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Original Article

Checklist of avifauna diversity from Hürmetçi Marsh Natural Protected Area, Kayseri, Türkiye

Mehmet Ünlü[1], Hakan Karaardiç[2], Sevil Sungur[3], Erdoğan Çiçek[*3]

[1]Institute of Science, Department of Biology, Nevşehir Hacı Bektaş Veli University, Nevşehir, Türkiye.
[2]Alanya Alaaddin Keykubat University, Faculty of Education, Department of Mathematic and Sciences, Alanya, Türkiye.
[3]Department of Biology, Faculty of Art and Sciences, Nevşehir Hacı Bektaş Veli University, Nevşehir, Türkiye.

Abstract: Between 2015 and 2023, we conducted a study to evaluate the avifauna diversity in Hürmetçi Marshes, located near Kayseri city centre. This contour canal system and marsh areas encompass water and land habitats that attract a diverse bird species. After nine years of observations, we identified a total of 234 species of avifauna belonging to 21 orders and 53 families. Passeriformes had the most diversity with 94 species, followed by Charadriiformes (49 species), Anseriformes (17 species), Accipitriformes (15 species), Pelecaniformes (12 species), and the remaining 16 orders had the least diversity. A total of 65 species were identified as residents, 71 as summer visitors, 43 as winter visitors, and 55 as passage migrants. Researchers determined that 55 species of marsh fauna breed in the area. Furthermore, 23 species were found to be probable breeders in the marsh, while 10 species were likely to breed, and the remaining 146 species were not breeding. There are 217 species categorized as Least Concern (LC), nine species categorized as Near Threatened (NT), four species categorized as Vulnerable (VU), and two species categorized as Endangered (EN). This study provides basic information on the avifauna diversity and status of Hürmetçi Marsh for future management and conservation strategies and offers solutions for the sustainable use and conservation of the area.

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Introduction

Birds play a key role in creating a sustainable ecosystem by contributing to the ecosystem as major scavengers, predators, pollinators, and insect-pest control agents (Bensizerara et al., 2013; Pathan et al., 2014). They also serve as inevitable bioindicators of the surrounding ecosystem, such as air quality, water quality, and habitat quality (Sarkar et al., 2009; Singh et al., 2018). A total of 11001 extant species and 160 extinct species of birds worldwide (2376 genera belonging to 253 families from 44 orders) have been reported worldwide (Gill et al., 2023). Of these, 500 species from 73 families and 22 orders have been recorded from Turkey (Karataş et al., 2022; TRAKUS, 2023; ebird, 2023).

Wetland ecosystems attract many avifauna as they provide sufficient habitat for most birds due to their habitat diversity and high biological production potential (Byju et al., 2023). Wetlands, one of the most productive ecosystems, support many migratory and resident bird species (Paracuellos, 2006). Approximately 40% of global birds and another 12% of all mammalian species reside in freshwater wetlands (Kirsten and Brander, 2004). Indeed, wetlands stand out as areas that host a very high biodiversity in a relatively small area. For this reason, it is necessary to determine the avifauna diversity of wetlands and reveal this biodiversity's bioecological characteristics.

Despite their importance, wetlands are rapidly degrading and disappearing because of high levels of human impact and global climate change (Prigent et al., 2012). Changes in avifauna population diversity, their unique behaviour in different ecosystems, and their reproductive cycles have been used to study the long-term effects of habitat degradation (Jha, 2021).

[*]Correspondence: Erdoğan Çiçek
E-mail: erdogancicek50@gmail.com
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Table 1. Sighting points and their coordinates.

No	Name of the observation point	Lat. (N)	Long. (E)
1	Vanvanlı kurutma canal	38°40'27"	35°16'54"
2	Saraycık	38°43'28"	35°17'46"
3	Dokuzpınar	38°40'35"	35°18'17"
4	Karpuzsekisi	38°41'43"	35°18'40"
5	Hürmetçi	38°41'33"	35°19'56"
6	Organized Industrial Zone	38°43'22"	35°19'52"

No previously published source exists on the avifauna of Hürmetçi Marsh, located at the foot of Mount Erciyes. Right next to the Sultan Marsh are the most important wetlands in Turkey and a national park and Ramsar Area. Hürmetrçi Marsh, located next to Kayseri Province, covers an area of 9592 ha and includes fresh, salty, and slightly salty open water surfaces, large reeds and marshy areas, and wet meadows surrounding them. Depending on the seasonal changes in the water resources feeding the reeds, the surface area of the areas covered with water expands or contracts. Hürmetçi Marsh was defined as a "Wetland of National Importance" by the former Ministry of Environment and Forestry in 2004 due to its fulfillment of Ramsar criteria. Then it was declared a natural protected area by the Presidential Decree in the Official Gazette dated August 2, 2023.

The present research aims to learn about the avifaunal diversity in the Hürmetçi Marsh. The goal is to provide baseline data by creating an avian species inventory and information about the seasonal presence, breeding status, and IUCN categories of birds for future studies and to raise awareness about the need for conservation.

Materials and Methods

Hürmetçi Marsh, which is a part of the Karasaz Plain, borders the foothills of Mount Erciyes, 13 km southwest of Kayseri city centre. Vanvanlı Stream and Dokuzpınar are the important water sources of the reeds. In the past, there was a water inflow to Hürmetçi Marsh through the drainage channel coming from Sultan Marsh. In 1957, the drainage of the entire Karasaz Plain, which was covered with reeds as a semi-enclosed basin, was redirected into the Kızılırmak River through the Karasu Stream in the northeast of the plain, resulting in the reeds being limited to the northeast of the area today. Hürmetçi Marsh Natural Protected Area includes wet meadows, freshwater lake mirrors, reeds, saline steppes, hills, and partly agricultural lands. The wet meadows and soil structure around the reeds enable the development of animal husbandry rather than agriculture in the region, despite agricultural activities being carried out in the villages around the reeds.

From 2015 to 2023, we conducted the roving survey mostly during the spring and autumn migration seasons. We observed avifauna during the morning (06:00-10:00 hours) and evening (16:00-18:00 hours) based on their hyperactivity in roosting and foraging in six localities (Table 1). We surveyed the birds using random sighting and point observation procedures.

We used binoculars (Kowa, 8x42 mm and 10x50 mm) and a Spotting Scope (Canon, 10x30–60 mm, 30x60 mm, and 45x60 mm) for avifaunal sightings. Birds were photographed using SLR digital cameras and 400- 600 mm telephoto lenses. We identified the observed birds using the latest scientific papers and field guides (Heinzel et al., 1995; Svensson, 2010) as well as an online database named TRAKUS and e-bird (e-bird, 2023; TRAKUS, 2023; Karataş et al., 2022). We also examined species lists provided by previous studies and ebird records reported from the area with photographs (ebird, 2023). Each identified species is cross-checked for its current IUCN status in the e-version (IUCN, 2023).

The residential status of the birds was worked out, and birds are grouped under different categories like Resident (R), Passage Migrant (PM), Summer Visitor (SV), and Winter Visitor (WV) depending on their timing and duration of occurrence (Byju et al., 2023).

