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The Ornithofauna Of Yörükkırka Lake (Eskişehir)

İnan Tolga ÇELİK Elif YAMAÇ*
Anadolu University, Science Faculty, Biology Department, Eskişehir, TURKEY

***Corresponding Author**
e-mail: eerdogdu@anadolu.edu.tr

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Abstract

The aim of this study is to provide information on the species list and seasonal diversity of ornithofauna in Yörükkırka Lake, Eskişehir. As observation methods, point count and line transect were used. In the study area 96 bird species of which 49 are resident (R), 39 are summer migrant (S), 4 are winter visitor (WV), 4 are passage migrant (PM) were recorded. The results showed that there is a significant difference between the diversity indices of the spring and winter seasons (p=0.005). The most abundant bird species was *Fulica atra* (Eurasian coot) (81-100%). Overhunting and use of chemicals are the threatening factors on the bird populations in Yörükkırka Lake.

Key Words: Ornithofauna, diversity, Yörükkırka, Eskişehir

INTRODUCTION

Turkey includes a lot of different natural habitats, ranging from forest to arid land, beaches to interior mountains, deeply incised valleys to expansive steppes [1]. Due to its location and diversity of its geographic features and climate conditions, Turkey hosts a rich biodiversity many of which are endemic [2].

In addition to Turkey's habitat diversity, migration routes in turn predict a wide diversity of birdlife. A total of 453 bird species are found in Turkey [3; 4]. But those numbers do not guarantee continued existence. Not only in Turkey but also in the entire world, human population is a big threat for bird species. The threats range from direct exploitation by hunting, to habitat loss or degradation, to poisoning of food supplies with pesticides and other chemical contaminants [5]. In order to conserve Turkey's bird biodiversity, it is very important to gain information about the bird groups, distribution, habitats, etc.

When compared with other groups, ornithofauna of Turkey is relatively well known [6]. First bird checklist was published by Ergene in 1945 [7]. Since 1945, a lot of papers have been published on Turkey's bird species [8; 9; 10; 11; 12; 13; 14]. However, there are limited studies about the birds of Eskişehir [3, 15; 16].

The principal objectives of the present study were to gather information concerning the avifauna and the negative effects of human population on bird species of Eskişehir, Yörükkırka Lake. It was thought that this information provides a sustainable income for the conservation management in coming years.

MATERIAL AND METHOD

Study Area

The study was conducted in Yörükkırka Lake situated 29 km. southwest of Eskişehir (39º 35 N 30º 25 E). The survey was carried out in a 9 km^2 area (Figure 1). The highest point in the study site is 876 m above mean sea level (asl), the mean monthly temperatures range from 21.6°C in July to –1.1°C in December, and the mean annual precipitation is 373.8 mm. Lake has an area of 2 km^2, small freshwater marshes occupy around it and only one small stream flows all year.

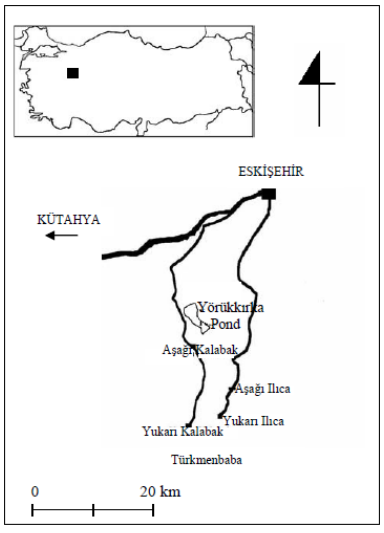

Figure 1. Map of the study area

Steppe and forest are the two main habitat types of the study area. Vegetation includes *Thymus* sp., *Astragalus* sp., *Verbascum stachydifolium*, *Lathyrus laxiflorus*, *Adonis aestivalis subsp*. *aestivalis*, *Acanthus hirsutus*, *Teucrium polium*, *Salvia* sp. *Allium* sp., *Convolvulus* sp., *Stipa* sp., *Pinus nigra subsp. pallasiana*, *Salix alba*, *Populus alba* [17]. The study area includes a rich diversity of wildlife, such as Lepus capensis, Sciurus anomalus, Canis lupus, Canis aureus, Vulpes vulpes and Sus scrofa (observation by researchers and public information). The area's main economic activities are agriculture and grazing.

Method

Observations were made from June 2005 to May 2006. A total of 16 ornithological observations were conducted along with survey visits distributed to include all four seasons. Each visit consisted of one or two observers. Observations were performed from 30 min after sunrise to 1 h before sunset. Birds were surveyed visually (8,5x42 binocular and Nikon Fieldscope 82mm ED Spotting Scope) and by voice and identified using ornithological books [18, 19].

