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Research Article/Araştırma Makalesi

Breeding and Migratory Bird Diversity in Iğdır Province (Eastern Anatolia)

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Abstract: The aim of this study was to contribute to the knowledge of avian diversity and breeding species in Türkiye. Observations were carried out in Iğdır Province within a total of 40 days spread throughout the migration and breeding periods of 2017-2018. Regional status and breeding codes were determined for each species. Some winter visitors have also been observed during the early stages of the spring migration. In the study, 192 species were identified belonging to 50 families from 20 orders and 58 residents, 83 summer visitors, 11 winter visitors, and 40 transit migratory birds. According to the result of the recording breeding behavior, 52 bird species were classified as confirmed breeders, 36 as probable breeders, and 70 as possible breeders. According to IUCN Red List, 10 globally threatened species (*Haematopus ostralegus, Vanellus vanellus, Numenius arquata, Gallinago media, Gypaetus barbatus, Aegypius monachus, Circus macrourus, Aythya ferina, Streptopelia turtur, Neophron percnopterus*) were observed. Aras Valley and Aralık-Karasu Wetlands are the most important areas for birds. The conservation of these areas is of high importance in the region for migratory birds.

Keywords: Avifauna, migratory birds, breeding birds, Aras Valley, stopover ecology.

Iğdır İlinde (Doğu Anadolu) Üreyen ve Göçmen Kuş Çeşitliliği

Öz: Bu çalışmanın amacı, Türkiye'deki kuş çeşitliliğine ve üreyen kuşlara dair bilgiye katkıda bulunmaktır. Iğdır ilinde 2017-2018 yıllarının göç ve üreme dönemlerinde 40 gün boyunca gözlemler yapılmıştır. Tespit edilen her tür için bölgesel durum ve üreme kodları belirlenmiştir. 20 takım ve 50 familyaya ait 192 kuş türü tespit edilmiştir. Bu türlerden 58'i yerli, 83'ü yaz ziyaretçisi, 11'i kış ziyaretçisi ve 40'ı transit göçmendir. Türlerin 52'si ilde kesin üreyen, 36'sı kuvvetle olası üreyen ve 70'i olası üreyen olarak sınıflandırılmıştır. Küresel olarak tehdit altındaki 10 tür (*Haematopus ostralegus, Vanellus vanellus, Numenius arquata, Gallinago media, Gypaetus barbatus, Aegypius monachus, Circus macrourus, Aythya ferina, Streptopelia turtur, Neophron percnopterus*) Iğdır ilinde gözlemlenmiştir. Aras Vadisi ve Aralık-Karasu Sulak Alanları kuşlar için en önemli alanlardır. Bu bölgenin korunması, göçmen kuşlar için büyük önem taşımaktadır.

Anahtar kelimeler: Avifauna, göçmen kuşlar, üreyen kuşlar, Aras Vadisi, konaklama ekolojisi.

1. Introduction

Birds are among the most remarkable groups in biodiversity and are relatively easy to observe directly than other vertebrate groups. However, detailed information is far from complete for most species and regions (Bibby et al., 1998). Birds are highly sensitive indicators of ecosystem quality (Smits & Fernie, 2013). Therefore, it is advantageous to monitor, count, and record them, even the most common ones, to better understand and follow the populations and communities (Lovette & Fitzpatrick, 2016).

Türkiye has one of the richest avifauna in the Western Palearctic due to different types of habitats, various climate regimes, a high degree of variable topography, location on the important migration routes, and being on the joint of several different biogeographic regions (Barış, 2000; Bilgin, 2004; Barış, 2012). A total of 491 bird species belonging to 76 families of 25 orders were listed in Türkiye and 313 of them breed in the country (Boyla et al., 2019; Furtun et al., 2021). Due to the increasing number of ornithology research and contributions to citizen science through bird watching in recent years, avifauna studies have become widespread in Türkiye. However, all breeding distributions and regional migration status even for the common species have been not revealed clearly. Therefore, there is still an information gap to determine the national-level population sizes for the assessments of national red list categories of the species. For this reason, the main objective of this study is to contribute to the knowledge of the avifauna of the province and also Türkiye by determining the breeding bird species.

