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Spring Bird Survey of Talysh Mountains in Azerbaijan

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Abstract. The materials of bird counts in the Talysh Mountains in April 2019 are presented. The field survey was carried out in three altitudinal zones: pastures and semi-desert territories of Zuvand, a transitional zone in the middle mountain belt with fragmented forests and pastures around the Lerik, and old-growth forests in the Hyrcan National Park. A total of 104 bird species have been recorded, including 73 passerine species. Bird migrants predominate in the open landscapes of the highlands, sedentary species are prevalent in the forests. *Linaria cannabina*, *Oenanthe oenanthe*, *Emeberiza cia*, *Upupa epops*, *Dendrocopos syriacus* form the basis of the bird communities in open pastures and *Fringilla coelebs*, *Parus ater*, *Sitta europaea*, *Troglodytes troglodytes*, *Phoenicurus phoenicurus* and others – in forest areas. *Columba livia*, *Passer domesticus*, *Parus major*, *Sturnus vulgaris* predominate within rural settlements. The forests of the Hyrcan Park are a key natural site supporting the existence of populations of *Poecile hyrcanus*, *Ficedula semitorquata*, *Pyrrhula pyrrhula*, *Jynx torquilla*. The total average density of birds in the open highland landscapes of Zuvand was 172 individuals/km^2, in the transitional zone of fragmented forests and pastures – 373 ind./km^2, in old-growth forests – 1180 ind./km^2. The importance of protection of bird communities and their habitats is emphasized.

Keywords: bird survey, abundance, Talysh mountains, Azerbaijan

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Весеннее орнитологическое обследование Талышских гор в Азербайджане

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Аннотация. Представлены материалы учетов птиц в Талышских горах в апреле 2019 года. Полевое обследование выполнено в трех высотных поясах: высокогорные пастбища и полупустынные территории Зуванда, переходная зона в среднегорье с фрагментированными лесами и пастбищами в районе Лерика, старовозрастные леса в Гирканском национальном парке. Всего зарегистрировано

104 вида птиц, их них 73 вида воробьиных. В открытых ландшафтах высокогорий преобладают мигранты, в лесных массивах – оседлые виды птиц. Доминантами в сообществе птиц открытых пастбищ выступают *Linaria cannabina*, *Oenanthe oenanthe*, *Emeberiza cia*, *Upupa epops*, *Dendrocopos syriacus*, на лесных территориях – *Fringilla coelebs*, *Parus ater*, *Sitta europaea*, *Troglodytes troglodytes*, *Phoenicurus phoenicurus* и другие. В пределах сельских поселений преобладают *Columba livia*, *Passer domesticus*, *Parus major*, *Sturnus vulgaris*. Леса Гирканского национального парка представляют собой ключевую территорию, поддерживающую существование популяций *Poecile hyrcanus*, *Ficedula semitorquata*, *Pyrrhula pyrrhula*, *Jynx torquilla*. Средняя суммарная плотность птиц в открытых высокогорных ландшатах Зуванда составила 172 особи/км^2, в переходной зоне фрагментированных лесов и пастбищ – 373 особи/км^2, в старовозрастных лесах – 1180 особей/км^2. Подчеркивается важность охраны сообществ птиц и их местообитаний.

Ключевые слова: орнитологическое обследование, обилие, Талышские горы, Азербайджан

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Introduction

The Caucasus is one of the centers of the world's biodiversity [Myers et al., 2000; Agakhanjanz, Breckle, 2002; Mittermeier et al., 2011]. The southeastern part of the Caucasus is a special ecological uniqueness. This is a vast territory of the so-called Hyrcanian physical-geographical region (the Hyrcanian ecoregion), located in a subtropical climate and stretching a vast strip bordering the entire southern coast of the Caspian Sea [Gvozdetsky, 1958; Takhtajan, 1986; Noroozi et al., 2019].

The Talysh Mountains (Talysh Mountain Range) and the Lankaran-Astara Lowland in Azerbaijan represent the western part of the Hyrcanian ecoregion. Often directly under the name of ‘‘Talysh’’, the authors mean only the forest landscapes of the mountains [Grossheim, 1926, 1960; Kamelin, 2017]. The total area of Talysh forests is 153 thousand hectares, or about 15 % of the forest fund of the Republic of Azerbaijan[2]. To preserve the nature of these mountains, the Hyrcan Reserve was organized in 1936, which now has the status of a national park [Safarov, Olisaev, 1991]. The Hyrcan National Park (Hyrcan NP) covers only 40,000 ha of forests [Abbasov et al., 2022]. The hallmark of the Hyrcanian ecoregion is a unique vegetation cover, represented by a large number of tree and shrub relicts of the Tertiary period and endemics that form the forest structure [Grossheim, 1926; Safarov, 1960; Takhtajan, 1986; Kamelin, 2017].

Non-forest xerophytic drought-resistant vegetation of highland landscapes of Zuvand (Diabar basin) is not part of the Hyrcanian ecoregion, but belong to the Atropatenian Plant Subprovince [Kamelin, 2017; Parolly, 2020]. In terms of climatic features and composition of plant communities, the Diabar basin is similar to the Ardabil basin (plain) in Iran [Grossheim, 1926]. Many areas of mountain-steppe and semi-desert landscapes are of anthropogenic origin, and a significant part of xerophytic communities formed after deforestation in historical time [Prilipko, 1970]. Therefore, bird communities here are not yet fully formed, and the composition of the fauna is largely determined by the flow of invaders from Iran.

Two centuries ago, the Talysh mountains were still covered with vast virgin forests, but grass communities were already widespread on the very tops of the mountains. At the beginning of the last century, it was established that the upper limit of the forest in these mountains was artificially lowered due to logging [Kiritschenko, 1910; Grossheim, 1926]. By the middle of the last century, lowland virgin forests along the Caspian coast were completely reduced, and now this territory is a complex of agroecosystems and urbanized territories (settlements, plantations, gardens) [Prilipko,

[2] Forests of the Azerbaijan Republic (Respublikanın meşələri). 2020. Available at: http://eco.gov.az/az/fealiyyet-istiqametleri/mesheler (accessed by April 3, 2023).

1970]. At present, the human impact on the nature of the region is increasing every year, due to the high population and extensive economic development of the territories. Active rural construction, logging, lopping, intensive animal breeding and expansion of silvopastures have penetrated most of the natural landscapes, including protected areas [Scharnweber et al., 2007; Ibrahimov, 2011; Gulieva, 2018; Ismaylov et al., 2019].

The general impression of early naturalists who visited these places was the obvious similarity of the Talysh fauna with the fauna of the Mediterranean with a permanent presence in both territories of a large number of herds of sheep on mountain pastures [Menetries, 1832]. The state of pastoral systems and the dynamics of tree-shrub vegetation in an ecosystem quickly affect the diversity of the avifauna and the abundance of species associated with the agricultural landscapes [Fonderflick et al., 2010]. The all-penetrating factor of private livestock and sheep breeding in natural ecosystems (from lowlands to mountain peaks) is characteristic of the forests of Azerbaijan [Safarov, 1982; Safarov, Olisaev, 1991], but the impact of this factor on the biodiversity of the flora and fauna of the region has not been fully assessed yet. Probably, active pasture cattle and sheep breeding limits the ability of birds to fully colonize the ecological niches of this territory.

