

# The Ornithofauna of Lake Karakuyu (Afyonkarahisar, Turkey)

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**Abstract:** This study was carried out to determine the ornithofauna of Lake Karakuyu, which is located in the Inner-West Toros surroundings of the Lakes Region and in Dinar district of Afyonkarahisar province.

The study area is an artificial lake and it has Wildlife Protection Area status. During the study period from August 2004 to July 2005, a total of 74 bird species belonging to 31 families were observed in the area. The status of these species is as follows: 24 residents, 7 winter migrants, 22 summer migrants, and 21 transit migrants.

To show the national and international importance of Lake Karakuyu, the numbers of threatened bird species are compared with the Red Data Book of Turkey (total 38 threatened species: A.1.2 = 1, A.2 = 9, A.3 = 15, A.4 = 1) and the International Nature Conservation Union (IUCN) categories (none of the species is endangered).

According to the statistical data, among the other lakes in the Lakes Region, Lake Karakuyu and Lake Kovada were the most similar with regard to bird species.

**Key Words:** The Lakes Region, birds, ornithofauna, Lake Karakuyu

## Karakuyu Gölü'nün Ornitofaunası (Afyonkarahisar-Türkiye)

**Özet:** Bu çalışmada, İç Batı Toros Kuşığı Göller Bölgesinde, Afyonkarahisar ili Dinar ilçesi sınırları içerisinde bulunan Karakuyu Gölü ve çevresindeki kuş faunası araştırılmıştır. Çalışma sahası olan göl, Yaban Hayatı Koruma Sahası statüsünde olan yapay bir göldür. Ağustos 2004-Temmuz 2005 tarihleri arasında gerçekleştirilen arazi çalışmaları sonucunda, alanda 31 familya'ya ait 74 kuş türü tespit edilmiştir. Çalışma alanında saptanmış olan kuş türlerinden 24'ü yerli, 7'si kış ziyaretçisi, 22'si yaz ziyaretçisi ve 21'i transit olarak geçen türlerdir.

Karakuyu Gölü'nün kuşlar açısından ulusal ve uluslararası önemine bakmak için buradaki türlerin tehlike dereceleri Türkiye Kırmızı Kitap Kategorileri - RDB (A.1.2 = 1 tür, A.2 = 9 tür, A.3 = 15 tür, A.4 = 13 tür) ile Uluslararası Doğa Koruma Birliği kategorileri - IUCN (türlerden hiçbiri uluslar arası ölçekte tehlike altında değildir) karşılaştırılarak verilmiştir.

Göl, barındırdığı kuş türleri açısından Göller bölgesinin diğer gölleri ile karşılaştırıldığında en fazla Kovada en az Burdur Gölü ile benzer olduğu görülmüştür.

**Anahtar Sözcükler:** Göller Bölgesi, Kuşlar, Ornitofauna, Karakuyu Gölü

## Introduction

Turkey, lying on major migration paths in the Palearctic region, has both floristic and faunistic richness. The most important reason for those riches is thought to be the abundance of wetlands (Kızıroğlu, 1989).

The Lakes Region has a great importance in terms of breeding, protection, and feeding for birds because it has many wetlands and freshwater ecosystems of different sizes and with different biological features. These wetlands are a meeting place on the migratory route for

bird species migrating in spring and autumn (Bilgin and Akçakaya, 1987; Kirwan et al., 1998). Because it is a small area, some bird species such as Mallards (*Anas platyrhynchos*) and Cots (*Fulica atra*) use the lake as a wintering area.

This study was carried out to determine the bird species at Lake Karakuyu and to lay the groundwork for later research in the region as well as to indicate the importance of artificial wetlands in terms of food and shelter for birds.

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## Study Area

Lake Karakuyu is located in Dinar district of Afyonkarahisar province. It is an artificial wetland originally constructed for irrigation by the State Waterworks (DSI). The research area is at lat 38°15' N, long 39° 22' E. It is surrounded by Burdur Basin to the south, Uluborlu Plain to the east, and Large Menderes Basin to the west.

The lake area is 1220 ha and the altitude is 950 m. Its maximum depth is 3.5 m. The lake, tectonic in origin, is fed by Kocapınar surface sources and underground water.

