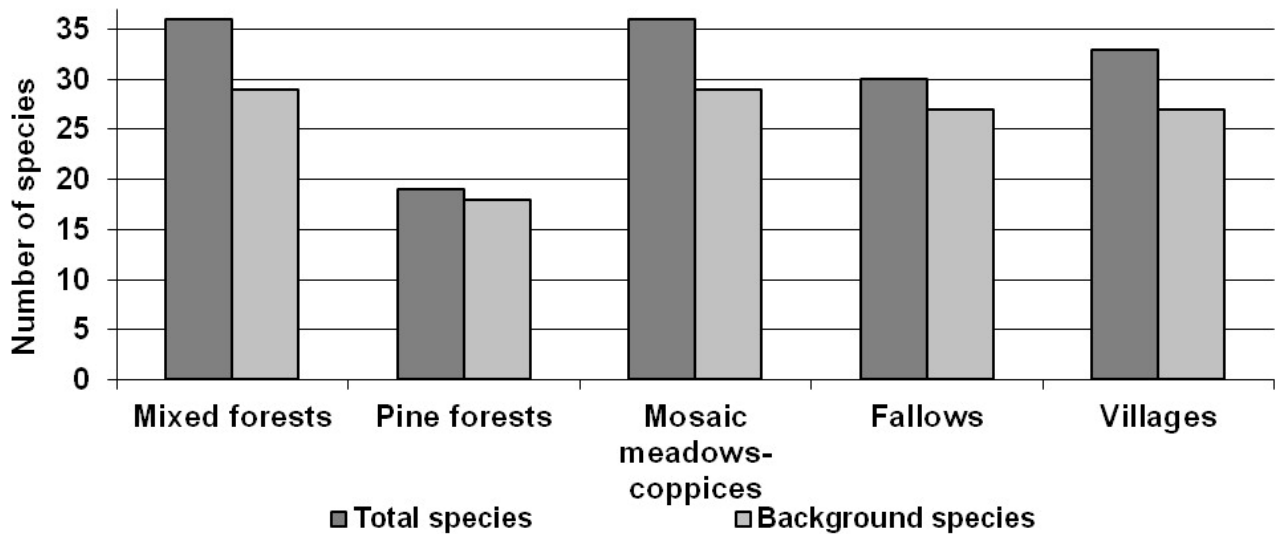


Fig. 1. Species richness of bird communities in coniferous-deciduous forests of Seryozha river valley during the nesting period (2017).

After a decade and a half after the first comprehensive studies, the summer population of birds of various habitats was recorded again. Goal of these studies was to identify changes in the dynamically developing conditions and the increasing recreational load on this territory.

Material and methods

Materials on bird population were collected during surveys in the valley of Seryozha river from the first half of June to the second half of August 2017. Birds were counted using the route method without a dedicated counting belt with subsequent recalculation to the area according to the average group detection range (Ravkin, 1967). To calculate the abundance of flying individuals, corrections were made for the

speed of movement (Ravkin and Dobrokhotov, 1963). When conducting bird surveys, the following main habitats previously surveyed in 2003 (Noskova, 2007) were selected:

- spruce-pine-lime (mixed further in the text) forests;
- pine forests of various types;
- mosaic meadows (meadows-coppices) – mosaic-located small groups of shrubs and forest areas, separated by larger overgrowing (sometimes swampy) meadows, floodplain lakes and marshes;
- fallow lands (earlier, in 2003, overgrown upland dry meadows-haymaking lands, not exploited for the last 2–3 years);
- rural areas (settlements).