To date, the species composition and ecology of birds in Azerbaijan have been investigated quite well and have been fully covered in modern review scientific publications [Patrikeev, 2004; Mustafayev, Sadigova, 2005; Mustafayev, Mamedov, 2006] and guides for birdwatchers [Shelton 2001; Schmidt et al., 2008; Gauger, Heiss, 2011]. The high-mountain avifauna of the Talysh Mountains has been surveyed to a much lesser extent. The first complete taxonomic revision and assessment of the abundance of high mountain bird fauna was carried out here 40 years ago [Agayeva, Mustafayev, 1974; Agayeva, 1980], and subsequently, the checklists were constantly corrected and supplemented [Agayeva, Alieva, 1982; Agayeva, 1987; Sadikhova, 2008]. Some of the species disappeared from the territory of the Talysh Mountains in historical time. For example, bustards no longer nest in Azerbaijan [Mustafayev, Sadigova, 2007]. *Tetraogallus caspius*, which previously inhabited the highlands of Talysh [Bogdanov, 1879], has now disappeared. During active surveys in the last century, this species was never found in the Talysh mountains [Satunin, 1907; Baziev, 1978].

Most of the publications were devoted mainly to identifying the species composition of birds, clarifying their status in the region and the characteristics of migrations. Recent census data on the abundance and characteristics of the biotopic distribution of birds (nesting and migrant) were carried out in late spring-early summer 2008 [Heiss, 2010, 2012]. However, in these submitted materials, an extremely low density of birds was indicated, that led the author to conclude that the number of birds has sharply declined under the influence of human activity [Heiss, 2010]. Calculations made by this author show extremely low bird densities in all biotopes (less than 10 individuals/km^2 (ind./km^2) for each bird species, and for many species the density is less than 1 ind./km^2 [Heiss, 2010]. These data strongly contradict other materials. For example, the total average density of all bird species in the Talysh Mountains in summer varies in different forest types from 756 to 1441 ind./km^2, the average density of avifauna in the upland steppe is 643 ind./km^2, and in settlements it is 1270 ind./km^2 [Agayeva, 1980]. The strong discrepancy in the results of the assessment of the density of birds is very strange. Many landscapes have changed over three decades, but in the protected areas of the Hyrcan NP there were no cardinal natural deviations that could explain such a sharp decline in the number of passerines and other non-hunting birds.

Now, there are practically no quantitative data on the dynamics of bird populations in the Talysh Mountains in different seasons. The availability of this information is extremely important for monitoring biota and protecting the unique mountain ecosystems of the Hyrcan ecoregion in the face of ever-increasing human impact.

The aim of our study is to assess the diversity and abundance of birds in biotopes during the period of spring migration and the beginning of nesting in the ecosystems of the Talysh Mountains.

Material and Methods

We counted birds by walking along the paths across different landscapes from March 31, 2019 to April 18, 2019. This time of fieldwork coincides with the active passage of migrants and the beginning of nesting of many bird species, as well as the beginning of active growth of vegetation in the highlands. The absence or weak development of foliage in many trees and shrubs makes it possible to visually observe birds at a great distance and keep records with minimal errors. Bird counts were not carried out during hours of dense fog. On the contrary, in summer, it is extremely problematic to perform a visual avian survey in a high and dense tree canopy and in the places with impenetrable shrub vegetation.

Bird counts were made in three high-altitude clusters of the Talysh mountains (Fig. 1), which differ in the composition of ecosystems.

1. Tall relict forest (FZ – forest zone) on the territory of the Hyrcan NP. The area least disturbed by human activities is near the settlement of Sym (38°29′08″N, 48°37′29″E). Altitudes are from 700 m to 1100 m a.s.l. (Fig. 2). A typical virgin forest in Talysh has 5 canopy levels. The top canopy consists of *Quercus castaneifolia* and *Acer velutinum* up to 50 m high with a large number of lianes and epiphytes on the branches [Safarov, 1960; Safarov, Olisaev, 1991].

Fig. 1. Locations of the spring ornithological survey in Azerbaijan in 2019
Рис. 1. Места проведения весеннего орнитологического обследования в Азербайджане в 2019 году

2. Upper forest boundary and transition to mountain pastures and shrub communities around of Lerik (ETZ – ecotone-transitional zone) (38°46′32″N, 48°23′55″E). Altitudes are from 1000 to 1500 m a.s.l. (Fig. 3). These territories represent degraded mixed forest, which includes *Quercus castaneifolia, Zelkova carpinifolia*, *Parrotia persica*, *Diospyros lotus*, *Populus hyrcana*, *Fagus orientalis*, *Acer platanoides*, *A. pseudoplatanus*, *Tilia caucasica*, *Ulmus elliptica*, *Alnus subcordata* and other [Safarov, Olisaev, 1991]. Many tree species (*Quercus*, *Fagus*, *Ilex*, *Carpinus*) are represented by shrub forms due to intensive grazing and deforestation.

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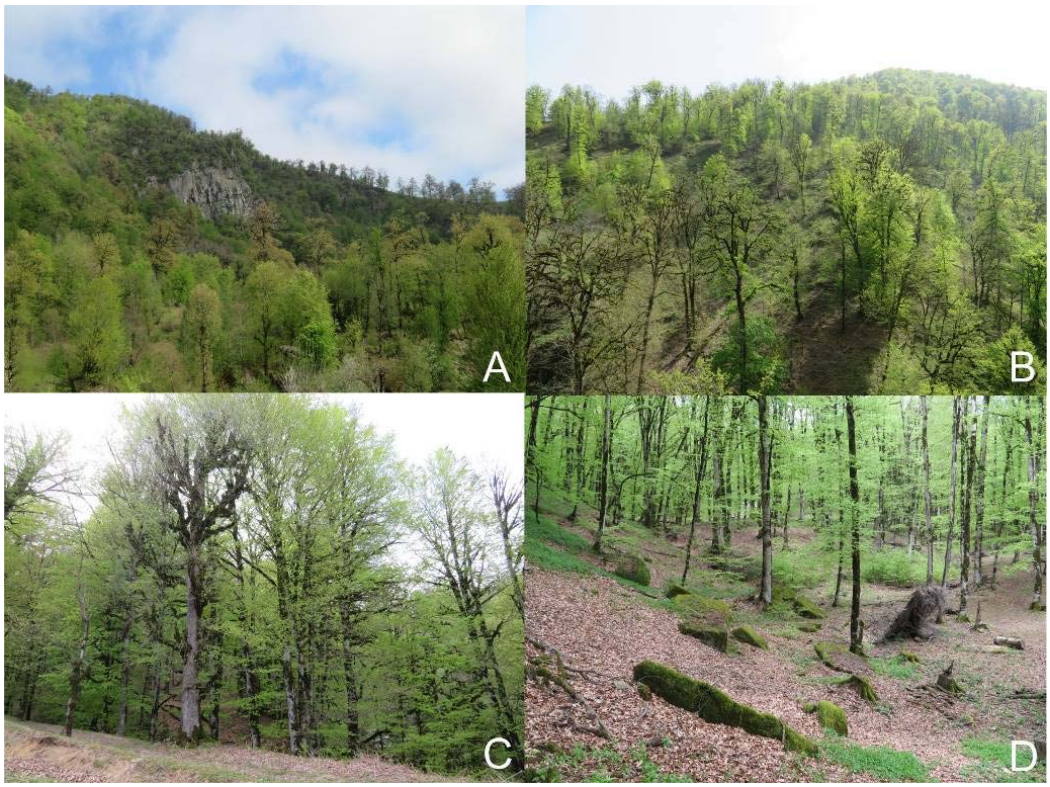