Breeding data is recorded in each survey and is categorized as follows: Definite Breeder (DB): Highly Possible Breeder (HPB): During the breeding period,

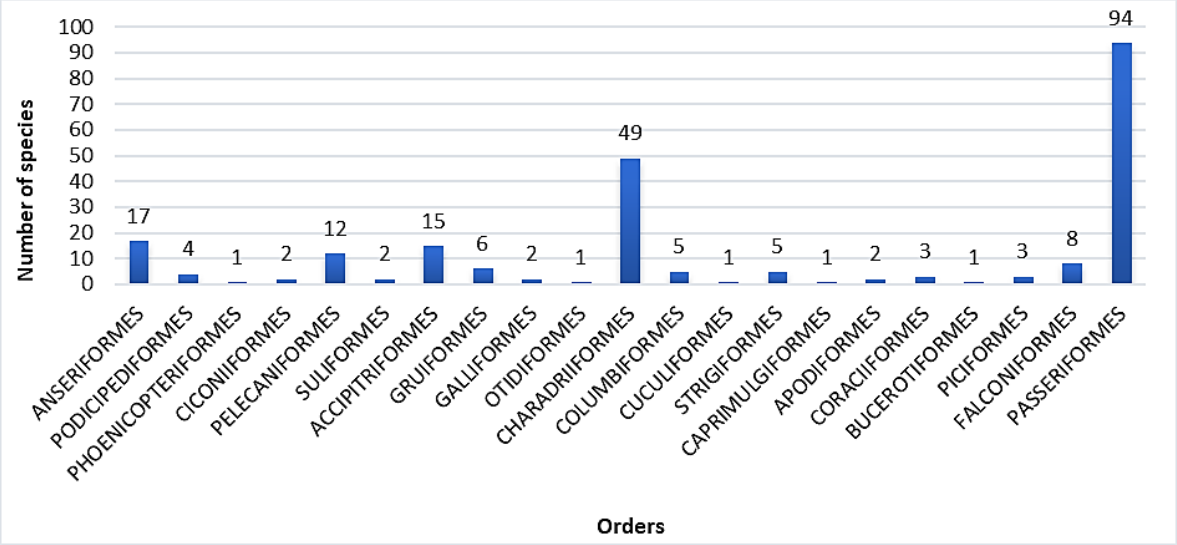

Figure 1. Order-wise species diversity of avifauna from Hürmetçi Marsh.

one pair was observed in a suitable breeding habitat; Probably Breeding (PB): Singing males were observed during the breeding period; None Breeder (NB): not encountered any sign of breeding.

The presence of avifauna was also reported based on their encounter as follows: Abundant (A) – > 100, Moderate (M) – > 50, and Rare (R) – < 10 (Raval 2022). We kept the data recorded in each survey separate and later analyzed it for relative abundance based on the frequency of bird sightings. The data is categorized as follows: Common (C): frequently observed in the study area (encountered on most of the visits, 6-8/10 visits); Uncommon (UC): spotted on multiple occasions but not as frequently as in the case of common (encountered on less than 3-5/10 visits); Rare (R): not frequently encountered in the entire study period (encountered once or twice/10 visits) (Byju et al., 2023; McKinnon and Philips, 1993).

Five main habitats are categorized in the marsh: Wetland, open water habitat (WL); Agricultural land (AL); Trees like willow, poplar, and spindle trees on the bund bordering the wetland (TR); Grassland on the wetland area (GL); and Shrub habitat, open Scrub type (OS).

Information such as date, time, bird species, general directions of gliding species, and weather conditions were recorded in a table. In addition, these records were recorded in the habitat area of Hürmetçi Marsh Natural Protected Area in the e-bird (ebird, 2023) database.

Results

Table 2 presents a checklist of birds in the Hürmetçi Marsh Natural Protected Area, documenting a total of 234 avian species, representing 53 families belonging to 21 orders, over a nine-year period from 2015 to 2023. Order The Passeriformes had the most species, with 23 families and 94 species (40.2%). They were followed by the Charadriiformes, with six families and 49 species (20.9%), the Anseriformes, with one family and 17 species (7.3%), the Accipitriformes, with one family and 15 species (6.4%), and the Pelecaniformes, with three families and 12 species (5.1%). The other 16 orders had the fewest species (Fig. 1). Scolopacidae is the dominant family, including 21 species (9.0%), followed by the families Anatidae (17 species, 7.3%), Accipitridae (15 species, 6.4%), Muscicapidae, and Laridae (14 species, 6.0% in each). The other 49 families have less than 10 species (Fig. 2). Information, including distribution, habitat, IUCN categories, etc., for each species is given below, considering the systematic ranking.

To comprehend the importance of a site, it is essential to study its significance in terms of occurrence and species richness (Bruford, 2002). Hürmetçi Marsh hosts two species (*Neophron percnopterus* and *Falco cherrug*) that are Endangered (EN), four species (*Aythya ferina*, *Otis tarda*, *Falco*

Table 2. Checklist of avifauna recorded from Hürmetçi Marsh National Park ((Euring (EG); IUCN Status: (NT) = Near Threatened, (VU) = Vulnerable, (EN) = Endangered, (LC) = Least Concern; Frequency of observation (FO): (C)= Common, (UC) = Uncommon, (VR) = Rare; Migratory status (MS): Resident (R), Winter visitor (WV), Passage migrant (PM); Breeding (B); Definite breeder (DB); Possible breeder (PB); None Breeder (NB); Habitat type (HT): (WL)= Wetland, (GL)=Grass land, (OS)= Open scrub, (AL)= Agriculture land, (TR)= Trees on the bund adjoining the wetland and Agri lands).

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
	ANSERIFORMES							
	Anatidae							
1890	*Anas acuta*	Northern Pintail	Kılkuyruk	LC	WV	NB	UC	WL
1840	*Anas crecca*	Common Teal	Çamurcun	LC	WV	NB	C	WL, AL, GL
1860	*Anas platyrhynchos*	Mallard	Yeşilbaş	LC	R	DB	C	WL, AL, GL
1590	*Anser albifrons*	Greater White-fronted Goose	Sakarca	LC	WV	NB	UC	WL, AL, GL
1610	*Anser anser*	Greylag Goose	Boz Kaz	LC	R	DB	C	WL, AL, GL
1980	*Aythya ferina*	Common Pochard	Elmabaş Patka	VU	R	DB	C	WL
2030	*Aythya fuligula*	Tufted Duck	Tepeli Patka	LC	PM	NB	VR	WL
2020	*Aythya nyroca*	Ferruginous Duck	Pasbaş Patka	LC	R	DB	C	WL
1530	*Cygnus columbianus*	Tundra Swan	Küçük Kuğu	LC	WV	NB	VR	WL
1540	*Cygnus cygnus*	Whooper Swan	Ötücü Kuğu	LC	WV	NB	VR	WL
1790	*Mareca penelope*	Eurasian Wigeon	Fiyu	LC	WV	NB	UC	WL
1820	*Mareca strepera*	Gadwall	Boz Ördek	LC	PM	NB	UC	WL
1960	*Netta rufina*	Red-crested Pochard	Macar Ördeği	LC	R	DB	C	WL
1940	*Spatula clypeata*	Northern Shoveler	Kaşıkgaga	LC	WV	NB	C	WL
1910	*Spatula querquedula*	Garganey	Çıkrıkçın	LC	SV	NB	UC	WL
1710	*Tadorna ferruginea*	Ruddy Shelduck	Angıt	LC	R	NB	C	WL, AL, GL
1730	*Tadorna tadorna*	Common Shelduck	Suna	LC	WV	NB	UC	WL
	GALLIFORMES							
	Phasianidae							
3550	*Alectoris chukar*	Chukar	Kınalı keklik	LC	R	PB	UC	GL, AL
3700	*Coturnix coturnix*	Common Quail	Bıldırcın	LC	PM	NB	C	GL, AL
	PODICIPEDIFORMES							
	Anatidae							
90	*Podiceps cristatus*	Great Crested Grebe	Bahri	LC	R	DB	C	WL
100	*Podiceps grisegena*	Red-necked Grebe	Kızılboyunlu Batağan	LC	SV	NB	VR	WL
120	*Podiceps nigricollis*	Black-necked Grebe	Karaboyunlu Batağan	LC	R	DB	UC	WL
70	*Tachybaptus ruficollis*	Little Grebe	Küçük Batağan	LC	R	DB	C	WL
	Phoenicopteridae							
1472	*Phoenicopterus roseus*	Greater Flamingo	Flamingo	LC	R	NB	C	WL
	CICONIIFORMES							
	Ciconiidae							
1340	*Ciconia ciconia*	White Stork	Leylek	LC	SV	DB	C	WL
1310	*Ciconia nigra*	Black Stork	Kara Leylek	LC	SV	NB	C	WL, AL, GL
	PELECANIFORMES							
	Threskiornithidae							
1440	*Platalea leucorodia*	Eurasian Spoonbill	Kaşıkçı	LC	SV	NB	UC	WL, GL
1360	*Plegadis falcinellus*	Glossy Ibis	Çeltikçi	LC	PM	NB	C	WL, GL
	Ardeidae							
1210	*Ardea alba*	Great White Egret	Büyük Ak Balıkçıl	LC	R	NB	C	WL, GL
1220	*Ardea cinerea*	Grey Heron	Gri Balıkçıl	LC	R	NB	C	WL, GL
1240	*Ardea purpurea*	Purple Heron	Erguvani Balıkçıl	LC	SV	DB	C	WL, GL
1080	*Ardeola ralloides*	Squacco Heron	Alaca Balıkçıl	LC	SV	NB	C	WL, GL
950	*Botaurus stellaris*	Eurasian Bittern	Balaban	LC	WV	PB	UC	WL, GL,

Table 2. To be continued.