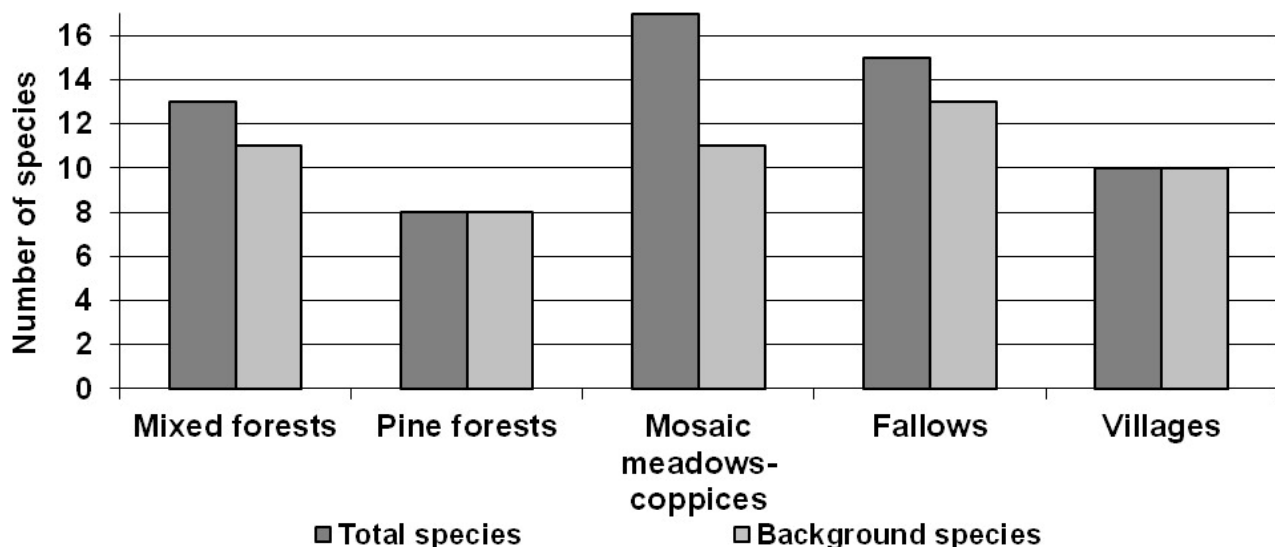


Fig. 2. Species richness of bird communities in coniferous-deciduous forests of Seryozha river valley during the post-nesting period (2017).

Habitat	Total abundance, ind./km ²		Share of dominants, % of abundance		Shannon's index (H)		Pielou equalization index (E)	
	2003	2017	2003	2017	2003	2017	2003	2017
Mixed forests	1173	334	53	52	2.83	2.68	0.74	0.75
Pine forests	857	193	51	52	2.78	2.21	0.72	0.75
Mosaic meadows-coppices	814	476	11	39	3.40	2.85	0.80	0.80
Fallows	596	364	45	46	2.52	2.52	0.67	0.74
Villages	996	503	49	60	2.69	2.52	0.69	0.72

Table 1. Main integral indices of nesting bird communities in coniferous-deciduous forests of Seryozha river valley.

Compared to 2003, a part of other habitats were not surveyed due to their inaccessibility (mixed and dense tree undergrowth) or a radical change of appearance (floodplain meadows-haymaking lands and dry meadows-pastures).

Small habitats were considered as a single whole with the surrounding landscape, as before (Noskova, 2007). Each of the five routes in the summer of 2017 was surveyed for six times, which in total length was 150 km.

We considered the breeding period to last from June 1 to July 15, and the post-nesting period – from July 16 to August 31. The dominant species are those whose share in the community is at least 10% (by abundance), and the background ones - with an abundance of at least one individual per 1 km² (Kuzyakin, 1962). Mathematical data processing was performed using the software package of the zoological monitoring laboratory of the Institute of Animal Systematics and Ecology, Siberian Branch of the Russian Academy of Sciences (Novosibirsk), as well as using the StatSoft Statistica 6.0 software package (Khalafyan, 2007). We compared the

obtained results with the materials of 2003 obtained by O.S. Noskova (2007, 2012) on the same routes and using the same method. In 2003, one of the cycles of counts fell on the second half of May; in the analysis, the data were used only for the period from June 1 to August 31. Bird communities' similarity in 2017 and 2003 was tested using the Sørensen – Chekanovsky index (Pesenko, 1982).

Results

In total 73 species of birds from 10 orders, 27 families were encountered in Serezha river valley during the summer of 2017, which represents 43% of the total number of species found here (Bakka et al., 2014; a list of species is presented at the end of the article). Among them, there were 5 rare bird species included in the Red Book of the Nizhny Novgorod region (gray heron *Ardea cinerea* L., 1758, three-toed woodpecker *Picoides tridactylus* (L., 1758), stock dove *Columba oenas* L., 1758, common grasshopper warbler *Locustella naevia* (Boddaert, 1783), the collared flycatcher *Ficedula albicollis* (Temminck, 1815)), as well as four species listed in the Appendix

Habitat	Total abundance, ind./km ²		Share of dominants, % of abundance		Shannon's index (H)		Pielou equalization index (E)	
	2003	2017	2003	2017	2003	2017	2003	2017
Mixed forests	767	81	68	79	2.36	1.96	0.66	0.76
Pine forests	501	52	54	85	2.48	1.73	0.72	0.76
Mosaic meadows-coppices	570	66	46	71	2.95	1.93	0.74	0.68
Fallows	319	47	66	60	2.46	2.21	0.76	0.81
Villages	1046	137	66	80	2.35	1.53	0.67	0.58

Table 2. Main overall indices of post-nesting bird communities in coniferous-deciduous forests of Seryozha river valley.

(coal tit *Parus ater* L., 1758, wren *Troglodytes troglodytes* (L., 1758), corncrake *Crex crex* (L., 1758), honey buzzard *Pernis apivorus* (L., 1758)) (Red Book..., 2014). Some species are quite common here. Thus, for example, the corncrake is regularly found in meadow areas (up to eight individuals/km²), stock dove usually inhabits the section of mixed forest adjacent to the university's biostation, although it was only met once in 2017 (3 individuals/km²), coal tit is common here as well (up to 10 individuals/km²). The collared flycatcher began nesting in mixed forests regularly (up to 6 individuals/km²) in the recent years.

Species richness

In most habitats, the species richness of birds in the nesting period is about 30–35 species and only in pine forests – less than 20 (Fig. 1, 2). In the post-nesting period, the number of species in different habitats decreases markedly (no more than 17), since many birds at this time prefer to wander in search of food in the vast open spaces. The surveyed area is predominantly forested, therefore the birds leave it after nesting, and the differences between bird communities in terms of species number increase. The bird population of pine forests is still inferior to other bird communities in this respect.