Fig. 2. Forests of the Hyrcan National Park (Azerbaijan) (photos by A.E. Scopin):
A–C – oak forests; D – beech-hornbeam forests
Рис. 2. Леса (FZ) Гирканского национального парка (Азербайджан) (фото А.Е. Скопина):
A–C – дубовые леса; D – буково-грабовые леса

Fig. 3. Forest-pasture ecotone zone (Azerbaijan) (photos by A.E. Scopin):
A, C – Forest patches along peaks, mountain slopes and in relief depressions;
B – rural territory; D – degraded oak forests
Рис. 3. Лесопастбищная экотонная зона (Азербайджан) (фото А.Е. Скопина):
A, C – лесные участки, расположенные на вершинах, склонах гор и в депрессиях рельефа;
B – сельские территории; D – деградированные дубовые леса

3. High-mountain pasture and semi-desert ecosystems of the Diabar basin (Zuvand) around Mistan (38°38′28″N, 48°25′48″E) and Pirasora (38°43′07″N, 48°22′42″E) (DSZ – zone of the semi-deserts, dry steppes and pastures). Altitudes are from 1800 to 2300 m a.s.l. (Fig. 4). The basis of these different pasture ecosystems is formed by xerophytic grasses and forbs. There are plenty of scree slopes and canyons. Various shrubs grow on the rocks – *Juniperus oblonga*, *Lonicera iberica*, *Rosa iberica* [Grossheim, 1926]. Vegetation covers about 50 % of the soil surface [Prilipko, 1970].

Birds were counted visually on line transects by the standard method [Bibby et al., 1993, 2000]. We divided the daily route into small sections with a similar vegetation cover, marking the beginning and end of the separate biotope using a GPS navigator. Subsequently, we summarized the total length of the route for certain biotope type. In the course of the work, the distance to the encountered bird was estimated with a rangefinder. The average distance to individual detection was calculated for each bird species. The width of the counting strip did not exceed 50 m in dense woody vegetation, in open areas it was up to 200 m. And only for birds of prey soaring in the air, we estimated the registration distance up to 500 m. We have chosen the counting time when there is no developed foliage, which significantly reduces the error in detecting the birds. Knowing the total length of routes and average counting strip in a certain biotope, we calculated the density of birds per 1 km^2 for each biotope and, on average, for selected natural sites. The cumulative length of all routes was 95.6 km. In total, we registered 1857 individuals belonging to 104 species of birds during fieldwork. Encountered individuals are a complex of wintering, nomadic, and migratory birds, therefore, the calculation of densities is made mainly for common and frequently occurring species that can nest in this territory. The results are presented in four tables. The table data are the average bird densities in the surveyed areas for the three sites (zones). Tables 2–4 show the data on the density of small-size birds (mostly passerines) in different biotopes within a certain zone. We were unable to accurately visually identify the species level of all encountered individuals of the genus *Phylloscopus* and species of the genus *Anthus* migrating in flocks, so the density for similar birds of each genus was calculated as a whole. The taxonomic status and Latin names of birds are from del Hoyo & Collar [2014, 2016].

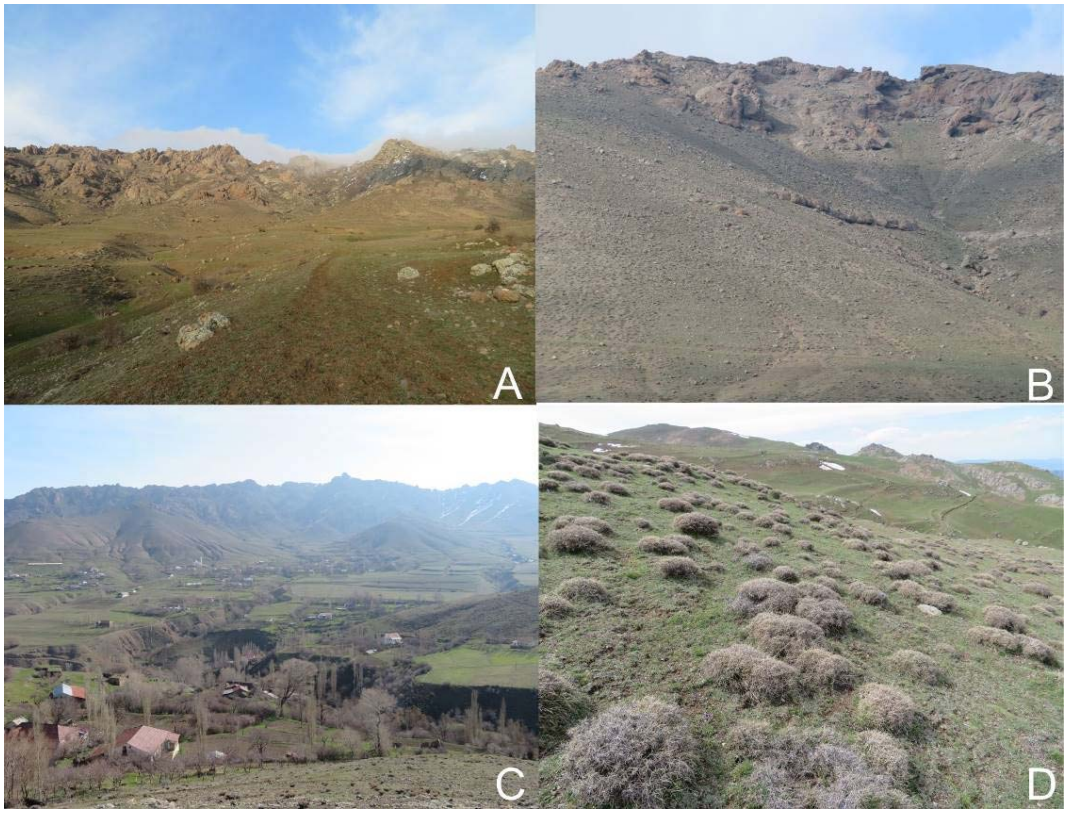

Fig. 4. High-mountain pasture and semi-desert ecosystems of Zuvand (Azerbaijan) (photos by A.E. Scopin): A, B – overgrazed dry steppes and semi-deserts; C – rural territory with woody vegetation; D – *Acantholimon* pastures
Рис. 4. Высокогорные пастбища и полупустынные экосистемы Зуванда (Азербайджан) (фото А.Е. Скопина): A, B – сухие степи и полупустыни в условиях перевыпаса; C – сельские территории с древесной растительностью; D – пастбища с доминированием акантолимона

Results and discussion

The checklist of birds recorded for Talysh is 167 species for the forest belt, and 176 species for high mountain steppes and pastures [Agayeva, Mustafayev 1974]. In total, 178 species of birds have been recorded for the Lankaran forest region of Azerbaijan [Mustafayev, 1985a]. Most of the recorded birds in the Talysh Mountains are nesting, wintering and sedentary species: 117 wintering and nesting bird species were noted in the forest belt, and 130 species - in the steppe and semi-desert zone of the highlands [Agayeva, 1980]. These bird species are good indicators of the state of ecosystems, and by monitoring the dynamics of their numbers, we can predict the threats to the existence of their populations.

The early period of our fieldwork did not allow us to take into account all bird species, since snow remained partly in the highlands. The birds began to nest actively only in the forest mountain belt. Therefore, late arriving species (*Apus*, *Merops*, *Oriolus*, *Irania*, etc.) were absent or counted as single individuals. We registered 104 species of birds typical for this area (Table 1). However, this is significantly less than the diversity of birds previously recorded by Heiss [2010], which has 156 species on his checklist.