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
1110	*Bubulcus ibis*	Cattle Egret	Sığır Balıkçılı	LC	SV	NB	UC	WL, GL
1190	*Egretta garzetta*	Little Egret	Küçük Ak Balıkçıl	LC	R	PB	C	WL, GL
980	*Ixobrychus minutus*	Common Little Bittern	Küçük Balaban	LC	SV	DB	UC	WL
1040	*Nycticorax nycticorax*	Black-crowned Night-heron	Gece Balıkçılı	LC	SV	HPB	UC	WL, TR
	Pelecanidae							
880	*Pelecanus onocrotalus*	Great White Pelican	Ak Pelikan	LC	SV	NB	UC	WL, GL
	SULIFORMES							
	Phalacrocoracidae							
820	*Microcarbo pygmaeus*	Pygmy Cormorant	Küçük Karabatak	LC	PM	NB	UC	WL
720	*Phalacrocorax carbo*	Great Cormorant	Karabatak	LC	WV	NB	C	WL
	ACCIPITRIFORMES							
	Accipitridae							
2670	*Accipiter gentilis*	Northern Goshawk	Çakır	LC	WV	NB	UC	GL
2690	*Accipiter nisus*	Eurasian Sparrowhawk	Atmaca	LC	R	NB	C	GL
2960	*Aquila chrysaetos*	Golden Eagle	Kaya Kartalı	LC	R	NB	UC	GL
2870	*Buteo buteo*	Eurasian Buzzard	Şahin	LC	WV	NB	C	WL, GL
2880	*Buteo rufinus*	Long-legged Buzzard	Kızıl Şahin	LC	R	DB	C	AL, GL
2560	*Circaetus gallicus*	Short-toed Snake-eagle	Yılan Kartalı	LC	SV	NB	UC	GL
2600	*Circus aeruginosus*	Western Marsh-harrier	Saz Delicesi	LC	R	DB	C	WL, GL
2610	*Circus cyaneus*	Hen Harrier	Gökçe Delice	LC	WV	NB	C	WL, GL
2620	*Circus macrourus*	Pallid Harrier	Bozkır Delicesi	NT	PM	NB	UC	WL, GL
2630	*Circus pygargus*	Montagu's Harrier	Çayır Delicesi	LC	SV	NB	UC	WL, GL
2920	*Clanga pomarina*	Lesser Spotted Eagle	Küçük Orman Kartalı	LC	PM	NB	VR	GL
2980	*Hieraaetus pennatus*	Booted Eagle	Küçük Kartal	LC	SV	NB	UC	GL
2380	*Milvus migrans*	Black Kite	Kara Çaylak	LC	SV	NB	UC	GL
2470	*Neophron percnopterus*	Egyptian Vulture	Küçük Akbaba	EN	SV	NB	UC	GL
2310	*Pernis apivorus*	European Honey-buzzard	Arı Şahini	LC	PM	NB	UC	GL
	OTIDIFORMES							
	Otididae							
4460	*Otis tarda*	Great Bustard	Toy	VU	R	NB	VR	GL, AL
	GRUIFORMES							
	Rallidae							
4290	*Fulica atra*	Common Coot	Sakarmeke	LC	R	DB	C	WL, GL
4240	*Gallinula chloropus*	Common Moorhen	Sutavuğu	LC	R	DB	C	WL, GL
4100	*Zapornia parva*	Little Crake	Bataklık Suyelvesi	LC	PM	NB	UC	WL
4080	*Porzana porzana*	Spotted Crake	Benekli Suyelvesi	LC	PM	NB	UC	WL
4070	*Rallus aquaticus*	Western Water Rail	Sukılavuzu	LC	R	DB	C	WL
	Gruidae							
4330	*Grus grus*	Common Crane	Turna	LC	R	HPB	C	WL, GL, AL
	CHARADRIIFORMES							
	Burhinidae							
4590	*Burhinus oedicnemus*	Eurasian Thick-knee	Kocagöz	LC	SV	PB	UC	GL

Table 2. To be continued.

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
	Recurvirostridae							
4550	*Himantopus himantopus*	Black-winged Stilt	Uzunbacak	LC	SV	DB	C	WL, GL
4560	*Recurvirostra avosetta*	Pied Avocet	Kılıçgaga	LC	SV	NB	UC	WL, GL
	Charadriidae							
4770	*Charadrius alexandrinus*	Greater Sandplover	Büyük Cılıbıt	LC	SV	NB	C	WL, GL
4690	*Charadrius dubius*	Kentish Plover	Akça Cılıbıt	LC	PM	NB	C	WL, GL
4700	*Charadrius hiaticula*	Little Ringed Plover	Halkalı Küçük Cılıbıt	LC	SV	NB	UC	WL, GL
4790	*Charadrius leschenaultii*	Spur-winged Lapwing	Mahmuzlu Kızkuşu	LC	SV	DB	UC	WL, GL
4850	*Pluvialis apricaria*	Grey Plover	Gümüş Yağmurcun	LC	PM	NB	UC	WL, GL, AL
4860	*Pluvialis squatarola*	Common Ringed Plover	Halkalı Cılıbıt	LC	PM	NB	UC	WL, GL, AL
4920	*Vanellus leucurus*	Eurasian Golden Plover	Altın Yağmurcun	LC	PM	NB	VR	WL, GL, AL
4870	*Vanellus spinosus*	White-tailed Lapwing	Sürmeli kızkuşu	LC	SV	DB	C	WL, GL, AL
4930	*Vanellus vanellus*	Spur-winged Lapwing	Mahmuzlu Kızkuşu	LC	R	DB	C	WL, GL, AL
	Scolopacidae							
5560	*Actitis hypoleucos*	Common Sandpiper	Dere Düdükçünü	LC	SV	DB	C	WL, GLWL, GL
5610	*Arenaria interpres*	Ruddy Turnstone	Taşçeviren	LC	PM	NB	VR	WL, GL
4970	*Calidris alba*	Sanderling	Ak Kumkuşu	LC	PM	NB	C	WL, GL, AL
5120	*Calidris alpina*	Dunlin	Karakarınlı Kumkuşu	LC	PM	NB	UC	WL, GL
5140	*Calidris falcinellus*	Broad-billed Sandpiper	Sürmeli Kumkuşu	LC	PM	NB	VR	WL, GL
5090	*Calidris ferruginea*	Curlew Sandpiper	Kızıl Kumkuşu	NT	PM	NB	UC	WL, GL
5010	*Calidris minuta*	Little Stint	Küçük Kumkuşu	LC	PM	NB	UC	WL, GL
5170	*Calidris pugnax*	Ruff	Dövüşkenkuş	LC	PM	NB	C	WL, GL, AL
5020	*Calidris temminckii*	Temminck's Stint	Sarıbacaklı Kumkuşu	LC	PM	NB	UC	WL, GL
5190	*Gallinago gallinago*	Common Snipe	Suçulluğu	LC	WV	PB	C	WL, GL
5200	*Gallinago media*	Great Snipe	Büyük Suçulluğu	NT	PM	NB	VR	WL, GL
5320	*Limosa limosa*	Black-tailed Godwit	Çamurçulluğu	NT	PM	NB	UC	WL, GL
5180	*Lymnocryptes minimus*	Jack Snipe	Küçük Suçulluğu	LC	WV	NB	UC	WL, GL
5410	*Numenius arquata*	Eurasian Curlew	Kervançulluğu	NT	SV	NB	UC	WL, GL
5640	*Phalaropus lobatus*	Red-necked Phalarope	Denizdüdükçünü	LC	PM	NB	VR	WL, GL
5450	*Tringa erythropus*	Spotted Redshank	Kara Kızılbacak	LC	PM	NB	UC	WL, GL
5540	*Tringa glareola*	Wood Sandpiper	Orman Düdükçünü	LC	PM	NB	UC	WL, GL
5480	*Tringa nebularia*	Common Greenshank	Yeşilbacak	LC	PM	NB	C	WL, GL
5530	*Tringa ochropus*	Green Sandpiper	Yeşil Düdükçün	LC	WV	NB	C	WL, GL
5470	*Tringa stagnatilis*	Marsh Sandpiper	Bataklık Düdükçünü	LC	PM	NB	UC	WL, GL
5460	*Tringa totanus*	Common Redshank	Kızılbacak	LC	R	DB	C	WL, GL
	Glareolidae							WL, GL
4670	*Glareola nordmanni*	Black-winged Pratincole	Karakanatlı Bataklıkkırlangıcı	NT	PM	NB	VR	WL, GL
4650	*Glareola pratincola*	Collared Pratincole	Bataklıkkırlangıcı	LC	SV	NB	UC	WL, GL

Table 2. To be continued.