2. Material and Methods

2.1. Study area

Iğdır Province is located in Eastern Anatolia. The Aras River constitutes the northern and northeastern border of the province. The province is surrounded by the Aras River and Armenia border in the north and northeast, Nakhichevan Autonomous Republic and Iran in the east and southeast, Ağrı Province in the south, and Kars Province in the west and northwest (Kaya, 2015). Mountainous and rugged terrain lands cover 74% of the province and the rest of the province is covered by Iğdır Plain. The average altitude of the plain is about 850 m (Parin & Gürbüz, 2022). Mount Ağrı, the highest mountain in the province is an ice-capped dormant compound volcano and the highest peak in Türkiye with an elevation of 5,137 m (Azzoni et al., 2017). General views of the study area were presented in Figure 1.

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2.2. Method

During the migration and breeding periods of 2017 and 2018, a total of 40 days of field study was carried out. Field studies were carried out for both years as April-May (pre-breeding migration period), June-July (late breeding period), and August-September (post-breeding migration period). The second half of the pre-breeding period were also considered as the early breeding period for the region and the coding of breeding behaviors began in this period.

The study was carried out in an area divided into 44 plots of a map with a scale of 1/25000 taken from the General Directorate of Mapping (Fig. 2). Binoculars, camera, and lens were used during the study. During observations, "point count" and "line transect" methods were used (Bibby et al., 2000). The locations for both methods were selected during field studies to cover different habitats in at least 10% of each plot. Field studies could not be carried out only in the region where Ağrı is located in the south of the province due to security reasons.