Table 1
Таблица 1

Bird population of the Talysh mountains according to the results of the spring field survey in 2019
Население птиц Талышских гор по результатам весеннего полевого обследования 2019 года

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
Galliformes						
Phasianidae						
1	*Alectoris chukar* Gray, 1830	–	Sd	1.90	0.19	–
2	*Phasianus colchicus* Linnaeus, 1758	Sd	–	–	1.30	–
Falconiformes						
Falconidae						
3	*Falco naumanni* Fleischer, 1818	M	S	0.17	0.09	–
4	*Falco tinnunculus* Linnaeus, 1758	S	S	+	+	–
5	*Falco cherrug* Gray, 1834	M	–	0.03	–	–
Accipitriformes						
Accipitridae						
6	*Pernis apivorus* Linnaeus, 1758	S	–	+	–	–
7	*Neophron percnopterus* Linnaeus, 1758	S	S	–	–	+
8	*Circus cyaneus* Linnaeus, 1766	Sd	Sd	+	–	–

Continuation of the table 1
Продолжение таблицы 1

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
9	*Accipiter nisus* Linnaeus, 1758	Sd	S	0.11	0.13	0.93
10	*Accipiter gentilis* Linnaeus, 1758	Sd	V	+	+	–
11	*Buteo buteo* Linnaeus, 1758	W	M	0.35	0.32	0.37
12	*Buteo rufinus* Cretzschmar, 1827	–	Sd	0.14	–	–
Charadriiformes						
Charadriidae						
13	*Charadrius dubius* Scopoli, 1786	–	M	+	–	–
Scolopacidae						
14	*Scolopax rusticola* Linnaeus, 1758	W	M	–	0.70	–
Columbiformes						
Columbidae						
15	*Columba livia* Gmelin, 1789	Sd	S	–	25.10	–
16	*Columba palumbus* Linnaeus, 1758	Sd	S	0.76	–	–
17	*Streptopelia turtur* Linnaeus, 1758	S	S	–	+	+
Cuculiformes						
Cuculidae						
18	*Cuculus canorus* Linnaeus, 1758	S	S	+	+	+

Continuation of the table 1
Продолжение таблицы 1

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
Strigiformes						
Strigidae						
19	*Otus scops* Linnaeus, 1758	S	S	+	+	–
20	*Bubo bubo* Linnaeus, 1758	Sd	Sd	+	+	–
21	*Strix aluco* Linnaeus, 1758	Sd	S	+	+	+
22	*Athene noctua* Scopoli, 1769	Sd	Sd	–	+	–
Apodiformes						
Apodidae						
23	*Apus apus* Linnaeus, 1758	M	S	0.13	+	1.90
Coraciiformes						
Meropidae						
24	*Merops apiaster* Linnaeus, 1758	M	M	+	+	+
25	*Merops persicus* Pallas, 1773	M	M	+	–	–
Bucerotiformes						
Upupidae						
26	*Upupa epops* Linnaeus, 1758	M	S	0.85	1.30	–
Piciformes						
Picidae						
27	*Jynx torquilla* Linnaeus, 1758	S	S	–	–	1.90
28	*Dendrocopos minor* Linnaeus, 1758	Sd	–	–	0.90	3.70
29	*Dendrocopos major* Linnaeus, 1758	Sd	S	–	+	23.20
30	*Dendrocopos syriacus* Ehrenberg, 1833	–	Sd	2.10	0.40	3.70
31	*Picus viridis* Linnaeus, 1758	Sd	–	+	0.40	+

Continuation of the table 1
Продолжение таблицы 1

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
Passeriformes						
Alaudidae						
32	*Eremophila alpestris* Linnaeus, 1758	V	Sd	5.70	–	–
33	*Alauda arvensis* Linnaeus, 1758	M	S	+	34.00	–
34	*Lullula arborea* Linnaeus, 1758	S	S	12.80	4.40	–
Hirundinidae						
35	*Hirundo rustica* Linnaeus, 1758	S	S	2.10	+	–
36	*Delichon urbicum* Linnaeus, 1758	S	S	0.64	–	–
Motacillidae						
37	*Anthus campestris* Linnaeus, 1758	M	S	0.85	17.9	–
38	*Anthus pratensis* Linnaeus, 1758	?	?			
39	*Anthus trivialis* Linnaeus, 1758	S	S			
40	*Anthus spinoletta* Linnaeus, 1758	S	Sd	6.60	0.70	–
41	*Motacilla cinerea* Tunstall, 1771	S	S	0.50	+	5.60
42	*Motacilla alba* Linnaeus, 1758	Sd	S	0.27	2.60	3.70
Cinclidae						
43	*Cinclus cinclus* Linnaeus, 1758	Sd	Sd	–	1.10	–
Troglodytidae						
44	*Troglodytes troglodytes* Linnaeus, 1758	Sd	S	0.35	7.30	81.70
Prunellidae						
45	*Prunella collaris* Scopoli, 1769	W	S	1.28	–	–
46	*Prunella modularis* Linnaeus, 1758	S	S	+	2.60	+

Continuation of the table 1
Продолжение таблицы 1

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
Turdidae						
47	*Turdus pilaris* Linnaeus, 1758	W	W	–	1.80	–
48	*Turdus torquatus* Linnaeus, 1758	V	W	2.34	–	–
49	*Turdus merula* Linnaeus, 1758	Sd	Sd	0.43	16.80	19.50
50	*Turdus iliacus* Linnaeus, 1766	M	M	–	+	–
51	*Turdus philomelos* Brehm, 1831	Sd	S	+	2.60	15.80
52	*Turdus viscivorus* Linnaeus, 1758	Sd	S	–	1.30	2.80
Muscicapidae						
53	*Monticola saxatilis* Linnaeus, 1766	–	S	0.63	–	–
54	*Monticola solitarius* Linnaeus, 1758	V	S	+	–	–
55	*Phoenicurus phoenicurus* Linnaeus, 1758	S	S	13.50	5.30	9.30
56	*Phoenicurus ochruros* Gmelin, 1774	W	S	+	+	–
57	*Erithacus rubecula* Linnaeus, 1758	M/Sd	M/S	–	15.20	46.40
58	*Saxicola torquatus* Linnaeus, 1766	–	M	1.90	0.90	–
59	*Oenanthe oenanthe* Linnaeus, 1758	M	S	20.40	0.70	–
60	*Oenanthe finschii* Heuglin, 1869	M	S	1.55	–	–
61	*Oenanthe isabellina* Temminck, 1829	?	?	4.94	+	–
62	*Muscicapa striata* Pallas, 1764	S	S	–	+	–
63	*Ficedula semitorquata* Homeyer, 1885	S	S	–	–	14.90
64	*Ficedula parva* Bechstein, 1792	S	S	+	+	83.60