The obtained results were compared with data from 2003 (Noskova, 2007). There was a decrease in species richness by 10 or more species in all habitats, mainly due to irregularly encountered birds – for example, the Oriental cuckoo *Cuculus optatus* Gould, 1845, hawfinch, *Coccothraustes coccothraustes* (L., 1758) and others. The European

turtle dove *Streptopelia turtur* (L., 1758), which was observed in almost all counts in the 20th century has completely become absent in the Seryozha river valley. The ortolan bunting *Emberiza hortulana* L., 1758 (Noskova and Kolesova, 2017) stopped nesting following the overgrowth of meadows-haymakings with trees. A noticeable decrease (by over two times) in the number of bird species in the nesting period is seen in pine forests (from 48 species in 2003 to 19 species in 2017). This may be due to an increase in the recreational load on the site, which is especially evident in this type of habitat due to the sparse structure of its vegetation and the convenience of visiting by tourists.

A similar situation, albeit caused by different reasons, has developed in mosaic meadows-coppices. Here, the habitat has changed noticeably as a result of the cessation of agricultural activities (haymaking, planting potatoes) and significant overgrowing of the meadow part by birch undergrowth with a number of ordinary species stopping nesting – for example, the western yellow wagtail *Motacilla flava* L., 1758, lapwing *Vanellus vanellus* (L., 1758) and other species of wading birds.

The number of encountered species in the post-nesting period of 2017 was 2–3 times lower than in 2003. Such changes are normal at this time of the year, because birds in the post-nesting period are more mobile and therefore abundance indices are subject to greater interannual fluctuations compared to the nesting period (Grazhdan, 2002; Rakhimov, 2002).

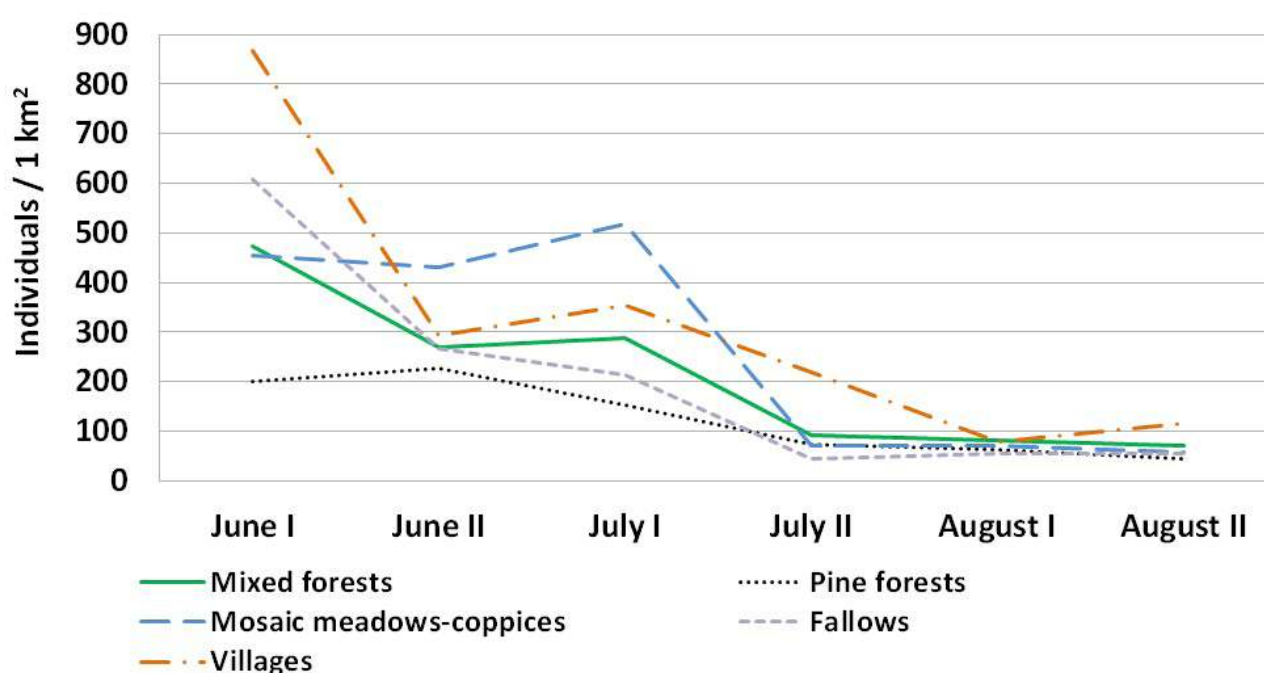


Fig. 3. Dynamics of the overall abundance of summer population of birds from various habitats in coniferous-deciduous forests of Seryozha river valley (2017).