The study area included 4 different bird habitats as follows: lake and temporary wetlands around the lake, agricultural area, steppe and forest. Point count method was used in the forest and line transect in the other three areas [20, 21, 22, 23, 24].

Red list of global threatened species and national threatened species categories are those of "The World Conservation Union (IUCN)" [25] and "Turkey's Important Natural Area" [26], respectively. Kasparek & Bilgin's terminology (1996) was followed for taxonomy, nomenclature and status of birds [13].

Data analysis

The number of visits a particular species is detected was divided by the total number of visits and multiplied by 100 to obtain an index of the frequency of the species. Frequency analysis (F%) was carried out according to Kocataş (1997) [27]. All of the species F% categories were ranked as follows: 1-20%: rare, 21-40%: seldom, 41-60% usual, 61-80%: frequent and 81-100%: common.

Simpson's Diversity Index was used to determine bird species diversity. The differences in species diversity according to seasons were evaluated using analysis of variance (One way ANOVA). [28]

The correlation between months - the number of species and months - the number of all birds were evaluated.

Also, the most two dominant species were noted in each visit.

RESULTS

96 bird species were recorded of which 49 are resident (R), 39 are summer migrant (S), 4 are winter visitor (WV), 4 are passage migrant (PM) [13]. Table 1 provides scientific names, the status, red list categories and F% of these birds.

Aythya nyroca (Ferruginous Duck), *Circus macrourus* (Pallid Harrier), *Buteo rufinus* (Long Legged Buzzard), *Neophron percnopterus* (Egyptian Vulture), *Aegypius monachus* (Cinereous Vulture), *Aquila clanga* (Spotted Eagle), *Charadrius leschenaultii* (Greater Sandplover) and *Coracias garrulus* (Roller) are threatened species which were observed in the study area [25, 26].

Correlation between F% and the number of the species is given in Table 2.

Table 2. Number of species according to observation frequency

F categories (%)	Number of species
1-20	60
21-40	23
41-60	10
61-80	2
81-100	1

Result of Simpson's diversity index is shown in Table 3.

Table 3. Diversity by season in Yörükkırka Lake.

Season	Spring	Summer	Autumn	Winter
Simpson's index	0.2733 a	0.3050 a	0.5175 ab	0.8167 b

One way ANOVA. values in each column followed by the same letter do not differ significantly at $p>0.05$.

While analyzing the bird species determined according to the data of survey method in study area, it became evident that the number of species was highest in the spring and the total number of all birds was highest during winter (Figure 2, 3).

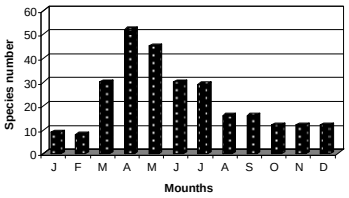

Figure 2. Number of species according to months

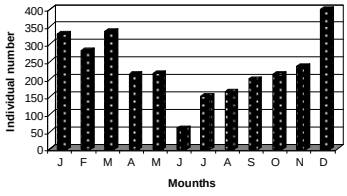

Figure 3. Number of all birds according to months

Table 1. Bird Species Lists of Yörükkırka Lake

Order	Family	Species	Status	DD	IUCN	F%
Podicipediformes	Podicipedidae	*Tachybaptus ruficollis*	R	-	LC	62
Pelecaniformes	Phalacrocoracidae	*Phalacrocorax carbo*	R	LC	LC	12
Ciconiiformes	Ardeidae	*Botaurus stellaris*	R	LC	LC	6
		Ixobrychus minutus	SM	LC	LC	25
		Nycticorax nycticorax	SM	LC	LC	6
		Ardeola ralloides	SM	LC	LC	6
		Egretta garzetta	SM	LC	LC	6
		Egretta alba	R	LC	LC	6
		Ardea cinerea	R	-	LC	37
		Ardea purpurea	SM	LC	LC	25
	Ciconiidae	*Ciconia ciconia*	SM	LC	LC	25
		Ciconia nigra	SM	LC	LC	31
	Thereskiornithidae	*Platalea leucorodia*	SM	LC	LC	6
Anseriformes	Anatidae	*Tadorna ferruginea*	R	LC	LC	69
		Anas strepera	R	LC	LC	25
		Anas platyrhynchos	R	-	LC	50
		Anas penelope	WM	LC	LC	6
		Anas querquedula	SM	-	LC	19
		Anas clypeata	R	-	LC	12
		Aythya ferina	R	LC	LC	44
		Aythya nyroca	R	VU	NT	6
Falconiformes	Accipitridae	*Circaetus gallicus*	SM	LC	LC	19
		Accipiter nisus	R	-	LC	12
		Circus aeruginosus	R	LC	LC	37
		Circus cyaneus	WM	-	LC	25
		Circus macrourus	T	CR	NT	6
		Buteo rufinus	R	NT	LC	44
		Buteo buteo	R	-	LC	44
		Neophron percnopterus	SM	EN	LC	6
		Aegypius monachus	R	LC	NT	25
		Aquila clanga	T	EN	VU	6
		Aquila pomarina	SM	LC	LC	6
	Falconidae	*Falco tinnunculus*	R	-	LC	6
		Falco subbuteo	SM	-	LC	6
Gruiformes	Rallidae	*Gallinula chloropus*	R	-	LC	37
		Fulica atra	R	LC	LC	100
Charadriiformes	Recurvirostridae	*Himantopus himantopus*	SM	LC	LC	6
	Charadriidae	*Charadrius dubius*	SM	-	LC	6
		Charadrius leschenaultii	SM	EN	LC	6
	Scolopacidae	*Calidris ferruginea*	T	-	LC	6
		Tringa totanus	R	-	LC	12
		Tringa ochropus	T	-	LC	6
		Actitis hypoleucos	SM	-	LC	6
	Sternidae	*Chlidonias leucopterus*	SM	-	LC	6
Columbiformes	Columbidae	*Columba livia*	R	-	LC	19