Continuation of the table 1
Продолжение таблицы 1

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
Scotocercidae						
65	*Cettia cetti* Temminck, 1820	Sd	S	+	+	–
Phylloscopidae						
66	*Phylloscopus trochilus* Linnaeus, 1758	M	M	4.30	35.30	110.00
67	*Phylloscopus collybita* Vieillot, 1817	S	S			
68	*Phylloscopus nitidus* Blyth, 1843	S	?			
Sylviidae						
69	*Sylvia atricapilla* Linnaeus, 1758	S	S	–	2.00	48.30
70	*Sylvia communis* Latham, 1787	S	S	+	–	–
71	*Sylvia curruca* Linnaeus, 1758	S	S	0.70	–	1.90
72	*Sylvia mystacea* Ménétries, 1832	M	0	+	–	+
Aegithalidae						
73	*Aegithalos caudatus* Linnaeus, 1758	Sd	S	–	3.30	7.40
Remizidae						
74	*Remiz pendulinus* Linaeus, 1758	Sd	S	+	–	–
Paridae						
75	*Poecile hyrcanus* Zarudny&Loudon, 1905	Sd	–	–	0.70	5.60
76	*Periparus ater* Linnaeus, 1758	Sd	Sd	–	30.40	160.0
77	*Cyanistes caeruleus* Linnaeus, 1758	Sd	Sd	+	9.90	59.50
78	*Parus major* Linnaeus, 1758	Sd	Sd	5.70	37.0	18.60
Sittidae						
79	*Sitta europaea* Linnaeus, 1758	Sd	S	+	4.60	106.0
80	*Sitta tephronota* Sharpe, 1872	V	Sd	+	–	–

Continuation of the table 1
Продолжение таблицы 1

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
Certhiidae						
81	*Certhia familiaris* Linnaeus, 1758	Sd	–	–	+	+
Laniidae						
82	*Lanius minor* Gmelin, 1788	M	S	–	+	–
Oriolidae						
83	*Oriolus oriolus* Linnaeus, 1758	S	S	+	–	–
Corvidae						
84	*Garrulus glandarius* Linnaeus, 1758	Sd	V	–	3.40	3.70
85	*Pica pica* Linnaeus, 1758	W	Sd	6.20	2.10	+
86	*Corvus frugilegus* Linnaeus, 1758	V	V	–	+	–
87	*Corvus cornix* Linnaeus, 1758	W	Sd	0.60	0.90	–
88	*Corvus corax* Linnaeus, 1758	V	Sd	0.27	0.20	+
Sturnidae						
89	*Sturnus vulgaris* Linnaeus, 1758	S	S	6.40	23.80	–
Passeridae						
90	*Passer domesticus* Linnaeus, 1758	Sd	Sd	20.50	16.80	+
91	*Petronia petronia* Linnaeus, 1766	–	S	1.80	–	–
Fringillidae						
92	*Fringilla coelebs* Linnaeus, 1758	Sd	S	+	19.80	264.70
93	*Fringilla montifringilla* Linnaeus, 1758	M	M	–	+	–
94	*Serinus pusillus* Pallas, 1811	V	M	+	–	–
95	*Chloris chloris* Linnaeus, 1758	Sd	Sd	+	1.30	21.70
96	*Spinus spinus* Linnaeus, 1758	Sd	S	–	+	9.30
97	*Carduelis carduelis* Linnaeus, 1758	Sd	Sd	2.10	29.10	+

End of table 1
Окончание таблицы 1

№	Species	Status		Density of birds, individuals/km^2		
		Forests	High-mountain dry steppes and pastures	High-mountain pastures and semi-deserts, Zuvand region	Transition region of high-mountain pastures and degraded forest	Virgin subtropical forests, Hyrcan National Park
98	*Linaria cannabina* Linnaeus, 1758	Sd	S	15.30	+	+
99	*Carpodacus erythrinus* Pallas, 1770	S	S	+	–	–
100	*Pyrrhula pyrrhula* Linnaeus, 1758	W	V	–	0.70	1.90
101	*Coccothraustes coccothraustes* Linnaeus, 1758	Sd	Sd	+	1.30	41.80
Emberizidae						
102	*Emberiza calandra* Linnaeus, 1758	Sd	Sd	6.00	–	–
103	*Emberiza citrinella* Linnaeus, 1758	W	W	+	4.00	–
104	*Emberiza cia* Linnaeus, 1766	W	Sd	18.80	0.70	–

Note. Status of birds of Talysh: Sd – sedentary birds, S – summering birds, W – wintering birds, M – migratory birds, V – vagrant birds [by Agayeva, Mustafayev, 1974]; + – record of single individual or voice registration.

Примечание. Статус птиц Талыша: Sd – оседлые птицы, S – летующие птицы, W – зимующие птицы, M – перелетные птицы, V – залетные птицы [по: Agayeva, Mustafayev, 1974]; + – отмечена одна особь или голосовая регистрация.

The range boundaries of 86 species and subspecies of birds pass through territories of Talysh in Azerbaijan and the adjacent provinces of Iran, that is about 44 % of the entire bird fauna of the study area [Agayeva, 1980]. This may explain why many birds occur here singly, inconsistently, and in low numbers. In addition, since the last century, changes in the avifauna of Azerbaijan have been observed, associated with a large-scale transformation of natural landscapes [Mustafayev, 1985a].

In result of fieldwork, we recorded 77 bird species in the zone of the semi-deserts and high-mountain pastures (DSZ), 75 species in the ecotone-transitional zone (ETZ), and 48 species in the forest zone (FZ) (Tables 1–4). The registered bird communities are formed by species belonging to different faunal complexes: 39.5 % of species have a Palearctic range, 30 % of species have a European range, 13.5 % of species have a Mediterranean range, and the rest of the species have an Asian range. But the chorological composition of bird communities in different landscapes is specific. For example, birds with a Mediterranean range predominate in high-mountain landscapes, while species with a European range are common in the anthropogenic landscapes [Agayeva, 1980].

Bird density was calculated for 70 % of the species (Table 1–4). The ecological status of certain birds in the vertical belt of the Talysh Mountains is not always clear, and most likely now for some species it could have changed after the publication of the latest materials [Agayeva, Mustafayev, 1974; Agayeva, 1980] (Table 1). Nevertheless, our field observations confirm the known facts. In open pastures, where there are fewer natural nesting and hiding places and the abundance of food is seasonal, the most species were summering birds (57 % of all species we encountered),

and sedentary birds were only about 29 %. On the contrary, in the forest zone, sedentary species predominate (about 55 % of all species), and summering ones accounted for 28 %. It is precisely due to the large proportion of open-nesting and migratory birds that are found only in summer that it is possible to explain the greater species diversity of the birds in the high-mountain steppes and semi-deserts, compared to the forest area located down the slope.

A total of 31 non-passerine birds were recorded throughout the surveyed area, and only 17 species (54 %) occurred regularly and density was calculated for them (Table 1–4). Low diversity of large birds is associated with active transformation of the territory by humans. Active sheep breeding in the highlands and cattle breeding in the forest zone threaten survival of ground-nesting birds. Particularly vulnerable are birds of prey found in high-mountain areas. Only *Buteo buteo*, *Falco naumanni*, *Accipiter nisus* are common species due to their tolerance for human presence. For example, *F. naumanni* very often nests in urban areas under the roofs of various buildings [Sultanov et al., 2007].

In the DSZ, the highest density among non-passerines is typical for *Dendrocopos syriacus*, found locally in isolated areas of woody vegetation, concentrated mainly near settlements; *Alectoris chukar*, adhering to open rocks and most often found only in inaccessible areas; and *Upupa epops*, a common species, easily seen in a variety of pasture and semi-desert landscapes, but also more common in the vicinity of villages (Table 1, 2).

The chukar partridge (*Alectoris chukar*) was previously encountered quite often in the Talysh mountains and was considered a common species [Agaeva, 1980]. Now, its abundance is low and is maximum near the highest mountain areas: we recorded 87 % of the individuals at an altitude of more than 1900 m above sea level. These are areas of the mountains adjacent to the state border, where human activity is minimal (grazing is less intensive, the activity of dogs is low and there is no hunting factor). *A. chukar* was found by us mainly as few or solitary individuals, whereas earlier in the Caucasus their flocks of 20-30 individuals were not uncommon [Lyaister, Sosnin, 1942] and counted hundreds of these birds on the slopes of some mountains [Khanmamedov, 1960].