Habitat	Dominants (% of abundance)	
	2003	2017
Nesting period		
Mixed forests	Chaffinch (16), European nuthatch (14), goldcrest (13), great tit (10)	Chaffinch (25), spotted flycatcher (14), great tit (14)
Pine forests	Willow tit (22), chaffinch (17), European nuthatch (12)	Chaffinch (37), wood warbler (16)
Mosaic meadows-coppices	Great tit (11)	River warbler (16), garden warbler (12), Blyth's reed warbler (11)
Fallows	Whinchat (34), common whitethroat (12)	Garden warbler (23), yellowhammer (12), Blyth's reed warbler (11)
Villages	barn swallow (18), European tree sparrow (16), white wagtail (15)	European tree sparrow (23), European goldfinch (13), white wagtail (13), European greenfinch (12)
Post-nesting period		
Mixed forests	Goldcrest (27), willow tit (18), great tit (13), European pied flycatcher (11)	Willow tit (34), great tit (21), tree pipit (14), chaffinch (11)
Pine forests	Willow tit (29), chaffinch (13), European nuthatch (12)	Great tit (35), chaffinch (21), chiffchaff (15), willow tit (13)
Mosaic meadows-coppices	Great tit (15), common whitethroat (11), willow warbler (11), willow tit (10)	Willow tit (41), long-tailed tit (17), great tit (14)
Fallows	White wagtail (16), whinchat (15), European goldfinch (12), meadow pipit (12), red-backed shrike (11)	Great tit (28), willow tit (21), chaffinch (11)
Villages	White wagtail (21), barn swallow (16), common house martin (15), European tree sparrow (14)	European tree sparrow (56), great tit (13), white wagtail (12)

Table 3. Dynamics of dominant species abundance and their shares in the summer population of birds in coniferous-deciduous forests of Seryozha river valley (2017).

Total abundance and its dynamics

The nesting population of birds in villages and mosaic meadows-coppices is noticeably distinguished (about 500 individuals/km²) in terms of total abundance. Bird communities of villages retain leadership in this respect in the post-nesting period as well, although it decreases almost everywhere by over three times (Table 1, 2).

Minimum abundance of birds in summer is seen in pine forests and long fallow lands, which was also noted in previous studies. At the same time, the abundance of birds over the summer decreased almost everywhere, especially in the woodlands by up to 4–5 times compared to 2003, on average. The main reason for this was the cool and humid summer of 2017. Many researchers note the influence of weather

conditions (average temperature in spring and June, amount of precipitation in the breeding period, etc.) upon the interannual dynamics of nesting birds' total abundance (Golovatin, 2001; Grazhdan, 2002). The abundance of birds of mixed forests is markedly below the multiannual average (1167 ind./km²) in 2017, where research has been conducted annually for more than 10 consecutive years (Noskova, 2016).

The population of birds of all surveyed habitats in 2017 is characterized by emigrational type of summer abundance dynamics (Fig. 3). Most likely this reflects the weather conditions of the summer – rainy and cool. Many species did not have the opportunity to feed full broods, therefore, there was no noticeable increase in the number of birds during the departure of the younger generation. Such trends

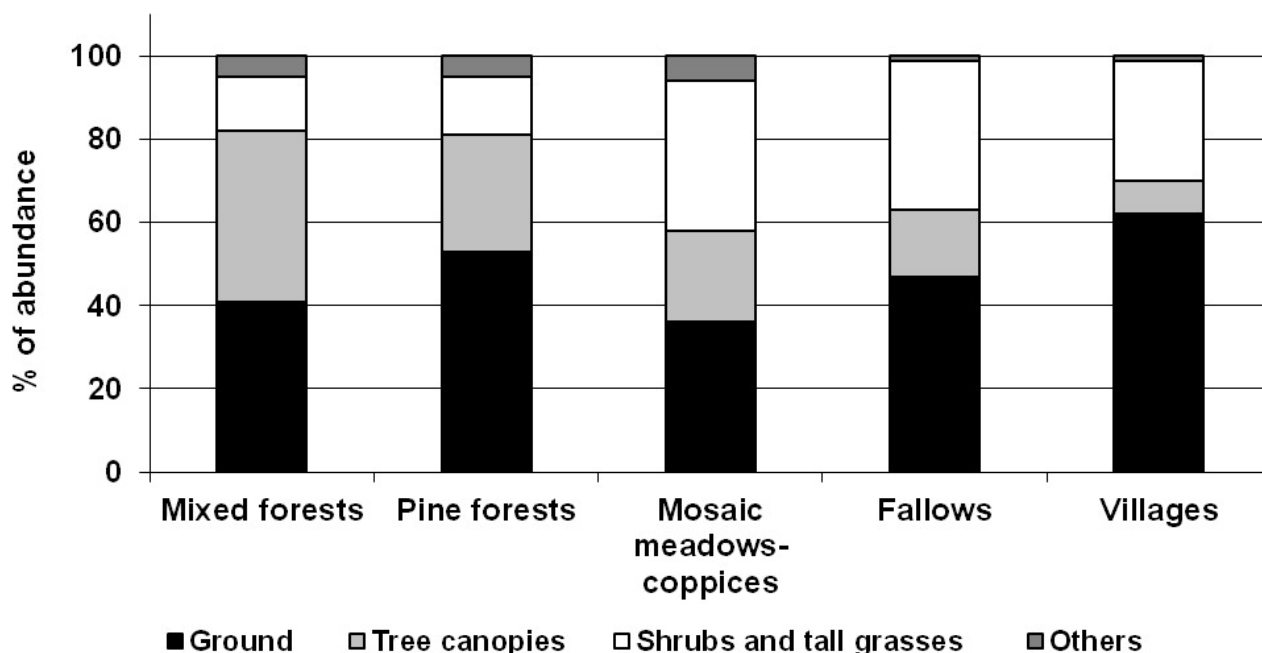


Fig. 4. Layer distribution of birds in coniferous-deciduous forests of Seryozha river valley during the nesting period (% of abundance, 2017).

were less obvious only in the bird population of mosaic meadows-coppices.