Table 1. Bird Species Lists of Yörükkırka Lake (Continued)

		Streptopelia decaocta	R	-	LC	12
		Streptopelia turtur	SM	-	LC	12
Cuculiformes	Cuculidae	*Cuculus canorus*	SM	-	LC	12

Order	Family	Species	Status	DD	IUCN	F%
Apodiformes	Apodidaae	*Apus apus*	SM	-	LC	19
Coraciiformes	Alcedinidae	*Alcedo atthis*	SM	LC	LC	12
	Meropidae	*Merops apiaster*	SM	-	LC	6
	Coraciidae	*Coracias garrulus*	SM	VU	NT	6
	Upupidae	*Upupa epops*	SM	-	LC	12
Passeriformes	Alaudidae	*Galerida cristata*	R	-	LC	37
		Lullula arborea	R	LC	LC	6
	Hirundinidae	*Hirundo rustica*	SM	-	LC	31
		Riparia riparia	SM	-	LC	12
		Delichon urbica	SM	-	LC	19
	Motacillidae	*Motacilla flava*	SM	-	LC	19
		Motacilla alba	R	-	LC	44
	Turdidae	*Erithacus rubecula*	R	-	LC	6
		Saxicola torquata	R	-	LC	12
		Oenanthe oenanthe	SM	-	LC	25
		Oenanthe isabellina	SM	-	LC	25
		Turdus philomelos	WM	-	LC	6
		Turdus torquatus	SM	-	LC	6
		Turdus merula	R	-	LC	31
		Turdus viscivorus	R	-	LC	6
	Sylvidae	*Acrocephalus scirpaceus*	SM	-	LC	25
		Acrocephalus arundinaceus	SM	-	LC	6
		Phylloscopus collybita	SM	-	LC	19
	Muscicapidae	*Ficedula parva*	SM	-	LC	19
	Paridae	*Parus ater*	R	-	LC	12
		Parus caeruleus	R	-	LC	44
		Parus major	R	-	LC	38
		Parus lugubris	R	-	LC	12
	Remizidae	*Remiz pendulinus*	R	-	LC	6
	Laniidae	*Lanius colluria*	SM	-	LC	6
	Corvidae	*Garrulus glandarius*	R	LC	LC	19
		Pica pica	R	-	LC	32
		Corvus monedula	R	-	LC	19
		Corvus frugilegus	R	-	LC	6
		Corvus corone cornix	R	-	LC	50
		Corvus corax	R	-	LC	12
	Sturnidae	*Sturnus vulgaris*	R	-	LC	32
	Passeridae	*Passer domesticus*	R	-	LC	12
		Passer montanus	R	-	LC	6
		Passer hispaniolensis	SM	-	LC	25
	Fringillidae	*Fringilla coelebs*	R	-	LC	56
		Fringilla montifringilla	WM	-	LC	6

Table 1. Bird Species Lists of Yörükkırka Lake (Continued)

		Carduelis chloris	R	-	LC	25
		Carduelis carduelis	R	-	LC	56
		Carduelis cannabina	R	-	LC	31
		Coccothraustes coccothraustes	R	-	LC	6
	Emberizidae	*Emberiza melanocephala*	SM	-	LC	25
		Emberiza calandra	R	-	LC	56

Abbreviations in Table 1: DD: national threatened species categories, IUCN: The World Conservation Union, %F: observation frequency %, R: resident, SM: summer migrant, WM: winter migrant, T: transit, LC: least concern, NT: near threatened, VU: vulnerable, EN: endangered, CR: critically endangered, -: data deficient.