The dominant species among non-passerines in the ETZ are *Upupa epops* inhabiting settlements and pastures; *Phasianus colchicus*, which occurs mainly in dense and impassable thickets of shrubs located along watercourses, and *Columba livia* in large flocks dwelling in the settlements and on pastures (Table 1, 3).

Only woodpeckers (*Dendrocopos syriacus*, *D. minor* and *D. major*) among non-passerines are most abundant in the FZ. Wherein, *D. major* in the entire surveyed area is three times larger in number than all other woodpecker species.

The species composition and density of passerine birds differ significantly in different zones of mountains. *Oenanthe oenanthe*, *Linaria cannabina*, *Passer domesticus*, *Emberiza cia*, *Phoenicurus phoenicurus*, *Alauda arvensis* are common species in DSZ. The diversity of abundant species increases in ETZ and the dominant group includes, *Anthus* sp., *Turdus merula*, *Erithacus rubecula*, *Lullula arborea*, *Phylloscopus* sp., *Periparus ater*, *Parus major*, *Sturnus vulgaris*, *Fringilla coelebs*, *Carduelis carduelis*. The dominants of avian communities in FZ are many species: *Troglodytes troglodytes*, *Turdus merula*, *T. phylomelos*, *Erithacus rubecula*, *Phylloscopus* sp., *Ficedula semitorquata*, *F. parva*, *Sylvia atricapilla*, *Periparus ater*, *Cyanistes caeruleus*, *Parus major*, *Sitta europaea*, *Coccothraustes coccothraustes*, *Fringilla coelebs*. The latter species is a clear dominant in terms of density exceeding even small passerines. *Fringilla coelebs* is the most common species in the surveyed area covered with forest vegetation. The abundance of *F. coelebs* in the forests of the Caucasus was mentioned in the publications of the 19th century [Bogdanov, 1879].

The distribution of small-sized birds differs in certain biotopes within each surveyed zone. Four groups of biotopes were identified in the DSZ: high-mountain pastures, pasture-garden ecotones, semi-desert territories and small settlements (villages). The distribution of birds in these biotopes is extremely uneven (Table 2). About 50 % of passerine species are predominantly found in only one of these biotopes. And only two species (*Emeberiza cia*, *Phoenicurus phoenicurus*) are recorded in all biotopes with a 20–30-fold variation in abundance between them. *Eremophila alpestris*, *Oenanthe isabellina*, *Pica pica* were found in a small number in most ecosystems of this

zone. Ten species of birds were recorded mainly in settlements and irrigated orchards around them. These are *Columba livia*, *C. palumbus*, *Corvus cornix*, *Dendrocopos syriacus*, *Picus viridis*, *Emberiza calandra*, *Phylloscopos* sp., *Pica pica*, *Sturnus vulgaris* and *Passer domesticus*. The latter species reaches high local densities within villages and towns (Table 2). Species of the genus *Oenanthe* and *Emeberiza cia* can most often be found on pastures. But in semi-desert territories the diversity of birds is four times lower than on pastures. The obvious dominant is *Linaria cannabina*, and other species in semi-desert areas present with extremely low numbers (Table 2).

Table 2
Таблица 2

Density of small-size birds in high-mountain pastures and semi-deserts of Zuvand (Azerbaijan), individuals/km^2 (April 7–13, 2019)
Плотность населения мелкоразмерных видов птиц на высокогорных пастбищах и полупустынных территориях Зуванда (Азербайджан), особей/км^2 (7–13 апреля 2019 года)

Species	Ecosystems			
	High-mountain pasture	Pasture-garden ecotone	Semi-desert area	Villages and settlements
Alauda arvensis	12.6	–	–	–
Anthus pratensis	1.1	–	–	–
Anthus spinoletta	8.4	–	–	–
Carduelis carduelis	2.8	–	–	–
Circus cyaneus	0.1	–	–	–
Circus macrourus	0.1	–	–	–
Columba livia	–	–	–	2.2
Columba palumbus	0.4	21.0	–	–
Corvus corax	0.4	–	–	–
Corvus cornix	–	–	–	4.6
Dendrocopos syriacus	–	–	–	16.2
Emberiza cia	19.5	130.7	4.6	2.7
Emberiza calandra	2.8	–	–	29.1
Eremophila alpestris	5.9	–	1.8	6.5
Linaria cannabina	15.1	–	14.7	–
Lullula arborea	3.5	–	–	4.0
Monticola saxatilis	0.8	–	–	–
Oenanthe finschii	2.3	–	–	–
Oenanthe isabellina	6.5	–	1.5	2.7
Oenanthe oenanthe	30.0	–	–	5.4
Parus major	–	98.0	–	21.6
Passer domesticus	1.9	–	–	145.5
Petronia petronia	2.3	–	–	–
Phoenicurus phoenicurus	11.2	32.7	1.5	29.6
Phylloscopus sp.	2.8	–	–	16.2
Pica pica	1.4	–	1.8	34.0
Picus viridis	–	–	–	3.7
Prunella collaris	1.7	–	–	–
Saxicola maurus	1.7	29.4	–	–
Sitta tephronota	0.6	–	–	–
Sturnus vulgaris	–	122.6	–	26.3
Sylvia curruca	–	32.7	–	–
Troglodytes troglodytes	0.5	–	–	–
Turdus merula	0.6	–	–	–
Turdus torquatus	3.1	–	–	–
Upupa epops	–	–	1.8	3.2

Forest species of passerines begin to appear in the ETZ. This zone has a very mosaic territory and can be divided into four large biotopic clusters: forest patches, pastures, forest-pasture ecotones, and human settlements. *Fringilla coelebs*, *Periparus ater*, *Cyanistes caeruleus*, *Parus major*, *Pica pica*, *Troglodytes troglodytes*, *Turdus merula* are the most widespread species of this zone, which are found in all allocated biotopes. The greatest diversity of passerines was noted for pastures and ecotones along the edge of forest, that is due to the abundance of various dense shrubs. Here, the number of registered passerine species is two times higher than in the forest patches. However, the density of most birds in open pasture ecosystems is low (Table 3), and depends on the degree of overgrowth of shrubs. *Columba livia*, *Emberiza cia*, *Motacilla alba*, *Pica pica*, *Saxicola torquatus*, *Sturnus vulgaris* concentrate mainly only on those parts of pastures where shrub cover is less than 20 %. In contrast, *Parus ater*, *P. major*, *Prunella modularis*, *Troglodytes troglodytes*, *Carduelis carduelis* are often found in pasture areas where shrub cover exceeds 50 %. *Fringilla coelebs*, *Turdus merula* and *T. phylomelos* predominantly inhabit pastures with a highly mosaic distribution of shrubs, with an average coverage of 30–50 %. *Fringilla coelebs* prevails in the forest-pasture ecotone.

The highest density of birds was noted in forest patches. This is typical for *Parus ater*, *Erithacus rubeculla*, *Phylloscopus* sp., *Cyanistes caeruleus*, *Turdus merula*, etc. The dominants within settlements are *Columba livia*, *Passer domesticus*, *Sturnus vulgaris* and *Parus major*. The number of the latter species in the anthropogenic territory is even higher than in natural biotopes (Table 3).