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
	Laridae							
6260	*Chlidonias hybrida*	Whiskered Tern	Bıyıklı Sumru	LC	SV	DB	C	WL, GL
6280	*Chlidonias leucopterus*	White-winged Tern	Akkanatlı Sumru	LC	PM	NB	UC	WL, GL
6270	*Chlidonias niger*	Black Tern	Kara Sumru	LC	PM	NB	VR	WL, GL
5850	*Chroicocephalus genei*	Slender-billed Gull	İncegagalı Martı	LC	R	NB	C	WL, GL
5820	*Chroicocephalus ridibundus*	Black-headed Gull	Karabaş Martı	LC	R	NB	C	WL, GL, AL
6050	*Gelochelidon nilotica*	Common Gull-billed Tern	Gülen Sumru	LC	SV	PB	UC	QL, GL
5780	*Hydrocoloeus minutus*	Little Gull	Küçük Martı	LC	PM	NB	VR	WL
5730	*Ichthyaetus ichthyaetus*	Pallas's Gull	Büyük Karabaş Martı	LC	PM	NB	UC	WL,
5750	*Ichthyaetus melanocephalus*	Mediterranean Gull	Akdeniz Martısı	LC	SV	NB	UC	WL, GL
5921	*Larus armenicus*	Armenian Gull	Van Gölü Martısı	LC	R	NB	UC	WL
5926	*Larus cachinnans*	Caspian Gull	Gümüş Martı	LC	WV	NB	UC	WL
5910	*Larus fuscus*	Lesser Black-backed Gull	Karasırtlı Martı	LC	PM	NB	VR	WL
6150	*Sterna hirundo*	Common Tern	Sumru	LC	R	NB	UC	WL, GL
6240	*Sternula albifrons*	Little Tern	Küçük Sumru	LC	SV	HPB	UC	WL, GL
	COLUMBIFORMES							
	Columbidae							
6650	*Columba livia*	Rock Dove	Kaya Güvercini	LC	R	DB	C	TR, GL
6680	*Columba oenas*	Stock Dove	Gökçe Güvercin	LC	WV	NB	VR	TR, GL
6900	*Spilopelia senegalensis*	Laughing Dove	Küçük Kumru	LC	R	HPB	C	TR
6840	*Streptopelia decaocto*	Eurasian Collared-dove	Kumru	LC	R	DB	C	TR
6870	*Streptopelia turtur*	European Turtle-dove	Üveyik	VU	SV	NB	UC	TR
	CUCULIFORMES							
	Cuculidae							
7240	*Cuculus canorus*	Common Cuckoo	Guguk	LC	SV	DB	C	WL, GL, TR
	STRIGIFORMES							
	Strigidae							
7680	*Asio flammeus*	Short-eared Owl	Kır Baykuşu	LC	WV	NB	VR	GL
7670	*Asio otus*	Northern Long-eared Owl	Kulaklı Orman Baykuşu	LC	PM	HPB	UC	TR
7570	*Athene noctua*	Little Owl	Kukumav	LC	PM	DB	C	GL
7440	*Bubo bubo*	Eurasian Eagle-owl	Puhu	LC	WV	NB	VR	GL
7390	*Otus scops*	Eurasian Scops-owl	İshakkuşu	LC	SV	HPB	UC	TR
	CAPRIMULGIFORMES							
	Caprimulgidae							
7780	*Caprimulgus europaeus*	European Nightjar	Çobanaldatan	LC	SV	NB	UC	GL
	APODIFORMES							
	Apodidae							
7950	*Apus apus*	Common Swift	Ebabil	LC	SV	HPB	C	GL
7980	*Tachymarptis melba*	Alpine Swift	Akkarınlı Ebabil	LC	SV	NB	UC	GL
	CORACIIFORMES							
	Coraciidae							
8410	*Coracias garrulus*	European Roller	Gökkuzgun	LC	SV	NB	UC	TR, GL, OS

Table 2. To be continued.

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
	Alcedinidae							
8310	*Alcedo atthis*	Common Kingfisher	Yalıçapkını	LC	WV	NB	C	WL
	Meropidae							
8400	*Merops apiaster*	European Bee-eater	Arıkuşu	LC	SV	HPB	UC	TR, GL, OS
	BUCEROTIFORMES							
	Upupidae							
8460	*Upupa epops*	Common Hoopoe	İbibik	LC	SV	DB	C	GL, OS
	PICIFORMES							
	Picidae							
8780	*Dendrocopos syriacus*	Syrian Woodpecker	Alaca Ağaçkakan	LC	R	DB	C	TR
8870	*Dryobates minor*	Lesser Spotted Woodpecker	Küçük Ağaçkakan	LC	WV	NB	UC	TR
8480	*Jynx torquilla*	Eurasian Wryneck	Boyunçeviren	LC	SV	NB	UC	GL, OS
	FALCONIFORMES							
	Falconidae							
3140	*Falco biarmicus*	Lanner Falcon	Bıyıklı Doğan	LC	R	NB	VR	GL
3160	*Falco cherrug*	Saker Falcon	Ulu Doğan	EN	R	NB	VR	GL
3090	*Falco columbarius*	Merlin	Boz Doğan	LC	WV	NB	UC	GL, OS
3030	*Falco naumanni*	Lesser Kestrel	Küçük Kerkenez	LC	PM	NB	VR	GL,
3200	*Falco peregrinus*	Peregrine Falcon	Gök Doğan	LC	R	NB	UC	GL, OS
3100	*Falco subbuteo*	Eurasian Hobby	Delice Doğan	LC	SV	NB	UC	GL, OS
3040	*Falco tinnunculus*	Common Kestrel	Kerkenez	LC	R	DB	C	GL, TR
3070	*Falco vespertinus*	Red-footed Falcon	Ala Doğan	VU	PM	NB	UC	GL, TR
	PASSERIFORMES							
	Laniidae							
15150	*Lanius collurio*	Red-backed Shrike	Kızılsırtlı Örümcekkuşu	LC	SV	DB	C	GL, OS
15190	*Lanius minor*	Lesser Grey Shrike	Karaalınlı Örümcekkuşu	LC	SV	NB	UC	GL, OS
15240	*Lanius nubicus*	Masked Shrike	Maskeli Örümcekkuşu	LC	SV	NB	UC	GL, OS
15230	*Lanius senator*	Woodchat Shrike	Kızılbaşlı Örümcekkuşu	NT	SV	NB	VR	GL, OS
	Oriolidae							
15080	*Oriolus oriolus*	Eurasian Golden Oriole	Sarıasma	LC	SV	DB	UC	TR
	Corvidae							
15600	*Coloeus monedula*	Eurasian Jackdaw	Küçük Karga	LC	R	DB	C	GL, AL, TR
15720	*Corvus corax*	Common Raven	Kuzgun	LC	PM	NB	UC	GL, AL
15673	*Corvus cornix*	Carrion Crow	Leş Kargası	NE	R	DB	C	GL, AL, TR
15630	*Corvus frugilegus*	Rook	Ekin Kargası	LC	R	HPB	C	GL, AL, TR
15390	*Garrulus glandarius*	Eurasian Jay	Alakarga	LC	R	NB	UC	TR
15490	*Pica pica*	Eurasian Magpie	Saksağan	LC	R	DB	C	GL, AL, TR
	Paridae							
14620	*Cyanistes caeruleus*	Eurasian Blue Tit	Mavi Baştankara	LC	R	DB	C	TR, OS
14640	*Parus major*	Great Tit	Büyük Baştankara	LC	R	DB	C	TR, OS
14610	*Periparus ater*	Coal Tit	Çam Baştankarası	LC	WV	NB	UC	TR, OS
	Remizidae							
14900	*Remiz pendulinus*	Eurasian Penduline-tit	Çulhakuşu	LC	R	HPB	C	WL, TR
	Panuridae							
13640	*Panurus biarmicus*	Bearded Reedling	Bıyıklı Baştankara	LC	R	HPB	C	WL
	Alaudidae							
9760	*Alauda arvensis*	Eurasian Skylark	Tarlakuşu	LC	WV	NB	UC	GL, AL

Table 2. To be continued.