The region has a climate between the arid-cold central Anatolian and the mild Mediterranean climates. The area has various plant species depending on climatic factors and the rich soil structure.

The lake has reeds (*Typha* spp., *Phragmites australis*, and *Schoenoplectus* spp.) and water lilies (*Nymphaea alba*) (Türkiye Çevre Vakfı, 1993). In the research area, 46 plant and 2 fish (*Esox lucius* L. and *Cyprinus carpio* L.) species were found (Diler, 1995; Seçmen and Leblebici, 1997).

## Method

The survey was conducted from August 2004 to July 2005. Four observation stations were selected and counts were performed twice a month between 6 AM and 6 PM at these stations. Binoculars and a telescope were used for observations. Bruun and Singer (1978), Kiziroğlu (1989), Del Hoyo et al. (1992), Cerny (1993), Schneck (1999), Harrison and Greensmith (2000), Campbell (1999), Heinzel et al. (1995), and Cramp et al. (1980) were used for identification. Kocataş (1997) was used for statistical analysis.

### Similarity Analysis

$Q = 2c / a + b$  ( $Q$  = Sorensen similarity index;  $c$  = the number of bird species in both lakes;  $a$  = the number of species in only the first lake;  $b$  = the number of species in only the second lake) (Kocataş, 1997).

### Diversity Index

$D = S - 1 / \log_e N$ ;  $D$  = Diversity Index,  $S$  = the number in total species,  $N$  = the number of total individuals (Kocataş, 1997).

Observation at the lake was carried out only once. Specifications of various types of birds' nests were studied from a boat. Adults carrying nest materials, eggs, chicks, and nests were the criteria for the determination of reproduction. Courtship behaviors of adult birds were also recorded separately. Nesting activities were observed without disturbing the birds.

Observation stations, representative of the different habitats in the study area, reflected all the properties of the lake (Figure 1).

Station 1 was located to the north of the lake. Karakuyu village extends into this region of the lake. Station 2 was located to the northwest of the lake. There are fields and mountainous areas at the shore of this station. This station was suitable for the breeding and feeding of birds. There was a vast flat area with a rich soil structure at this station. At station 3, located to the southwest of the lake, there were many fruit gardens, fields, and marshes. Stations 2 and 3, which were far from settlements and human influence, were suitable for bird populations. Station 4 was situated to the southeast of the lake. The Afyonkarahisar-Isparta railway passes through this station. In addition, there was a restaurant where trout were raised. At this station dabbling ducks were observed in groups.

## Results

In this study, 74 bird species belonging to 13 orders and 31 families were recorded at Lake Karakuyu and its near surroundings. Their residence status is as follows: 24 residents, 7 winter migrants, 22 summer migrants, and 21 transit migrants. Thirty-seven bird species are passerines, while 37 are nonpasserines (Table 1).

As a result of this study, 38 species are threatened with 1 species (the kingfisher, *Alcedo atthis*) being placed in the categories A.1.2 according to the Red Data Book (Kiziroğlu, 1989). According to the IUCN (2004), none of these species is endangered.

The periods of observation for the species were within a period of 1 year. The complete survey data are presented in Figure 2.

Figure 2 shows that the study area has a rich bird fauna, especially during the spring migration period. In winter periods, the lake froze partly. It was determined that water level fluctuates with regard to discharge by the