The distribution of birds is more even in the FZ within Hyrcan NP. *Fringilla coelebs*, *Parus ater*, *Sitta europaea*, *Turdus merula*, *T. philomelos*, *Erithacus rubecula*, *Phylloscopus* sp. densely inhabit all forest communities. However, the diversity of recorded species is lower than in the DSZ (Table 4). In the structure of the forest cover of this zone, three plant formations are clearly distinguished: forests with a predominance of oak, forests without oak (*Fagus–Carpinus* forests), as well as gardens and shrub thickets in the vicinity of villages. Oaks, primarily *Quercus castaneifolia*, play a key role in maintaining the diversity of the avian community. Bird diversity in old-growth oak communities is twice higher than in other forest ecosystems. And first of all, these are tree-nesting birds such as *Dendrocopos*, *Ficedula*, *Parus*, *Phoenicurus*, *Sitta*. The endemic of the Talysh Mountains, *Poecile hyrcanus*, inhabits only mountain forests with oak. Previously, there was an indication that *P. hyrcanus* lived only in the vicinity of Lerik [Loskot, 1978, 2014; Ukolov et al., 2018]. This town has been an important point for ornithological surveys in this region since the beginning of the last century [Satunin, 1907]. We also confirmed the presence of *P. hyrcanus* in the forest patches located east of Lerik. However, this bird reaches its highest density on the territory of the Hyrcan NP in the area of Sym village. Forest territory of the Hyrcan NP is the key nesting place of this endemic tit.

In forest ecosystems without oak, the abundance of *Sitta europaea*, *Ficedula parva*, *Periparus ater*, *Parus major* and *Cyanistes caeruleus* significantly decreases, but the occurrence of *Troglodytes troglodytes* and *Erithacus rubecula* perceptibly increases (Table 4). A similar picture is observed in the flat broad-leaved forests of Eastern Europe, where a noticeably higher density of passerines, especially nesting species, was noted in oak stands compared to hornbeam forests [Vladyshevsky, 1975; Tilba, Kazakov, 1985].

Our materials about the dominance of certain birds in the landscapes of Talysh are similar to those described earlier [Agayeva, 1980]. In accordance with Ch. Agayeva [1980], *Fringilla coelebs*, *Parus major*, *Sitta europaea* dominated in oak forests in terms of abundance, and *F. coelebs* and *Turdus merula* dominated in terms of biomass. In our research, these species also form the prevailing group of avian community of oak forests together with different species of tits and leaf warblers.

Table 3
Таблица 3

Density of small-size birds in forest-pasture ecotone zone (Azerbaijan), individuals/km^2 (March 31 – April 6, 2019).
Плотность населения мелкоразмерных птиц в лесо-пастбищной экотонной зоне (Азербайджан), особей/км^2 (31 марта – 6 апреля 2019 года)

Species	Ecosystems			
	Forest patches	Pasture	Forest-pasture ecotone	Villages and settlements
Aegithalos caudatus	–	5.6	–	–
Alauda arvensis	1.6	4.0	–	–
Anthus sp.	–	3.4	10.0	–
Carduelis carduelis	–	38.2	–	36.1
Chloris chloris	–	2.2	–	–
Coccothraustes coc-cothraustes	–	1.1	–	4.0
Columba livia	–	34.8	–	96.2
Corvus corax	–	0.2	1.0	–
Corvus cornix	–	–	–	5.3
Cyanistes caeruleus	43.6	4.5	–	4.0
Dendrocopos syriacus	–	–	–	2.7
Emberiza cia	–	1.1	–	–
Emberiza citrinella	4.0	5.0	40.2	–
Erithacus rubecula	75.2	2.2	10.0	–
Fringilla coelebs	11.9	18.0	100.4	20.0
Garrulus glandarius	1.6	4.9	–	–
Lanius minor	–	0.7	–	–
Lullula arborea	–	4.5	–	–
Motacilla alba	–	3.4	–	4.0
Oenanthe oenanthe	–	–	–	4.0
Parus major	35.6	32.6	20.1	64.2
Passer domesticus	–	–	–	101.6
Periparus ater	130.6	11.2	50.2	8.0
Phoenicurus phoenicurus	–	2.2	–	24.1
Phylloscopus sp.	73.9	37.5	–	5.4
Pica pica	3.2	1.8	–	3.2
Picus viridis	–	0.8	6.7	–
Poecile hyrcanus	4.0	–	–	–
Prunella modularis	–	4.5	–	–
Pyrrhula pyrrhula	–	1.1	–	–
Saxicola maurus	–	0.4	–	–
Scolopax rusticola	–	1.1	–	–
Sitta europaea	23.8	–	10.0	–
Sturnus vulgaris	–	6.7	–	132.3
Sylvia atricapilla	–	3.4	–	–
Troglodytes troglodytes	11.9	5.6	10.0	8.0
Turdus merula	31.7	17.2	13.4	2.7
Turdus philomelos	–	3.8	6.7	–
Turdus viscivorus	3.2	–	12.1	–
Upupa epops	4.0	–	–	–

Table 4
Таблица 4

Density small-size birds in the forest zone of the Hyrcan National Park (Azerbaijan), individuals/km^2 (April 14–18, 2019)
Плотность населения мелкоразмерных птиц в лесной зоне Гирканского национального парка (Азербайджан), особей/км^2 (14–18 апреля 2019) года

Species	Ecosystems		
	Oak forest	Forest without oak	Gardens in rural territory
Aegithalos caudatus	8.7	–	–
Chloris chloris	21.7	–	39.2
Coccothraustes coccothraustes	48.7	–	–
Cuculus canorus	6.5	–	–
Cyanistes caeruleus	62.8	–	70.6
Dendrocopos syriacus	4.3	–	–
Dendrocopos major	24.9	–	29.9
Dendrocopos minor	4.3	–	–
Erithacus rubecula	46.9	74.6	19.6
Ficedula parva	95.2	30.0	–
Ficedula semitorquata	17.3	–	–
Fringilla coelebs	276.0	199.0	196.1
Garrulus glandarius	4.3	–	–
Parus major	17.3	–	47.1
Periparus ater	168.6	93.8	117.7
Phoenicurus phoenicurus	8.7	–	23.5
Phylloscopus sp.	116.9	119.4	23.5
Poecile hyrcanus	6.5	–	–
Pyrrhula pyrrhula	2.2	–	–
Sitta europaea	117.0	30.0	47.1
Spinus spinus	10.8	–	–
Sylvia atricapilla	56.3	–	–
Sylvia curruca	2.2	–	–
Troglodytes troglodytes	75.8	268.7	–
Turdus merula	19.5	14.9	23.5
Turdus philomelos	15.2	29.9	11.8
Turdus viscivorus	3.3	–	–

The total average density of birds in the DSZ is 172 individuals/km^2 (ind./km^2). In the semi-desert area, the density was minimal, 28 ind./ km^2, and the maximum density was in the territory of settlements, 354 ind./km^2 and in the pastures-garden ecotone, 467 ind./ km^2. The high occurrence of birds in the villages is associated with the fact that most birds winter there. Our results represent lower rates than it was previously shown for the Talysh steppe pastures – 830 ind./km^2 [Agayeva, 1987]. But close to summer data indicated for Zuvand by by N. Drozdov [1965] – 455 ind./km^2. *Passer domesticus* dominates in the villages of Zuvand with a density of up to 533 ind./km^2 [Drozdov, 1965]. In our materials, the house sparrow also dominates there, but with a density of 145 ind./km^2. According to our accounts, in Zuvand, the density of *Linaria cannabina*, *Millaria calandra* is 10–20 times less, *Carduelis carduelis* is 5 times less compared to the data of N. Drozdov [1965]. This can be attributed to the fact that birds have not yet started nesting in the surveyed territory. We can also note that, in contrast to the records in the 1960s, agricultural pro-

duction, in the form of cereals, has decreased here, as the region has become drier due to the lack of snow and reduced rainfall. The absence of cereals affected the decrease in abundance of small granivorous birds. But the number of *Emberiza cia*, using the forage base of wild plants, decreased noticeably less. The density of this species in pasture-orchard ecotone ecosystems is similar to the data obtained by Drozdov [1965].