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
9700	*Alaudala heinei*	Turkestan Short-toed Lark	Türkistan Çorak Toygarı	LC	SV	DB	C	GL
9680	*Calandrella brachydactyla*	Greater Short-toed Lark	Bozkır Toygarı	LC	SV	HPB	UC	GL, AL
9720	*Galerida cristata*	Crested Lark	Tepeli Toygar	LC	R	DB	C	GL, AL
9740	*Lullula arborea*	Woodlark	Orman Toygarı	LC	WV	NB	UC	GL
9610	*Melanocorypha calandra*	Calandra Lark	Boğmaklı Toygar	LC	R	HPB	C	GL, AL
	Hirundinidae							
9950	*Cecropis daurica*	Red-rumped Swallow	Kızıl Kırlangıç	LC	PM	NB	VR	OS
10010	*Delichon urbicum*	Northern House Martin	Ev Kırlangıcı	LC	SV	NB	UC	OS
9920	*Hirundo rustica*	Barn Swallow	Kır Kırlangıcı	LC	SV	DB	C	GL, OS
9910	*Ptyonoprogne rupestris*	Eurasian Crag Martin	Kaya Kırlangıcı	LC	PM	NB	VR	OS
9810	*Riparia riparia*	Collared Sand Martin	Kum Kırlangıcı	LC	SV	HPB	UC	OS
	Cettiidae							
12200	*Cettia cetti*	Cetti's Warbler	Kamışbülbülü	LC	R	DB	C	WL, OS
	Phylloscopidae							
13110	*Phylloscopus collybita*	Common Chiffchaff	Çıvgın	LC	WV	NB	C	TR, GL, OS
13080	*Phylloscopus sibilatrix*	Wood Warbler	Orman Çıvgını	LC	PM	NB	VR	TR
13120	*Phylloscopus trochilus*	Willow Warbler	Söğütbülbülü	LC	PM	NB	UC	TR, GL, OS
	Acrocephalidae							
12530	*Acrocephalus arundinaceus*	Great Reed-warbler	Büyük Kamışçın	LC	SV	DB	C	WL
12410	*Acrocephalus melanopogon*	Moustached Warbler	Bıyıklı Kamışçın	LC	R	DB	C	WL
12500	*Acrocephalus palustris*	Marsh Warbler	Çalı Kamışçını	LC	PM	NB	VR	WL, OS, TR
12430	*Acrocephalus schoenobaenus*	Sedge Warbler	Kındıra Kamışçını	LC	PM	NB	UC	WL
12510	*Acrocephalus scirpaceus*	Common Reed-warbler	Saz Kamışçını	LC	SV	DB	C	WL
12550	*Iduna pallida*	Eastern Olivaceous Warbler	Ak Mukallit	LC	SV	DB	C	TR, OS
	Locustellidae							
12380	*Locustella luscinioides*	Savi's Warbler	Bataklık Kamışçını	LC	SV	HPB	C	WL
	Sylviidae							
12750	*Curruca communis*	Common Whitethroat	Akgerdanlı Ötleğen	LC	SV	DB	C	OS, TR
12740	*Curruca curruca*	Lesser Whitethroat	Küçük Akgerdanlı Ötleğen	LC	SV	HPB	C	OS, TR
12670	*Curruca melanocephala*	Sardinian Warbler	Maskeli Ötleğen	LC	PM	NB	VR	OS, TR
12770	*Sylvia atricapilla*	Eurasian Blackcap	Karabaşlı Ötleğen	LC	PM	NB	UC	OS, TR
12760	*Sylvia borin*	Garden Warbler	Boz Ötleğen	LC	PM	NB	UC	TR, OS
	Troglodytidae							
10660	*Troglodytes troglodytes*	Western Rock Nuthatch	Çitkuşu	LC	WV	NB	UC	OS, WL
	Sittidae							
14810	*Sitta neumayer*	Western Rock Nuthatch	Kaya Sıvacısı	LC	R	DB	C	OS, GL

Table 2. To be continued.

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
	Sturnidae							
15840	*Pastor roseus*	Rosy Starling	Alasığırcık	LC	SV	NB	VR	GL, OS
15820	*Sturnus vulgaris*	Common Starling	Sığırcık	LC	R	DB	C	GL, OS, TR
	Turdidae							
13350	*Muscicapa striata*	Spotted Flycatcher	Benekli Sinekkapan	LC	SV	NB	C	GL, TR, OS
12010	*Turdus iliacus*	Redwing	Kızıl Ardıç	NT	WV	NB	VR	GL, TR
11870	*Turdus merula*	Eurasian Blackbird	Karatavuk	LC	R	DB	UC	OS
12000	*Turdus philomelos*	Song Thrush	Öter Ardıç	LC	WV	NB	UC	GL, TR
11980	*Turdus pilaris*	Fieldfare	Tarla Ardıcı	LC	WV	NB	UC	GL, TR
12020	*Turdus viscivorus*	Mistle Thrush	Ökse Ardıcı	LC	R	NB	UC	TR, GL
	Muscicapidae							
10990	*Erithacus rubecula*	European Robin	Kızılgerdan	LC	WV	NB	C	WL, GL, OS, TR
13480	*Ficedula albicollis*	Collared Flycatcher	Halkalı Sinekkapan	LC	PM	NB	UC	TR
13490	*Ficedula hypoleuca*	European Pied Flycatcher	Kara Sinekkapan	LC	PM	NB	VR	TR
11030	*Luscinia luscinia*	Thrush Nightingale	Benekli Bülbül	LC	PM	NB	UC	WL, OS
11040	*Luscinia megarhynchos*	Common Nightingale	Bülbül	LC	SV	DB	C	WL, GL, OS, TR
11060	*Luscinia svecica*	Bluethroat	Mavigerdan	LC	WV	NB	UC	WL
11480	*Oenanthe melanoleuca*	Black-eared Wheatear	Karakulaklı Kuyrukkakan	LC	SV	NB	UC	OS, TR
11440	*Oenanthe isabellina*	Isabelline Wheatear	Boz Kuyrukkakan	LC	SV	DB	C	GL, OS
11460	*Oenanthe oenanthe*	Northern Wheatear	Kuyrukkakan	LC	SV	HPB	C	GL, OS
11210	*Phoenicurus ochruros*	Black Redstart	Kara Kızılkuyruk	LC	WV	NB	UC	GL, OS
11220	*Phoenicurus phoenicurus*	Common Redstart	Kızılkuyruk	LC	SV	NB	UC	WL, OS, TR
11370	*Saxicola rubetra*	Whinchat	Çayır Taşkuşu	LC	SV	NB	UC	GL, OS
11393	*Saxicola rubicola*		Taşkuşu	NE	SV	HPB	UC	GL, OS
	Passeridae							
15910	*Passer domesticus*	House Sparrow	Serçe	LC	R	DB	C	GL, OS, TR
15920	*Passer hispaniolensis*	Spanish Sparrow	Söğüt Serçesi	LC	R	NB	UC	GL, OS, TR
15980	*Passer montanus*	Eurasian Tree Sparrow	Ağaç Serçesi	LC	R	DB	C	GL, OS, TR
16040	*Petronia petronia*	Rock Sparrow	Kaya Serçesi	LC	R	NB	UC	TR, OS
	Prunellidae							
10840	*Prunella modularis*	Dunnock	Dağbülbülü	LC	WV	NB	UC	OS, TR
	Motacillidae							
10050	*Anthus campestris*	Tawny Pipit	Kır Incirkuşu	LC	SV	NB	UC	GL, OS
10120	*Anthus cervinus*	Red-throated Pipit	Kızılgerdanlı Incirkuşu	LC	PM	NB	UC	GL
10110	*Anthus pratensis*	Meadow Pipit	Çayır Incirkuşu	LC	WV	NB	UC	GL
10140	*Anthus spinoletta*	Water Pipit	Dağ Incirkuşu	LC	WV	NB	UC	WL, GL
10090	*Anthus trivialis*	Tree Pipit	Ağaç Incirkuşu	LC	PM	NB	VR	OS, TR
10200	*Motacilla alba*	White Wagtail	Ak Kuyruksallayan	LC	R	PB	C	WL, GL
10190	*Motacilla cinerea*	Grey Wagtail	Dağ Kuyruksallayanı	LC	WV	NB	UC	WL, GL
10180	*Motacilla citreola*	Citrine Wagtail	Sarıbaşlı Kuyruksallayan	LC	SV	HPB	UC	WL, GL
10170	*Motacilla flava*	Western Yellow Wagtail	Sarı Kuyruksallayan	LC	SV	DB	C	WL, GL
	Fringillidae							
16530	*Carduelis carduelis*	European Goldfinch	Saka	LC	R	HPB	C	TR, OS, GL