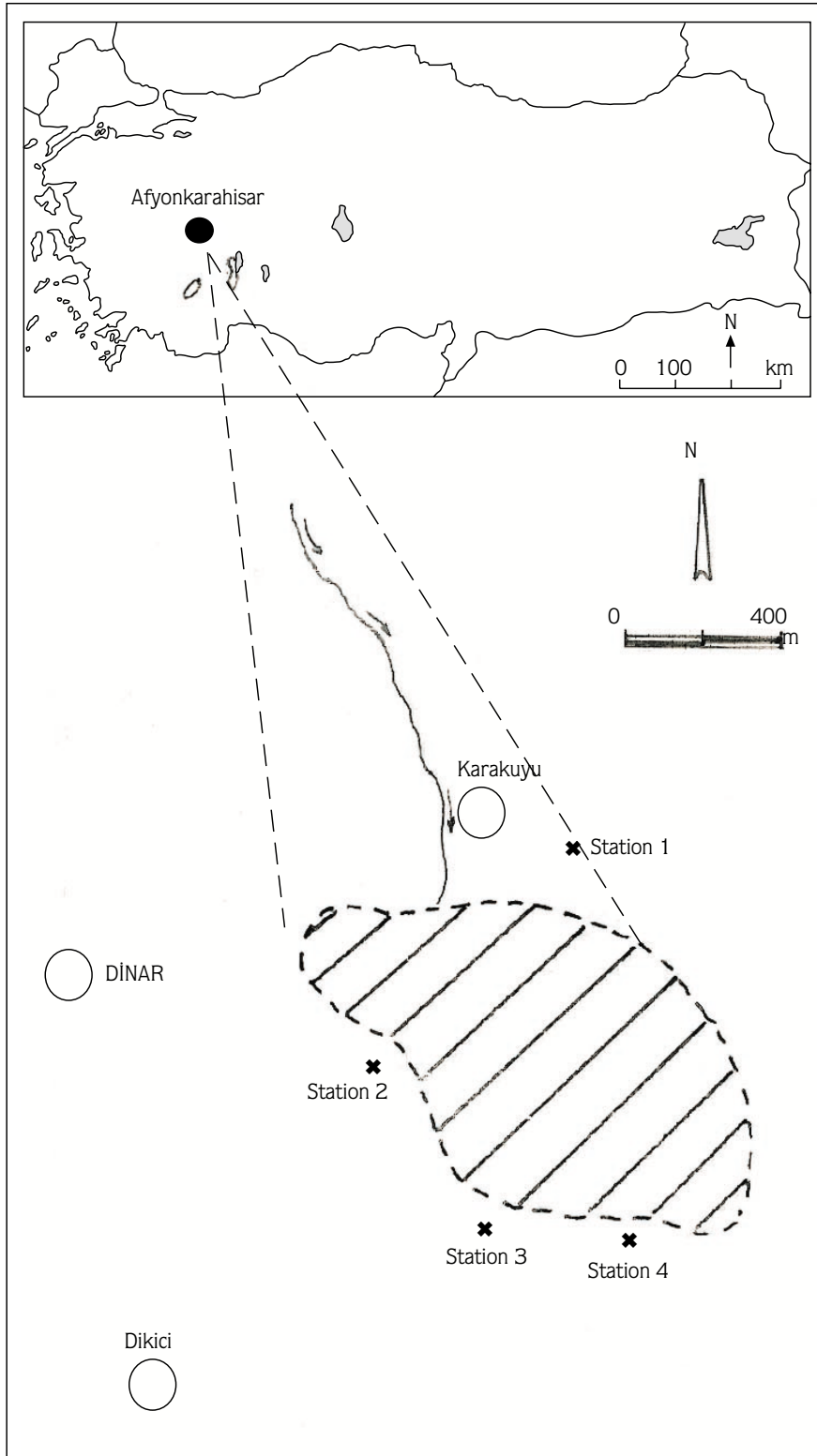


Figure 1. Lake Karakuyu and the stations.

Table 1. List of birds recorded in the study area, with threatened status and maximal numbers counted each month (+: Fixed without counting). Seasonal status of species for Turkey (Kinwan et al., 1998), regional status and breeding status. Abbreviations: R = Resident; SM = Summer migrant; WV = Winter visitor; PM = Passage migrant; D = Definitely Breeding, P = Probable breeding. Red Data Book (Kızıroğlu, 1989) A.1.2 Threatened with extinction, A.2 Severely endangered, A.3 Endangered, A.4 Potentially endangered, B.2 Severely endangered (not nesting), B.3 endangered (not nesting). Globally threatened status, (IUCN, 2004): LC = Least Concern.