According to our data, the averaged density of birds in the ETZ zone is 373 ind./km^2. The density of birds was minimal on pastures (264 ind./km^2), and maximum in forest patches (460 ind./km^2) and in settlements (546 ind./km^2). In previous studies, the summer density of birds in rural areas with orchards reached 1269 ind./km^2 [Agayeva, 1987], that is twice as much as our data.

The old-growth forests in Hyrcan NP has the highest bird density (1180 ind./km^2), of which one fifth is accounted for by one species – *Fringilla coelebs*. The total average density of birds in the FZ varied from 650 ind./km^2 in gardens to 1242 ind./km^2 in forest communities with oak. These indicators are close to the data noted by Ch. Agayeva [1980] for the lower forest belt of the mountains.

According to Drozdov [1965], *Periparus ater* predominates in the canopy in the upper forest belt, while *Fringilla coelebs* is prevalent in lowland forests. This is also confirmed by us (see Tables 3, 4). These two passerine species were also the most widespread according to the data of Heiss [2012]. *Fringilla coelebs* is a species that prefers to dwell in insular forest communities and visit for foraging the territories at a considerable distance from forest edges [Vladyshevsky, 1975; Kurlavichius, 1986]. These adaptive ecological features give *F. coelebs* an undeniable advantage over other small birds, that ultimately determines its high density in many fragmented forests of Talysh. *F. coelebs* is a unique species with a pronounced tendency to expand its range and a high and slightly fluctuating abundance, that allows it to act as the dominant passerine in all forest ecosystems in different natural zones [Payevsky, 2020].

The general trend of zonal changes in the bird density is a decrease in total summer density with increasing altitude, that is, from forests to high-mountain pastures. The same trend is observed in the natural ecosystems of the Western Caucasus [Tilba, Kazakov, 1985; Perevozov, 2008, 2009]. However, this trend may be broken in other seasons. In winter, the bird concentration with very high densities is observed in the vicinity of highland villages of the Talysh [Agayeva, 1980; Mustafayev, 1985a].

The lowest density of birds was noted by us in the semi-desert landscapes of Zuvand. A similar situation (extremely low density of birds) is observed in high-mountain and semi-desert landscapes adjacent to degraded forests of the Hyrcanian type on the eastern side of the Caspian Sea – on the Kopet-Dagh [Mishchenko, 1984].

A large number of fragmented forest plots formed from the once vast Hyrcanian forests were noted in the last century due to the expansion of deforestation, plantations, and pastures [Drozdov, 1965]. The bird density in natural forests with undergrowth reached 1643 ind./km^2, and in forest areas with grazing – 748 ind./km^2 in early summer [Drozdov, 1965] and these rates of densities are close to our materials. A similar density level for the same bird species was also noted in the broad-leaved forests of the North Caucasus [Perevozov, 2008, 2009]. On the contrary, according to Heiss [2010], the density of many birds is several times lower, that may be due to extrapolation of his data on the avian density in biotopes along all routes, including large areas inhabited by humans, and also probably due to the underestimation of birds due to dense vegetation. The densities calculated by him for easily visible species such as *Pica pica* and *Upupa epops* were similar to our data.

The relatively high density of some species in our survey is possibly associated with the migratory movements of birds in the spring. The Talysh is located near the western coast of the Caspian Sea, where intensive migration routes of many bird species pass through [Mikheev, 1997; Heiss, Gauger, 2011]. It is known that in the highest mountains a significant proportion of individuals are migrants [Vilkov 2008], so the counts during the migration period may show a higher density of birds.

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Conclusion

The spatial distribution and allocation of birds in the biotopes of the Caucasus and Transcaucasia has been described since the 19th century [Bogdanov, 1879; Radde, 1884; Satunin, 1907], and even then the strong influence of human activity on the abundance of birds, in particular, raptors was noted [Bogdanov, 1879]. Now, the impact of the anthropogenic factor is only accelerating, that was demonstrated by many field ornithologists [Drozdov, 1965; Agayeva, 1980; Mustafayev, Sadigova, 2005, 2007; Heiss, 2010, 2012]. The Talysh mountains are no exception. In the first half of the 20th century, Alexander Grossheim compared the Hyrcanian forest to the jungle, where solid oak forests were combined with insignificant clearings, which were overgrown with such impenetrable shrubs and undergrowth that it was easy to get lost in them [Grossheim, 1960]. However, high-mountain ecosystems (1500–2000 m a.s.l.) were most strongly affected in Talysh, that led to the loss of a significant forest area, increased erosion intensity, reduced water runoff, and increased periods of drought [Safarov, 1982]. Further fragmentation and loss of forests is a significant environmental risk factor for local avifauna, as most of the endemic geographic races of birds are associated with woody vegetation. In particular, the nesting of *Poecile hyrcanus* is in the dry trunks of broad-leaved trees, which are extremely rare in the anthropogenic territories. Therefore, this species is preserved mainly within the Hyrcan NP. *Jynx torquilla*, *Ficedula semitorquata*, *Pyrrhula pyrrhula* predominantly inhabit only this park. In the DSZ, the highest bird densities are also created by woody vegetation in human settlements, irrigated agricultural landscapes and orchards. These tree oases among the semi-desert and steppe territories are important key ornithological places - centers of avifauna diversity. This is especially noticeable in the distribution and high abundance of birds associated with trees (*Dendrocopos syriacus*, *Picus viridis*, *Columba palumbus*, *Pica pica*).

The low number or absence of large birds (birds of prey and hunting species) especially catches the eye in the open landscapes. Here the anthropogenic impact on the avifauna is of a chronic nature, when many species of birds are encountered episodically or are localized in microrefugia (clefts, fissures, etc.) of the mountainous terrain. Therefore, the high heterogeneity of the mountain territory increases the success of the survival of birds nesting in rock crevices. Species of the genus *Oenanthe* are most common in open pastures, as they nest in burrows or in heaps of stones, and are less affected by grazing.

The total density of small-sized birds (mainly passerines) according to our records is close to the data obtained in the second half of the last century [Drozdov, 1965; Agayeva, 1980]. Over the long period of impact on the natural landscapes of Talysh, many bird species have adapted and even increased their numbers in the rural areas. Increased heterogeneity of agricultural landscapes may favorably affect the reproduction of some bird species, which leads to a significant increase in their abundance in these mosaic habitats [Vickery, Arlettaz, 2012]. Although it is indisputable that the decrease in the number of some conservative species, while maintaining the species richness of the avifauna, is noticeable for forest and steppe birds that are sensitive to deforestation and agriculture. To assess the trends in the population dynamics of certain birds, it is necessary to create special programs for monitoring the avifauna of this region. In order to preserve the populations of native bird communities, it is required to increase the area of protected areas, carry out afforestation and limit livestock grazing in forests and within key bird nesting areas on high mountain pastures.

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