The most abundant bird species was Fulica atra (Eurasian coot) in Yörükkırka Lake (Tablo 4.

Tablo 4. The most abundant bird species according to visit

Visit number	The most abundant species	Individual number	The second most abundant species	Individual number
1	*Fulica atra*	30	*Anas platyrhynchos*	9
2	*Fulica atra*	5	*Gallinula chloropus*	2
3	*Fulica atra*	84	*Anas platyrhynchos*	10
4	*Fulica atra*	108	*Ixobrycus minutus*	17
5	*Fulica atra*	196	*Corvus corone cornix*	9
6	*Fulica atra*	182	*Himantopus himantopus*	12
7	*Fulica atra*	220	*Aythya ferina*	6
8	*Fulica atra*	365	*Turdus merula*	8
9	*Fulica atra*	103	*Phalacrocorax carbo*	12
10	*Ciconia ciconia*	165	*Fulica atra*	102
11	*Fulica atra*	83	*Hirundo rustica*	16
12	*Fulica atra*	56	*Delichon urbica*	12
13	*Hirundo rustica*	50	*Fulica atra*	42
14	*Fulica atra*	46	*Hirundo rustica*	28
15	*Fulica atra*	300	*Turdus philomelos*	10
16	*Fulica atra*	250	*Tadorna ferruginea*	10

DISCUSSION

As a result of habitat diversity and migration routes of birds, Anatolia has been used by different bird species for breeding, wintering and migratory relocation. The result agrees with vast number of migrant species frequently seen in Anatolia in fall and spring time.

96 bird species were recorded in the study area. Residents constituted 50% of the avifauna and the others were migrant and transit. It was detected that more bird species were recorded during spring season than the other seasons. This result is indicative of the occurrence of migration during the spring season. According to Simpson's Index, 1 is a maximum value in a monoculture and becomes smaller as the community becomes more diverse. Therefore, the diversity indices of the spring time are indicative of high diversity of bird species and there is a significant difference between the diversity indices of the spring and winter seasons ($p=0.005$). The number of all birds was higher during winter. It is clear that study area provides food, resting and breeding ground for the migrants and residents.

According to F% value, rare category included 60 bird species. Frequent and common categories were 2 and

1, respectively (Table 2). Common species was *Fulica atra* (81-100%). The second frequently observed species were *Tadorna ferruginea* (Ruddy Shelduck) and *Tachybaptus ruficollis* (Little Grebe) (61-80%) (Table 1, 2).

The results indicate that the most abundant bird species recorded in the study area was *Fulica atra* and the largest population was observed in winter season. Eurasian Coot is one of the most abundant species (20.000-40.000 pairs) in Turkey [29]. Although the species is resident, it is known that, populations in northern and eastern Europe move south in winter from the North Sea south to the Middle East, as well as in parts of North Africa [30]. This information is in accordance with the findings of the study.

Aythya nyroca, *Circus macrourus*, *Buteo rufinus*, *Neophron percnopterus*, *Aegypius monachus*, *Aquila clanga*, *Charadrius leschenaultii* and *Coracias garrulus* which are threatened species were detected in study area [25, 26]. *Neophron percnopterus* bred in a 5 km south westerly direction away from Yörükkırka Lake. Furthermore, there is *Aegypius monachus*'s breeding site in Turkmenbaba Mountain in a 9 km. south direction away from Yörukkırka Lake. The study area is used by these species for feeding.

Many of the bird species are in decline, suffering the effects of habitat loss, toxic chemicals, excessive human predation, competition for food supplies, and many other threats. Illegal hunting has a negative effect on bird species in Yörükkırka Lake. It was stated by local people that not only waterfowl but also raptor species is hunted in the study area.

It is known that, certain chemicals such as fungicides, herbicides and insecticides that have been released into the environment have the potential to disrupt the bird populations [5]. Use of a large number of chemical is detected in agricultural area near Yörukkırka Lake. Bearing in mind that these chemicals could be harmful to bird populations in the area, further research is needed to reach the most valuable data.

Although, Yörükkırka has relatively restricted amounts of habitats, study site provides suitable feeding and resting ground for migrant, resident and wintering bird species. In this reason, overhunting and use of chemicals should be controlled in study site.

In this study, data on species composition and seasonal diversity of bird species in Yörükkırka Lake have been provided. Based on the results obtained, further research will be useful in order to conservation of the bird species from threatening factors. Furthermore, the results are considered to provide baseline data for bird studies in future.

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