Table 2. To be continued.

EG	Taxa	Common name	Local name	IUCN	MS	B	FO	HT
16490	*Chloris chloris*	European Greenfinch	Florya	LC	R	PB	C	TR, OS
16360	*Fringilla coelebs*	Common Chaffinch	İspinoz	LC	R	HPB	C	TR, OS
16380	*Fringilla montifringilla*	Brambling	Dağ Ispinozu	LC	WV	NB	UC	TR, OS
16600	*Linaria cannabina*	Common Linnet	Ketenkuşu	LC	R	PB	C	TR, OS, GL
16620	*Linaria flavirostris*	Twite	Sarıgagalı Ketenkuşu	LC	WV	NB	VR	OS, GL
16400	*Serinus serinus*	European Serin	Küçük Iskete	LC	R	PB	C	TR, OS, GL
16540	*Spinus spinus*	Eurasian Siskin	Karabaşlı Iskete	LC	PM	NB	VR	TR, OS
	Emberizidae							
18820	*Emberiza calandra*	Corn Bunting	Tarla Kirazkuşu	LC	R	HPB	C	AL, GL, TR, OS
18600	*Emberiza cia*	Rock Bunting	Kaya Kirazkuşu	LC	WV	NB	UC	OS
18570	*Emberiza citrinella*	Yellowhammer	Sarı Kirazkuşu	LC	WV	NB	UC	TR, GL, OS
18660	*Emberiza hortulana*	Ortolan Bunting	Kirazkuşu	LC	SV	PB	UC	OS
18810	*Emberiza melanocephala*	Black-headed Bunting	Karabaşlı Kirazkuşu	LC	SV	HPB	C	OS
18770	*Emberiza schoeniclus*	Reed Bunting	Bataklık Kirazkuşu	LC	R	DB	C	WL

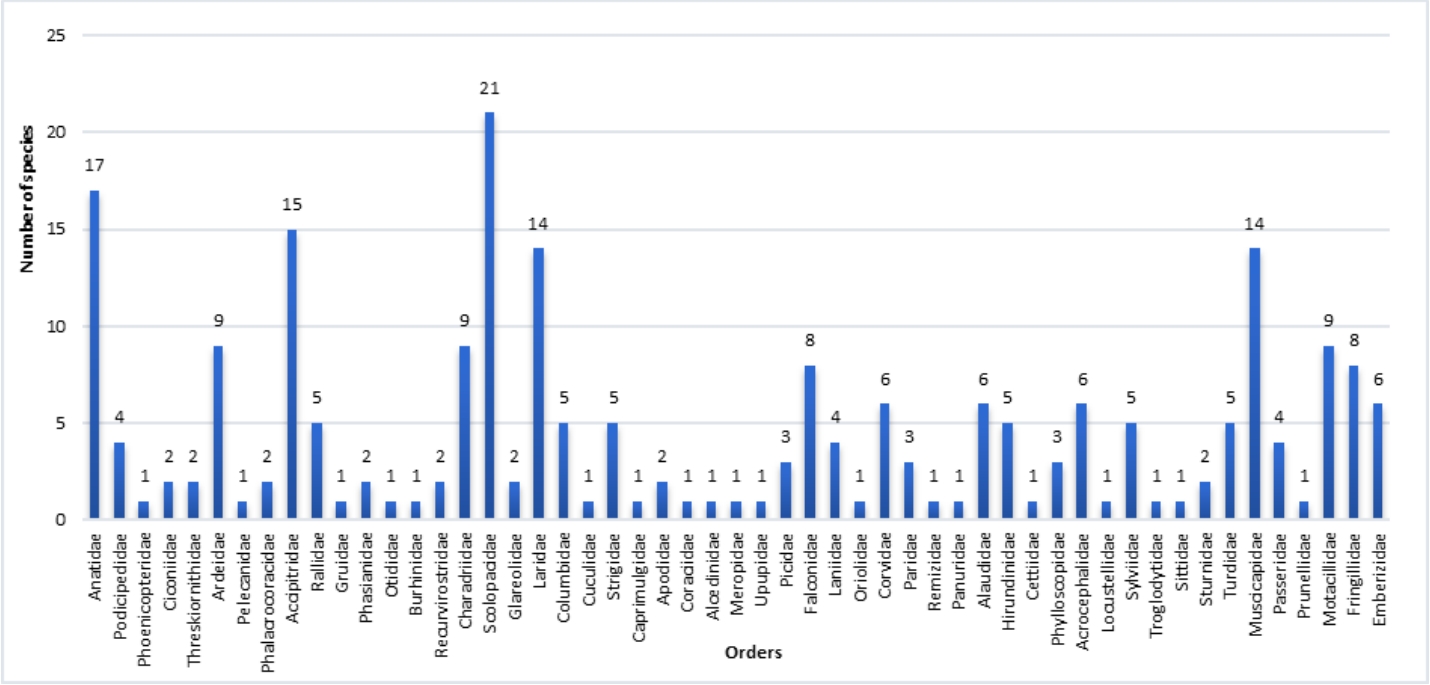

Figure 2. Family-wise species diversity of avifauna from Hürmetçi Marsh.

vespertinus, and *Streptopelia turtur*) that are vulnerable (VU), nine species, viz., *Circus macrourus*, *Vanellus vanellus*, *Numenius arquata*, *Limosa limosa*, *Calidris ferruginea*, *Gallinago media*, *Glareola nordmanni*, *Lanius senator*, and *Turdus iliacus* (IUCN, 2023) that are Near Threatened (NT), and the remaining 217 species are of Least Concern (LC). Newly ranked to species level, *Corvus cornix* and *Saxicola rubicolaæ*, are Not Evaluated (NE) (Fig. 3).

Based on residential status (Fig. 4), 65 species (27.8%) are resident (R), 71 species (30.3%) are summer visitor (SV), 43 species (18.4%) are winter visitors (WV), and the remaining ones (55 species, 23.5%) are passage migrant (PM).