The pyramidal type of summer dynamics of bird communities prevailed in the survey area as a whole due to a massive emergence of fledglings in the middle of the summer of 2003 in contrast to 2017. It even led to immigration tendencies being observed in bird communities of mixed and pine forest while in villages and on meadows-coppices the impact of immigration processes was combined with the impact of equilibrium-dynamic ones – birds actively roamed here in search of food in the post-nesting period (Noskova, 2007).

Dominant abundance

The composition of species dominant in terms of abundance in 2017 included 16 species: twelve in the nesting and eight in the post-nesting period (Table 3). Some species dominated in several habitats at once or during the whole summer.

Chaffinch *Fringilla coelebs* L., 1758 ranked first in the nesting period of 2017 in forest habitats, constituting up to 37% in pine forests. In 2003, this species also dominated in these bird communities, but in the pine forests it shared its leadership with the willow tit *Parus montanus* Conrad von Baldenstein, 1827 (Noskova, 2007). Since the beginning of the century, the great tit *Parus major* L., 1758 is regularly observed in mixed forests. It ranks first in abundance in 2006–2007 and 2009. In other years of observations, great tit's abundance was lower than that of the chaffinch. After installation of nestboxes at the research site in 2009, the pied flycatcher *Ficedula hypoleuca* (Pallas, 1764) became one of the dominant species three years later, becoming the species with the highest abundance in 2015 (Noskova, 2016).

Great tit, pied flycatcher and chaffinch dominated in mixed forests in terms of abundance in 2017.

Blyth's reed warbler *Acrocephalus dumetorum* Blyth, 1849 and garden warbler *Sylvia borin* (Boddaert, 1783) are among the leaders in the bird population of mosaic meadows and fallows. The latter takes the first place in abundance in fallow lands (23% in abundance), and the river warbler *Locustella fluviatilis* (Wolf, 1810) dominates in meadows-coppices, numbering 16%. The composition of dominating species in these bird communities has changed completely compared to 2003. The whinchat *Saxicola rubetra* (L., 1758), common whitethroat *Sylvia communis* Latham, 1787 and great tit stopped to dominate in the open meadow sites due to reduction of their area caused by strong bushing and overgrowth with birch-pine undergrowth.

Willow tit and great tit have dominated (41 and up to 35%, correspondingly) in all surveyed habitats in the post-nesting period of 2017. This was also observed in 2003. At that time, meadow species (white wagtail *Motacilla alba* L., 1758, whinchat *Saxicola rubetra* (L., 1758), and others) have only dominated in the fallow lands (previously, overgrown meadows and haylands). Now this habitat is heavily forested, and bird communities shift towards the forest type, which is more pronounced in the post-nesting period.

Tree sparrow *Passer montanus* (L., 1758) is the most abundant species in villages during the summer – up to 56%. The composition of dominants is relatively stable here both during one season and over the years. However, neither the barn swallow *Hirundo rustica* L., 1758 nor the common house martin *Delichon urbica* (L., 1758) were found here in 2017 in contrast to 2003. The lack of intensive cattle breeding and the reduction of agricultural