Figure 1. General views from the study area

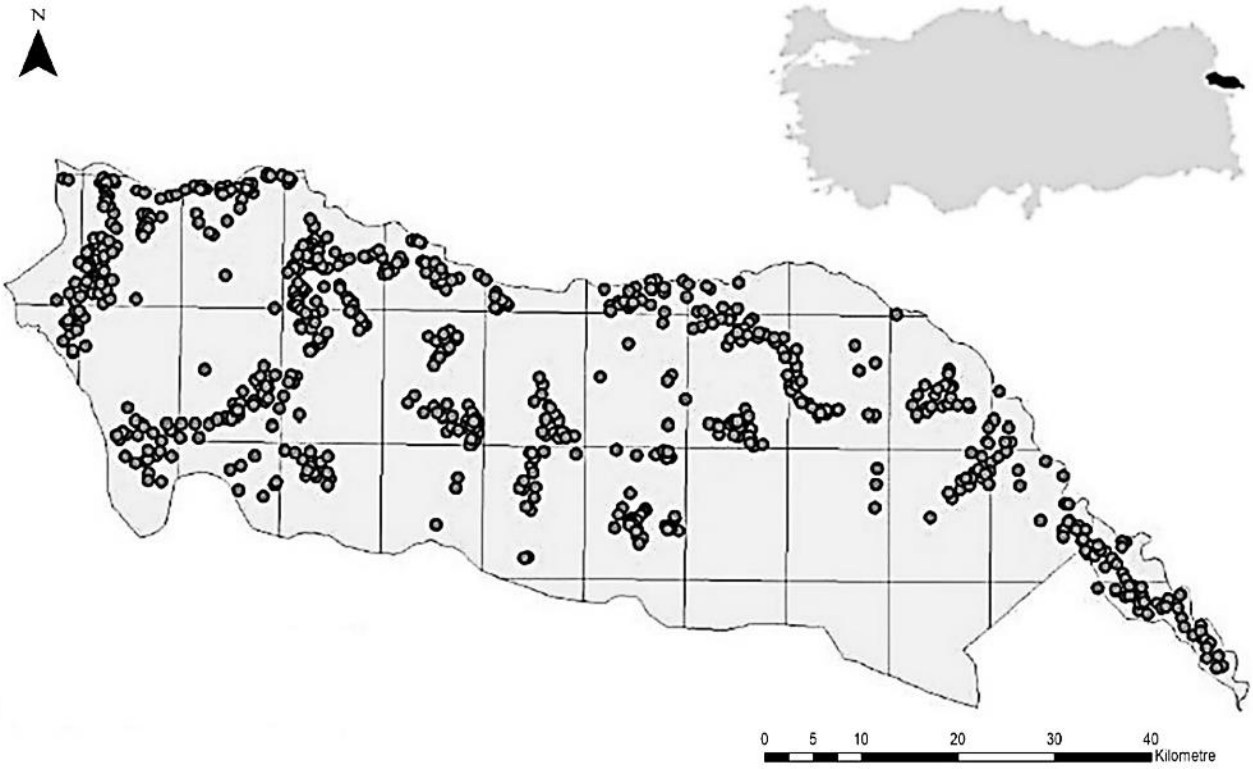

Figure 2. The map showing the plots and observation points, and the location of Iğdır province in Türkiye

The taxonomic list of bird species is arranged according to Gill & Donsker (2022). While determining the migration status of the species, the species seen throughout the year were categorized as "resident (R)" and those found during their breeding periods as "summer visitor (S)". In addition, some species recorded at the beginning of the spring migration were evaluated as winter visitors in the study area as a result of the regional assessment. Therefore, besides the breeding and transit migratory species targeted in the study, these species were categorized as "winter visitors (W)". The species observed only durissage or stopover during the migration periods were also classified as "transit migratory (T)". Since different populations of migratory bird species may have different migration behaviors, more than one migration status has been expressed for some species. The priority migration status is indicated by capital letters and the periods when the species are recorded in a smaller number are indicated by lowercase letters.

In order to identify breeding bird species, 16 codes system based on breeding behaviors suggested by Hagemeijer & Blair (1997) was used during breeding periods. In cases where more than one breeding behavior is coded, the highest breeding code was accepted.

3. Results

A total of 192 bird species were recorded in this study. The regional migration status were as follows: 58 residents (R/r), 83 summer visitors (S/s), 11 winter visitors (W/w), and 40 transit migrantories (T, t). They belong to 50 families of 20 orders (Table 1). Order Passeriformes (Passerines; 93 species) were the most diversified order followed by Charadriiformes (Shorebirds and relatives; 25), Accipitriformes (Raptors; 18), Pelecaniformes (Ibises, herons, pelicans; 9), and Anseriformes (Waterfowls; 7). 15 other orders cover 20.8% of all species (Fig. 3). The families Accipitridae (Raptors; 18) and Muscicapidae (Old World Flycatchers; 18 species) were the richest families followed by Scolopacidae (Sandpipers and Snipes; 11), Fringillidae (Finches; 10), and Ardeidae (Herons and bitterns; 8) (Fig. 3). The highest number of species (122 species) have been recorded in the Aras Valley.

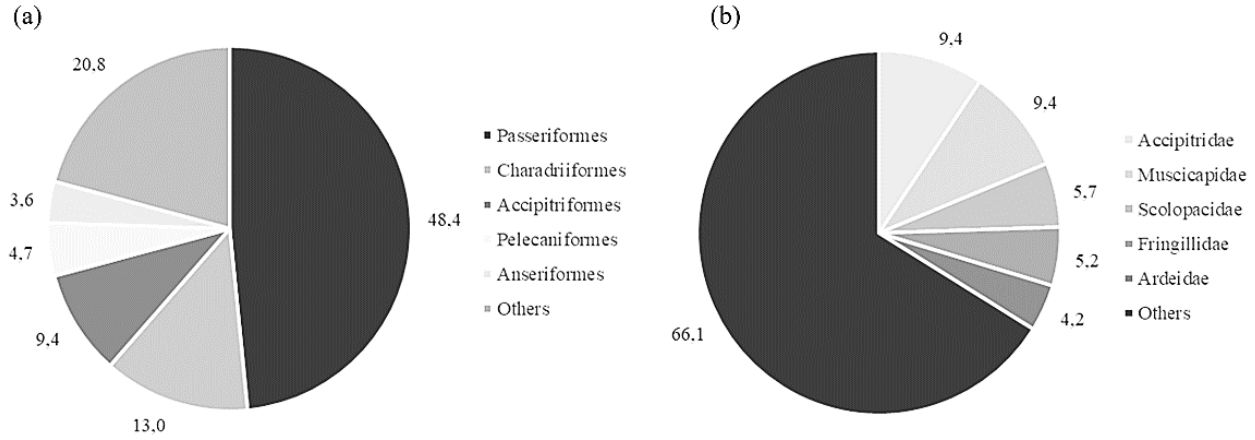

Figure 3. Percentage representation of the orders (a) and families (b) with the most species