Among the observed species (Fig. 5), 55 species

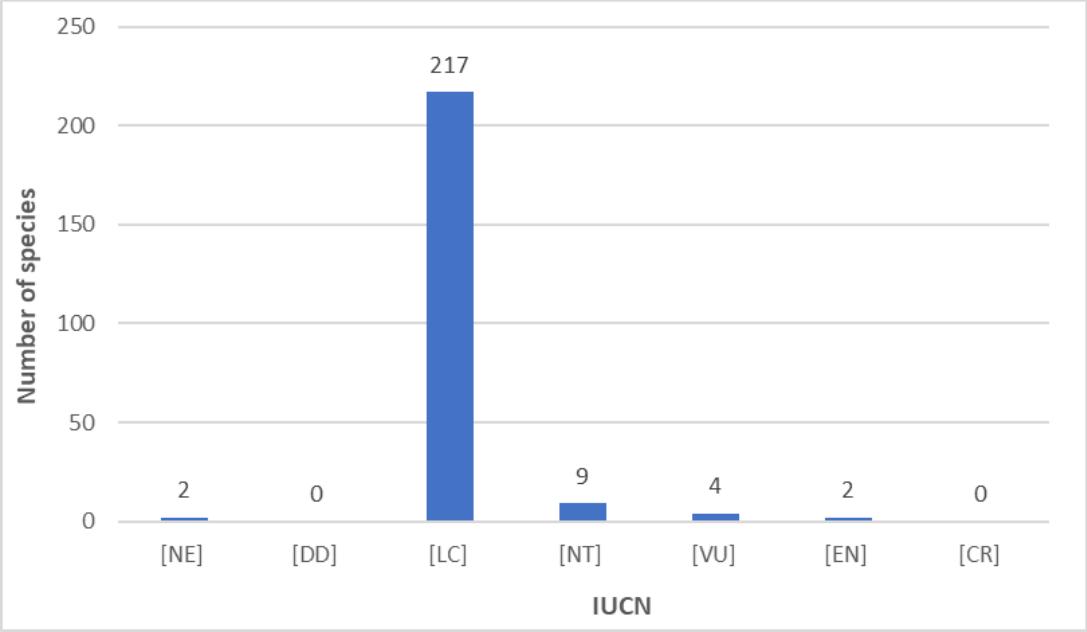

Figure 3. IUCN status-wise species diversity of avifauna from Hürmetçi Marsh.

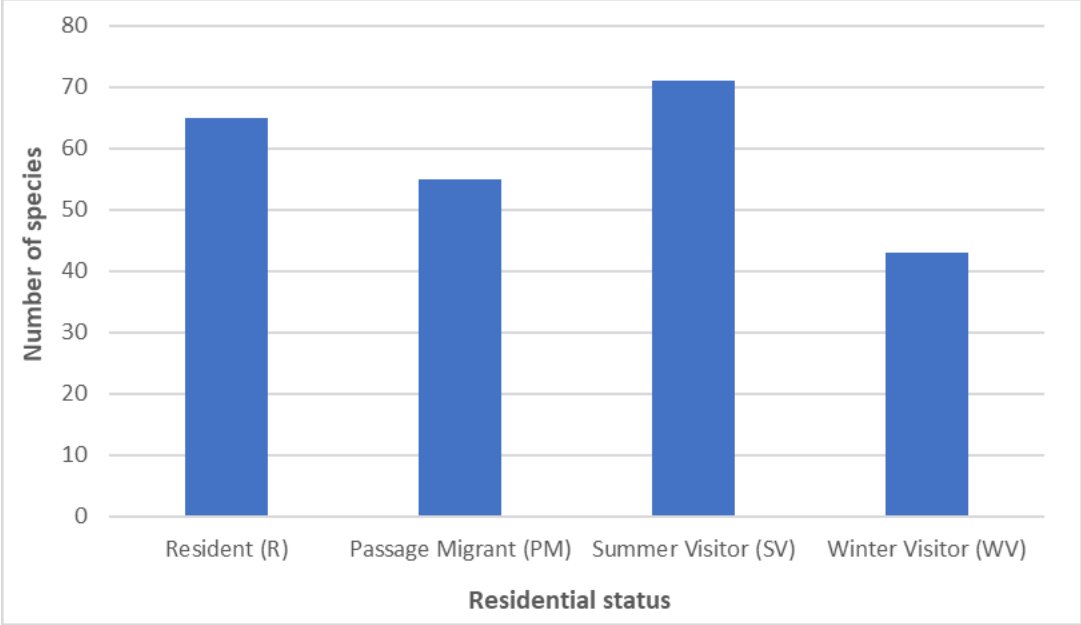

Figure 4. Residential status-wise species diversity of avifauna from Hürmetçi Marsh.

(23.5%) are classified as definitive breeders (DB), 23 species (9.8%) are highly possible breeders (HPB), 10 species (4.3%) are possible breeders (PB), and 146 species (62.4%) are none breeder (NR) in the marsh. Of these breeding species, it is noteworthy to mention that *V. vanellus* (NT) and *A. ferina* (VU), which are threatened species, breed in the area. Nine threatened species, which do not breed in the area, are encountered during migration in certain periods. In the marsh, 96 species (41.0%) are common (C); 105 species (44.9%) are uncommon (UC), and the remaining 33 (14.1%) are rare (VR) based on the frequency of observation (Fig. 6).

Discussions

The biodiversity of any given area is expressed in its genetic diversity, species diversity, and habitat diversity. Nine years of monitoring revealed a total of

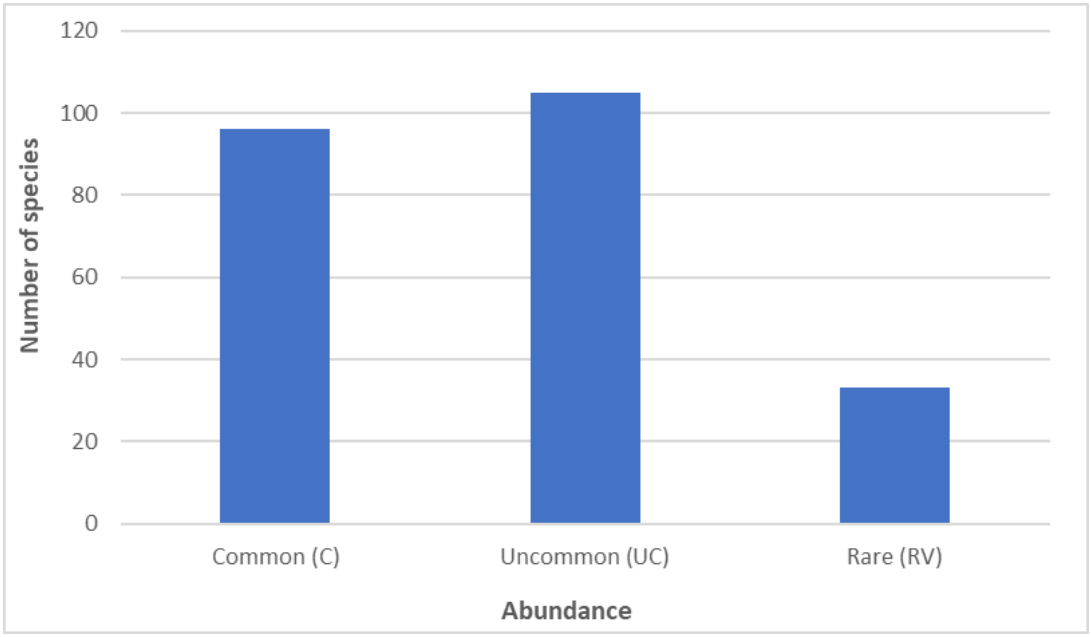

Figure 5. Abundance-wise species diversity of avifauna from Hürmetçi Marsh.

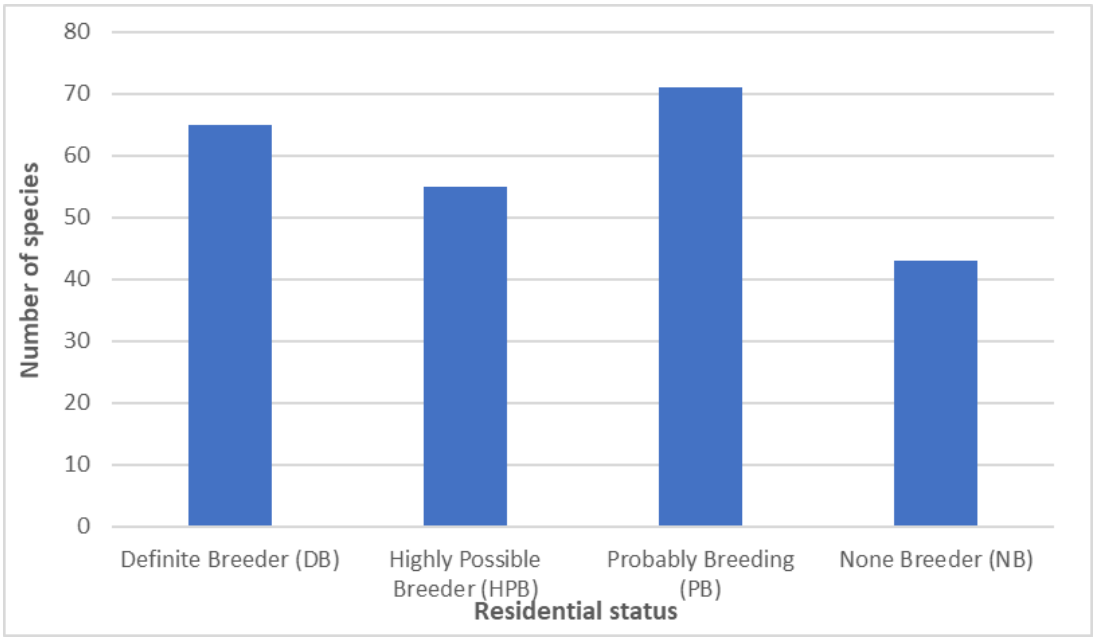

Figure 6. Breeding-wise species diversity of avifauna from Hürmetçi Marsh.