Species	Months												Seasonal status		Threat status			
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Status for the Turkey	Status for the region	Breeding status	Red Data Book	IUCN Book	
<b>NON-PASSERIFORMES</b>																		
<i>Podiceps nigricollis</i>	27	32	58	2								38	R, WV	PM	-	A.2	LC	
<i>Tachybaptus ruficollis</i>		3	6	12						16			R, WV	WM	-	A.3	LC	
<i>Ardea cinerea</i>													R, WV	WM	-	A.3	LC	
<i>A. purpurea</i>				1	3	9						1	S, PM	SM	P	A.2	LC	
<i>Egretta alba</i>	2				2								R, WM	PM	-	A.2	LC	
<i>E. garzetta</i>					4								S, WV	PM	-	A.2	LC	
<i>Ardeola ralloides</i>				1	4								S, PM	SM	P	A.3	LC	
<i>Ciconia ciconia</i>			1	2	1	25	78						R, S, PM	SM	D	A.3	LC	
<i>Anas platyrhynchos</i>	100	86	119	17	21	22	12			3	26		R, WV	R	D	A.4	LC	
<i>A. crecca</i>			2						12				R, WV	PM	-	A.4	LC	
<i>A. penelope</i>		1	2										WV, S	WM	-	A.4	LC	
<i>A. strepera</i>									1				R, WV	PM	-	A.3	LC	
<i>A. clypeata</i>												7	R, WV, PM	PM	-	A.3	LC	
<i>Aythya ferina</i>	9	6	13	8	5	15	9	3	4	3			R, WV	PM	-	A.4	LC	
<i>Circus aeruginosus</i>	11	7	16	2	3	14	3	5	3	7	2	2	R, PM, WV	R	D	A.3	LC	
<i>Buteo rufinus</i>	1	2	4			3	1		2	1			R, WV, PM	R	P	A.2	LC	
<i>B. buteo</i>					3							1	R	PM	D	A.3	LC	
<i>Aquila chrysaetos</i>				1	1	2							R, WV	SM	P	A.4	LC	
<i>Falco tinnunculus</i>						1							S, PM	PM	-	A.3	LC	
<i>F. subbuteo</i>	10	13	34	24	18	29	10	18	22	45	17	12	R	R	P	A.2	LC	
<i>Alectoris chukar</i>				1		1							R, PM, WV	R	P	A.4	LC	
<i>Gallinula chloropus</i>	72	62	160	95	162	278	281	25	35	65	20	65	R, WV	R	D	-	LC	
<i>Fulica atra</i>	1												S, WV, PM	PM	-	A.3	LC	
<i>Tringa totanus</i>			1		7								PM	WM	-	B.3	LC	
<i>T. nebularia</i>					1					1			WV, PM	PM	-	B.2	LC	
<i>T. erythroropus</i>					7								S, PM, WV	PM	-	A.2	LC	
<i>Chlidonias hybridus</i>	32	27	12	32	41	123	61	50	52	94	43	38	R	R	D	-	LC	
<i>Columba livia</i>	10		13	6	38	101	52	28	20	25	13	25	R	R	D	-	LC	
<i>Streptopelia decaocto</i>				7	11	36	27	7	8	8			S, PM	SM	D	A.2	LC	
<i>S. turtur</i>				2	10	7	2	4	5	6	2		R	R	P	A.3	LC	
<i>Athene noctua</i>			4	2	41	13							S, PM	SM	-	A.4	LC	
<i>Apus apus</i>			3	18	8	5							S, PM	SM	-	A.4	LC	
<i>A. melba</i>			1	7	8	7							R, WV, PM	SM	P	A.1.2	LC	
<i>Alcedo atthis</i>			3	3	7	2	8	7	9				S, PM	SM	-	A.4	LC	
<i>Merops apiaster</i>			8	7	7	2	7	26					S, PM, WV	PM	-	A.4	LC	
<i>Upupa epops</i>			8	7	8								S, PM, WV	SM	P	A.2	LC	
<i>Dendrocopos major</i>	3											R	PM	-	A.3	LC	LC	