The most frequently observed species are *Merops apiaster* (35 times) followed by *Ciconia Ciconia* (34), *Upupa epops* (28), *Corvus frugilegus* (27), *Coracias garrulus* (25), and *Larus armenicus* (25). The highest number of recorded species during a point count are *Hirundo rustica* (500 individuals), *Chlidonias leucopterus* (220), *Merops persicus* (150), *Larus armenicus* (102), and *Tadorna ferruginea* (90) (Table 1).

Breeding behaviors of 158 species were coded; 52 were classified as confirmed breeders, 36 as probable breeders, and 70 possible breeders. The other 34 species are thought not to breed within the provincial borders. The highest breeding codes were given for every species in Table 1.

According to the IUCN criteria, 10 globally threatened species including "Near Threatened species – NT" were recorded. *Haematopus ostralegus*, *Vanellus vanellus*, *Numenius arquata*, *Gallinago media*, *Gypaetus barbatus*, *Aegypius monachus*, and *Circus macrourus* are listed as "Near Threatened (NT)"; *Aythya ferina* and *Streptopelia turtur* are listed as "Vulnerable (VU)"; and *Neophron percnopterus* is listed as "Endangered (EN)" category.

Table 1. Recorded bird species in Iğdır province, regional status, breeding codes (0: non-breeders, A1-2: possible breeders, B3-9: probable breeders, C10-16: confirmed breeders), and the maximum numbers

Scientific Name & Order	Common English Name & Family	Regional Status	Breeding Codes	Highest Recorded Number
Anseriformes	Anatidae			
Tadorna ferruginea	Ruddy Shelduck	R, W	C12	90
Spatula querquedula	Garganey	t	B3	4
Spatula clypeata	Northern Shoveler	w	0	4
Mareca strepera	Gadwall	w, t	B3	3
Anas platyrhynchos	Mallard	R, W	C12	14
Aythya ferina	Common Pochard	t, s	B3	16
Aythya fuligula	Tufted Duck	w, t	B3	2
Galliformes	Phasianidae			
Alectoris chukar	Chukar Partridge	R	C12	11
Tetraogallus caspius	Caspian Snowcock	r	A1	-
Coturnix coturnix	Common Quail	S, T	A2	4

Table 1. (Continued)