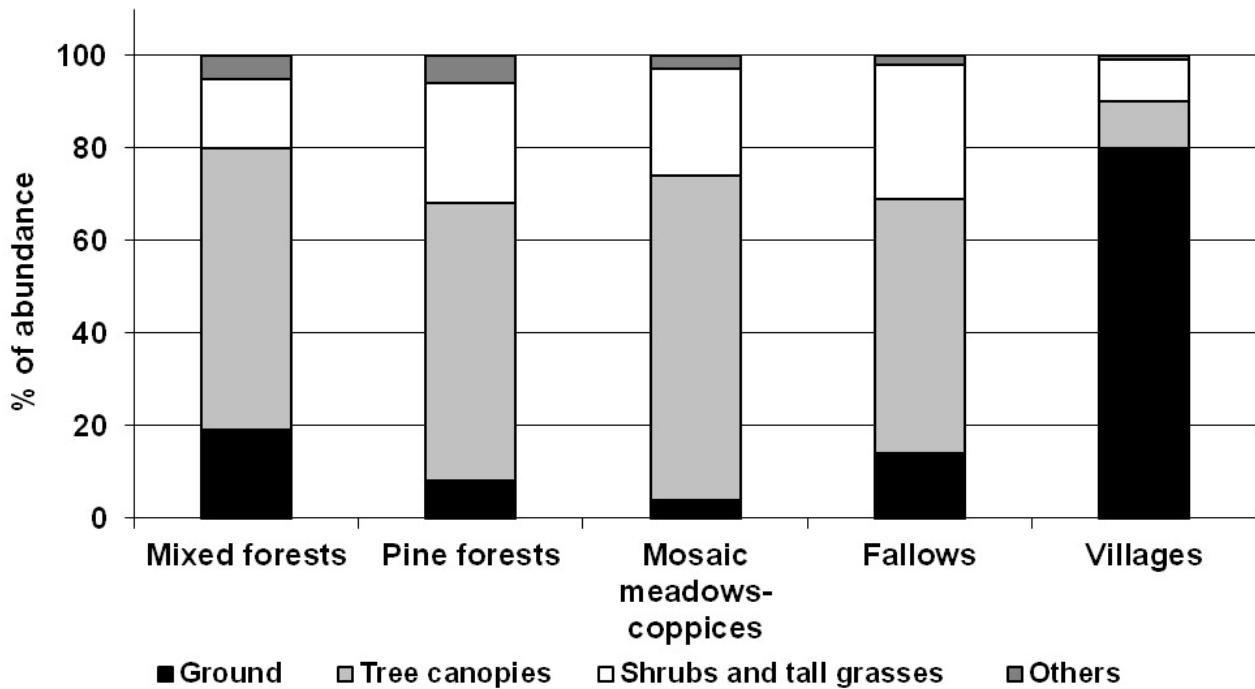


Fig. 5. Layer distribution of birds in coniferous-deciduous forests of Seryozha river valley during the post-nesting period (% of abundance, 2017).

activity at the research site led to the overgrowing of a significant part of the meadow areas with tree's undergrowth. The decrease of meadow areas led to reduction of swallows' and martins' areas of foraging and, ultimately, to the decrease in their abundance.

Evaluation of bird communities' similarity based on the counts of 2017 and 2003 using the Sørensen – Chekanovsky index, showed that it is most pronounced in mosaic meadows-coppices (0.63 units). The interannual similarity of forest bird communities is low. The greatest differences are seen in the bird population of the fallow lands (0.36 units), which is also easily observed visually during the habitat survey.

In 2017 the overall percentage of dominant species in the nesting period is minimal in bird communities of mosaic meadows-coppices (39% in abundance) and maximum in villages (up to 60%). In the post-nesting period, the proportion of dominants increases everywhere and almost everywhere exceeds 70% in abundance.

The species diversity of the nesting bird population, estimated by the Shannon and Pielou indices, in various habitats is 2.21–2.85 and 0.72–0.80 units, accordingly (Table 1). This is close to what is given for the subzone of coniferous-deciduous forests (Ravkin and Ravkin, 2005). Similar to 2003, the maximum values are in the bird communities of mosaic meadow-coppices. The species diversity of all habitats has slightly decreased by 2017 as compared to the previous study period.

Forest layer foraging distribution

During the summer the majority of bird species in the surveyed habitats mostly forage on the ground and in tree canopies, as well as in shrubs and tall grasses (Fig. 4, 5).

In the nesting period, ground-foraging birds dominate in most habitats. In the population of birds of mixed forests, they make up almost an equal share with birds foraging in canopies, while in mosaic

Habitat	Factors		
	1	2	3
Mixed forests	0.761296	-0.555758	-0.080155
Pine forests	0.758141	-0.550721	-0.133177
Mosaic meadows-coppices	0.664709	0.647204	0.008159
Fallows	0.658334	0.654158	0.006042
Villages	0.155852	-0.129843	0.979054

Table 4. Factors determining spatial heterogeneity of nesting bird community in coniferous-deciduous forests of Seryozha river valley. Note: the most important indices are highlighted (> 0.5).

Habitat	Factors	
	1	2
Mixed forests	0.948651	-0.048285
Pine forests	0.850115	0.105073
Mosaic meadows-coppices	0.830347	-0.134231
Fallows	0.961919	0.042118
Villages	0.027681	0.990782

Table 5. Factors determining spatial heterogeneity of post-nesting bird community in coniferous-deciduous forests of Seryozha river valley. Note: the most important indices are highlighted (> 0.5).

meadows-coppices and on fallow lands – with species foraging in shrubs. In the post-nesting period, in all habitats, except for the settlements, the share of birds foraging in the canopy (up to 70% in abundance) almost doubles due to large broods of tits. Similar trends were noted in 2003 (Noskova, 2007). In the settlements, on the contrary, the abundance of land-feeding birds almost doubles.

The number of bird species foraging on tree trunks during the nesting period in forest habitats has decreased threefold (from 15% to 5%) compared to 2003.

Territorial heterogeneity of bird population and its determinants

Using factors analysis we were able to identify three main factors that determine the spatial heterogeneity of bird communities in the valley of Seryozha river during the nesting period, and two factors during the post-nesting period (Table 4, 5).

The main factor determining the spatial distribution of birds throughout the summer is the

naturalness of habitats – natural bird communities differ from such in the villages (factor 1) (Table 4, 5). Hence, the opposite factor is the amount of buildings: factor 3 for Table 4 and factor 2 for Table 5. The factor of habitat's forestation degree is added in the nesting period: bird community of mixed and pine forests may be attributed into one group, and the bird community of mosaic meadows-coppices and long fallows into the other (factor 2) (Table 4).