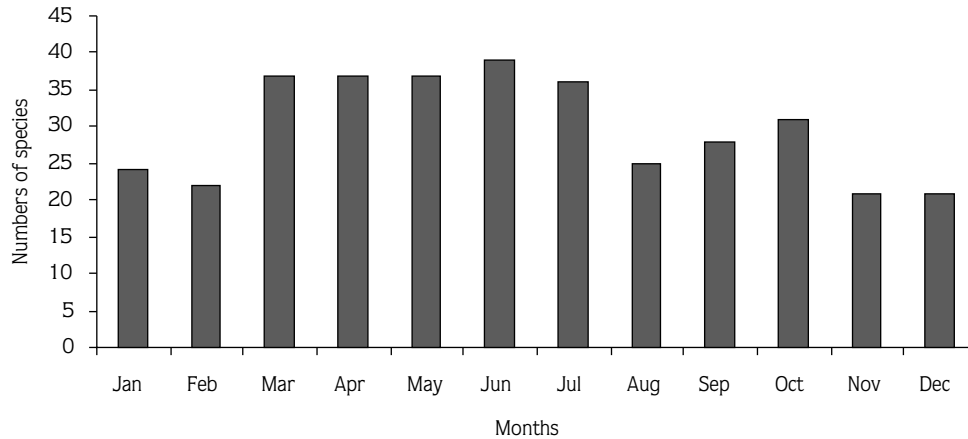


Figure 2. Dispersion of birds of Lake Karakuyu for each month.

DSI. In this period, both the number of species and population density were clearly seen to decrease (Figure 2). Especially water birds such as the little grebe (*Tachybaptus ruficollis*), grey heron (*Ardea cinerea*), wigeon (*Anas penelope*), and greenshank (*Tringa nebularia*) preferred the lake for feeding and resting in winter. However, in the breeding season they went to more suitable sites for nesting. On the other hand, 30 species definitely breed and 15 species probably breed in the study area (Table 1).

According to species diversity in the lake, the diversity ratio was 7.80.

When the lake-related data on bird species are compared with those of other lakes (Tabur, 2002), the highest similarity ratio of Lake Karakuyu is with Lake Kovada, 59%, while the lowest is with Lake Beyşehir and Lake Burdur, 54% (Table 2).

Table 3. Similarity ratio in Lake Karakuyu with other lakes.

Lakes	Lake Karakuyu
Lake Beyşehir	0.54
Lake Burdur	0.54
Lake Eğirdir	0.56
Lake Gölhisar	0.57
Lake Kovada	0.59

## Discussion

This is the first avifaunistic study of Lake Karakuyu. Therefore, we compared our findings with other previous locality studies especially carried out in other lakes of the Lakes Region. We found that some species reported to exist in these lakes were not observed during our study, as clarified below. On the other hand, some species were not mentioned by other researchers and these are first records for the region.

Of the 192 species of birds seen in 5 big lakes of the Lakes Region (Tabur, 2002), 70 were observed in our research area. Conversely, 4 of the bird species we recorded (*Falco subbuteo*, *Tringa nebularia*, *T. erythropus*, and *Chlidonias hybridus*) were not mentioned in Tabur (2002).

In this study, some changes of status for Turkey and the Lakes Region have been determined. The kingfisher (*Alcedo atthis*) and Spanish sparrow (*Passer hispaniolensis*) were observed as summer visitors in the study area, but are represented as resident bird species in other distribution maps (Kiziroğlu, 1989; Kirwan et al., 1998).

Turan (1990) recorded the marsh harrier (*Circus aeruginosus*) in the Aegean, Marmara, Black Sea, and East Anatolian regions. In the study area, we recorded this species as a resident bird species. This finding extends its breeding area and shows that this species breeds in the study area.

The little grebe (*Tachybaptus ruficollis*) was observed as a resident bird species in the Lakes Region (Tabur, 2002). However, we found that this species preferred the study area in winter only for feeding. It probably preferred another site for breeding.

## Conclusion

Lake Karakuyu as a small bird area has a prominent role for local and migrant bird species. According to our research results, the lake has 74 bird species from 31 families. Some species such as *Alcedo atthis*, *Alectoris chukar*, *Streptopelia turtur*, and *Upupa epops*, which are threatened species according to the Red Data Book of Turkey (Kiziroğlu, 1989), are still breeding in Lake Karakuyu.

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