234 species in the marsh. The area's species richness is revealed by the fact that approximately half of Turkey's birds (46.8%) are likely to be seen in Hürmetçi Marsh, considering that the number of species in Turkey is 500. Hürmetçi Reedbed is home to a high species diversity due to its habitat diversity: wetland, wasteland, meadow-pasture, steppe, wooded, and agricultural areas.

Wetlands are highly sensitive and endangered ecosystems (Turner et al., 2000). Wetland loss or shrinkage is increasing rapidly daily (Barbier et al., 1997), and according to Barbier et al. (1993), more than half of the world's wetlands have been destroyed or lost since 1900. Birds are the most important bioindicator organisms in all habitat types, especially in wetlands. Wetlands are indispensable stopover sites for migratory species (Karaardıç et al., 2006a; Karaardıç and Özkan, 2017), especially before or after ecological barriers such as desert, sea, or high mountain chains, to rest and accumulate energy for

physiological recovery (Karaardıç and Erdoğan, 2019; Schmaljohann et al., 2022). Therefore, wetlands offer bird species important stopover and breeding areas due to their habitat diversity and abundance of food. According to the results, 23.5% are PM (species that use the area for stopover, 55 species) regularly distributed in the Hürmetçi reeds. In addition, 30.3% are SV (71 species, definite and possible breeders), and 18.4% are WV (44 species, nonbreeders) clearly reveals the area's importance. Since 72.2% of the species (170 species) distributed in the area are migratory species, it reveals the necessity of protecting their habitats in line with the Bern Convention, Ramsar Convention, and Biological Diversity Convention criteria. Moreover, PM species such as the pallid harrier, Curlew sandpiper, great snipe, black-tailed godwit, black-winged pratincole, and red-footed falcon are NT species according to IUCN criteria and stand out in terms of conservation conditions.

No previous study has determined the avifauna of the area, despite its popularity among birdwatchers. The Hürmetçi Marsh Management Plan report provides only a list; some sources offer brief information. Earlier studies were done in the study area without proper methodology, and 129 species belonging to 38 families were listed in that study (Ürker et al., 2017). With this study, 116 new species were added to the marsh. *Strix aluco* was previously listed in the marsh by Ürker et al. (2017). However, Hürmetçi Marsh is not within the distribution area of this species, and the habitat characteristics of the area are not suitable for this species. It is likely to be confused with *Asio otus* species due to physical similarity. Some of the species given in previous studies refer to species that used to be at the subspecies level but were now elevated to the species level, e.g., *Corvus corone* vs. *C. cornix* (Madge, 2016), *Larus cachinnans* vs. *L. michahelis* (Sibley and Monroe, 1990), and *Saxicola torquatus* vs. *S. rubicola* (Collar, 2020).

The local people declared that they frequently saw *Otis tarda* in the area in the past, but it has not been observed there since the 2000s. It is thought that *O. tarda*, the largest bird in Turkey, is no longer seen in the area due to anthropogenic reasons such as intense hunting pressure, habitat fragmentation, and loss, as in other parts of Turkey (Özgencil et al., 2022).

This study is important to provide basic data for future works that can help frame future management plans for improving wetland conservation, which affects resident and migratory bird populations. Hence, this avifauna checklist, with emphasis on the comments on conservation measures, could help in devising scientific management by the authorities. The fact that the area is located on migration routes and is a stopover area, breeding area, or wintering area for many species shows the necessity of carrying out regular monitoring studies in the area, such as a prospective bird ringing station. Bird ringing stations provide clear information about the bird species distributed in the area (Karaardıç et al., 2006b; Prünte et al., 2010). On the other hand, environmental education at bird ringing stations effectively raises environmental awareness among local people, especially children (Altınbilek and Karaardıç, 2019). The continuation of human activities that threaten the area in the immediate vicinity, as well as the effects of climate change, require regular research and monitoring to quickly detect possible changes in bird fauna and other living diversity.

Shallow ponds form in the hollow areas of the Karasaz Plain, a closed basin where the Hürmetçi Marsh is located, surrounded by marsh and swamps. The size of the areas covered with water varies seasonally. In 1957, the discharge of water from the basin to Kızılırmak through a canal had the most significant impact on the ecosystem. This resulted in a shrinkage in the flooded areas during the winter and spring. Accordingly, agricultural areas around the marsh have expanded. Another important impact has been the establishment of the Kayseri Organized Industrial Zone (KOIZ) on the edge of the marsh and the realization of some activities within the area.

The presence or absence of birds reveals the environmental characteristics of a place because they are the most important component of freshwater wetland ecosystems. Waterbird abundance and

diversity are influenced by wetland factors such as wetland area, depth of water and its quality, trophic level structure, and favorable roosting and breeding locations for birds (Wiens, 1989; Ma et al., 2010; Byju et al., 2023). Therefore, it is plausible to presume that human land use has some impact on most existing wetlands, which in turn has led to population decreases in many taxa that depend on wetlands (Byju et al., 2023). Despite subjecting the marsh to serious anthropogenic impacts, the specific nature of these impacts remains unknown due to the absence of historical studies on the marsh ecosystem and its avifauna.

Wetlands are very attractive for birdwatchers. Small wetlands with rich species diversity are important for birdwatchers and bird photographers in terms of ecotourism because it is easy to find random species that are more difficult to see than large areas. Although Hürmetçi Reedbed is relatively small, close to the city, and easy to reach, it has these characteristics in terms of harbouring a rich bird diversity.

Climate change has devastating effects on both wetlands and their biodiversity (Yılmaz et al., 2021). On the other hand, the reduction of wetland areas due to changes in land use patterns to expand agricultural areas leads to a decrease or even extinction of biodiversity in these areas (Çolak et al., 2022). Changes in the water regime due to domestic, industrial, and agricultural water use cause changes in the hydrodynamics of wetlands (Jeppesen et al., 2023). Another important anthropogenic effect is the negative effect of industrialization. In the last half-century, all these impacts have affected Hürmetçi Marsh. For this reason, it is necessary to determine the avian fauna of Hürmetçi Marsh, to associate it with threats, and to determine the measures to be taken for the protection of biodiversity without loss. Taking the necessary measures to ensure that Hürmetçi Marsh does not disappear due to the Kayseri Organized Industrial Zone (KOIZ) but to maintain its existence despite it setting a good example and placing responsibility on the KOIZ management. If this is achieved, they will have the right to boast of being an Organized Industrial Zone with a bird paradise.

The study prepared a list of avifauna, attempted to reveal possible threats to the ecosystem, and presented suggestions for follow-up by KOIZ management: (1) Determination of the current ecological status of the area, (2) determination of hydrological status by hydrodynamic modelling, (3) identification of threats to the area, (4) discussion of the effects of these factors on ecosystems and biodiversity; 5) determining the measures to be taken to prevent these effects, (6) revealing the biodiversity through regular observations, (7) Establishing a bird ringing station to conduct regular monitoring studies and organize environmental education, (8) creating a brochure for bird watching, and (9) evaluating the ecotourism potential of the area and developing suggestions for its utilization, including the implementation of work packages according to a specific schedule.

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