Cluster analysis (Khalafyan, 2007) allowed to single out the population of birds in the villages. The remaining bird communities became a part of a single group (cluster), within which the population of birds of mixed and pine forests, as well as mosaic meadows and fallows (Figure 6) are combined pairwise.

Identified factors coincide with those that were identified in the course of the first comprehensive studies in 2003. Previously, only the influence of the forest-forming tree species was added to them (Noskova, 2007, 2012).

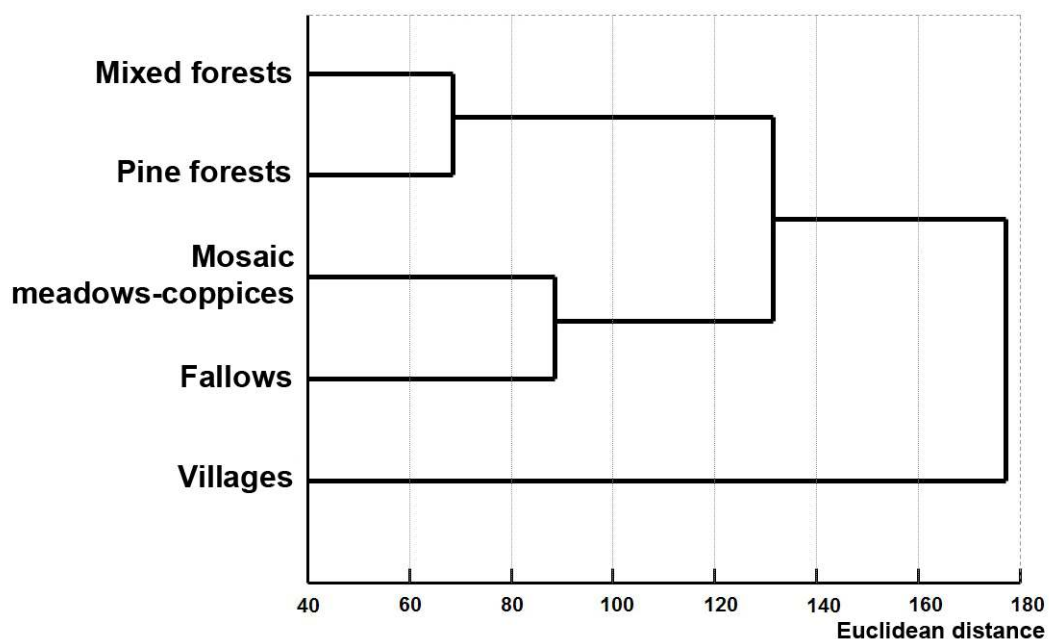


Fig. 6. Groups (clusters) of nesting bird communities in coniferous-deciduous forests of Seryozha river valley (2017).

List of bird species in deciduous-coniferous forests in the valley of Seryozha river (summer of 2017)

Order Ciconiiformes

Family Ardeidae

Gray heron *Ardea cinerea* L., 1758

Order Falconiformes

Family Accipitridae

European honey buzzard *Pernis apivorus* (L., 1758)

Black kite *Milvus migrans* (Boddaert, 1783)

Order Gruiformes

Family Rallidae

Corncrake *Crex crex* (L., 1758)

Spotted crane *Porsana porzana* (L., 1766)

Order Charadriiformes

Family Charadriidae

Northern lapwing *Vanellus vanellus* (L., 1758)

Family Scolopacidae

Green sandpiper *Tringa ochropus* L., 1758

Common sandpiper *Actitis hypoleucos* (L., 1758)

Common snipe *Gallinago gallinago* (L., 1758)

Order Columbiformes

Family Columbidae

Rock pigeon *Columba livia* Gmelin, 1789

Stock dove *Columba oenas* L., 1758

Common wood pigeon *Columba palumbus* L., 1758

Order Cuculiformes

Family Cuculidae

Common cuckoo *Cuculus canorus* L., 1758

Order Strigiformes

Family Strigidae

Ural owl *Strix uralensis* Pallas, 1771

Order Apodiformes

Family Apodidae

Common swift *Apus apus* (L., 1758)

Order Piciformes

Family Picidae

Black woodpecker *Dryocopus martius* (L., 1758)

Great spotted woodpecker *Dendrocopos major* (L., 1758)

White-backed Woodpecker *Dendrocopos leucotos* (Bechstein, 1803)

Eurasian Three-toed Woodpecker *Picoides tridactylus* (L., 1758)

Order Passeriformes

Family Hirundinidae

Collared Sand Martin *Riparia riparia* (L., 1758)

Barn Swallow *Hirundo rustica* L., 1758

Family Alaudidae

Eurasian Skylark *Alauda arvensis* L., 1758

Woodlark *Lullula arborea* (L., 1758)

Family Motacillidae

Tree Pipit *Anthus trivialis* (L., 1758)

White wagtail *Motacilla alba* L., 1758

Family Laniidae

Red-backed shrike *Lanius collurio* L., 1758

Family Sturnidae

Common starling *Sturnus vulgaris* L., 1758

Family Oriolidae

Golden oriole *Oriolus oriolus* (L., 1758)

Family Corvidae

Common jay *Garrulus glandarius* (L., 1758)

Common magpie *Pica pica* (L., 1758)

Hooded crow *Corvus cornix* L., 1758

Common raven *Corvus corax* L., 1758

Family Sylviidae

Garden Warbler *Silvia borin* (Boddaert, 1783)

Blackcap *Silvia atricapilla* (L., 1758)

Common whitethroat *Silvia communis* Latham, 1787

Willow Warbler *Phylloscopus trochilus* (L., 1758)

Common chiffchaff *Phylloscopus collybita* (Vieillot, 1817)

Wood warbler *Phylloscopus sibilatrix* (Bechstein, 1793)

Greenish warbler *Phylloscopus trochiloides* (Sundevall, 1837)

River warbler *Locustella fluviatilis* (Wolf, 1810)

Common grasshopper warbler *Locustella naevia* (Boddaert, 1783)

Blyth's reed warbler *Acrocephalus dumetorum* Blyth, 1849

Marsh warbler *Acrocephalus palustris* (Bechstein, 1798)

Family Regulidae

Goldcrest *Regulus regulus* (L., 1758)

Family Muscicapidae

Spotted flycatcher *Muscicapa striata* (Pallas, 1764)

European pied flycatcher *Muscicapa hypoleuca* (Pallas, 1764)

Collared flycatcher *Ficedula albicollis* (Temminck, 1815)

Family Turdidae

European robin *Erithacus rubecula* (L., 1758)

Thrush nightingale *Luscinia luscinia* (L., 1758)

Bluethroat *Luscinia svecica* (L., 1758)

Black redstart *Phoenicurus ochruros* (Gmelin, 1774)

Common redstart *Phoenicurus phoenicurus* (L., 1758)

Whinchat *Saxicola rubetra* (L., 1758)

Northern wheatear *Oenanthe oenanthe* (L., 1758)

Blackbird *Turdus merula* L., 1758

Fieldfare *Turdus pilaris* L., 1758

Redwing *Turdus iliacus* L., 1758

Song thrush *Turdus philomelos* Brehm, 1831

Mistle thrush *Turdus viscivorus* L., 1758

Family AegithalidaeLong-tailed tit *Aegithalos caudatus* (L., 1758)**Family Paridae**Willow tit *Parus montanus* von Baldenstein, 1827Coal tit *Parus ater* L., 1758Crested tit *Parus cristatus* L., 1758Great tit *Parus major* L., 1758**Family Sittidae**European nuthatch *Sitta europaea* L., 1758**Family Passeridae**House sparrow *Passer domesticus* (L., 1758)Eurasian tree sparrow *Passer montanus* (L., 1758)**Family Fringillidae**Chaffinch *Fringilla coelebs* L., 1758European greenfinch *Chloris chloris* (L., 1758)Eurasian siskin *Chloris chloris* (L., 1758)European goldfinch *Carduelis carduelis* (L., 1758)Common rosefinch *Carpodacus erythrinus* (Pallas, 1770)**Family Emberizidae**Yellowhammer *Emberiza citrinella* L., 1758**Conclusions**

During the first decade and a half of the 21st century, it is possible to identify a number of changes in the summer population of the birds of the coniferous-deciduous forests of Serezhka river valley, taking place both under the influence of natural processes (for example, weather conditions dynamics) and anthropogenic habitat transformation.

1. Compared to 2003, there has been a noticeable reduction (more than 2 times) in the species composition of birds of pine forests in the nesting period (from 48 to 19 species), apparently due to an increase in the recreational load. However, according to the results of cluster analysis, the appearance of the bird community is close to natural intact communities.

2. The composition of species dominating in terms of abundance varies noticeably during the summer in most habitats. This is especially pronounced in mosaic meadows-coppices and fallows, where as a result of the cessation of agricultural activity (grazing, mowing, etc.), succession processes are observed (overgrowing with shrubs and birch-pine undergrowth). For example, the whinchat and the common whitethroat dominant on fallows in the nesting period are replaced by garden warbler and Blyth's reed warbler, and the white wagtail, goldfinch *Carduelis carduelis* (L., 1758) and red-backed shrike *Lanius collurio* L., 1758 dominant in the post-nesting period were replaced by the great tit, willow tit typical for forest bird communities.

3. The nature of summer dynamics of total abundance changes from pyramidal to emigrational, which is probably determined by weather conditions studied year.

4. During the summer, the majority of bird species in the surveyed habitats mostly forage on the

ground and in tree canopies, as well as in shrubs and tall grasses, as before. The amount of species foraging on tree trunks decreases slightly in forest habitats during the nesting period.

5. The main factors determining the territorial distribution of birds in the valley of Seryozha river over the past fifteen years are almost similar. Among them – the naturalness of habitats, amount of buildings and the degree of habitats forestation. According to the results of cluster analysis, the surveyed bird communities can be grouped into two groups (clusters): the first is the bird community of settlements, the second – all other habitats, where the population of birds of mixed and pine forests and mosaic meadows and fallows are combined pairwise.

6. Evaluation of bird communities' composition based on the results of 2003 and 2017 counts showed that it is most pronounced in mosaic meadows-coppices. The interannual similarity of forest bird communities is small. The greatest differences are manifested in the composition of bird population in the fallow lands, which is also easily observed visually during the habitat survey.

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