Scientific Name & Order	Common English Name & Family	Regional Status	Breeding Codes	Highest Recorded Number
Caprimulgiformes	Caprimulgidae			
Caprimulgus europaeus	European Nightjar	S, T	B3	2
Apodiformes	Apodidae			
Tachymarptis melba	Alpine Swift	S, T	A1	17
Apus apus	Common Swift	S, T	C13	22
Cuculiformes	Cuculidae			
Cuculus canorus	Common Cuckoo	S, T	B3	3
Pterocliformes	Pteroclidae			
Pterocles orientalis	Black-bellied Sandgrouse	S, t	B3	11
Columbiformes	Columbidae			
Columba livia	Rock Dove	R	C12	21
Columba palumbus	Common Wood Pigeon	S, T	B3	16
Streptopelia turtur	European Turtle Dove	s, T	A2	2
Streptopelia decaocto	Eurasian Collared Dove	R	C13	4
Spilopelia senegalensis	Laughing Dove	r	A1	1
Gruiformes	Rallidae			
Rallus aquaticus	Water Rail	r	A1	1
Porzana parva	Little Crake	t	0	1
Porzana porzana	Spotted Crake	t	0	1
Gallinula chloropus	Common Moorhen	S	C12	4
Fulica atra	Eurasian Coot	R, W	C12	16
Podicipediformes	Podicipedidae			
Tachybaptus ruficollis	Little Grebe	W, t	A1	4
Podiceps grisegena	Red-necked Grebe	t, s	B3	1
Podiceps cristatus	Great Crested Grebe	w	A1	1
Podiceps nigricollis	Black-necked Grebe	s, T	B3	3
Charadriiformes	Haematopodidae			
Haematopus ostralegus	Eurasian Oystercatcher	S	B7	8
Charadriiformes	Recurvirostridae			
Himantopus himantopus	Black-winged Stilt	S, T	C12	12
Recurvirostra avosetta	Pied Avocet	t	0	1
Charadriiformes	Charadriidae			
Vanellus vanellus	Northern Lapwing	R	C12	20
Charadrius dubius	Little Ringed Plover	S	A1	7
Charadrius alexandrinus	Kentish Plover	t	0	1
Charadriiformes	Scolopacidae			
Numenius arquata	Eurasian Curlew	t	0	1
Calidris pugnax	Ruff	T, s	0	42
Calidris minuta	Little stint	t	0	7
Gallinago media	Great Snipe	t	0	1
Gallinago gallinago	Common Snipe	t, W	0	2
Actitis hypoleucos	Common Sandpiper	S, T	B3	6
Tringa ochropus	Green Sandpiper	T, W	0	4
Tringa totanus	Common Redshank	S	B7	13
Tringa glareola	Wood Sandpiper	T	0	2
Tringa erythropus	Spotted Redshank	T	0	1
Tringa nebularia	Common Greenshank	T, W	0	10

Table 1. (Continued)

Scientific Name & Order	Common English Name & Family	Regional Status	Breeding Codes	Highest Recorded Number
Charadriiformes	Glareolidae			
Glareola pratincola	Collared Pratincole	t	A1	5
Charadriiformes	Lariidae			
Chroicocephalus ridibundus	Black-headed Gull	r, W	A1	3
Larus armenicus	Armenian Gull	R, W	B9	102
Gelochelidon nilotica	Gull-billed Tern	t	0	1
Sternula albifrons	Little Tern	s, T	A1	2
Sterna hirundo	Common Tern	s	A1	4
Chlidonias leucopterus	White-winged Tern	s, T	C12	220
Chlidonias niger	Black Tern	t	0	2
Ciconiiformes	Ciconiidae			
Ciconia nigra	Black Stork	s, t	B3	2
Ciconia ciconia	White Stork	S, T, w	C16	39
Suliformes	Phalacrocoracidae			
Microcarbo pygmeus	Pygmy Cormorant	r, w	A1	21
Phalacrocorax carbo	Great Cormorant	r, w	0	4
Pelecaniformes	Threskiornithidae			
Plegadis falcinellus	Glossy Ibis	s, T	A1	12
Pelecaniformes	Ardeidae			
Ixobrychus minutus	Little Bittern	s	A1	2
Nycticorax nycticorax	Black-crowned Night Heron	s, t	A1	4
Ardeola ralloides	Squacco Heron	s, t	0	1
Bubulcus ibis	Western Cattle Egret	s, T	0	6
Ardea cinerea	Grey Heron	R, W	C16	4
Ardea purpurea	Purple Heron	S, T	A1	2
Ardea alba	Great Egret	W, t	0	2
Egretta garzetta	Little Egret	s, T	0	3
Accipitriformes	Accipitridae			
Gypaetus barbatus	Bearded Vulture	R	B6	2
Neophron percnopterus	Egyptian Vulture	S	A1	3
Pernis apivorus	European Honey Buzzard	T	0	29
Gyps fulvus	Griffon Vulture	R	A1	7
Aegypius monachus	Cinereous Vulture	t	0	1
Circaetus gallicus	Short-toed Snake Eagle	s, t	A1	1
Clanga pomarina	Lesser Spotted Eagle	T	0	4
Hieraaetus pennatus	Booted Eagle	s, t	A1	1
Aquila chrysaetos	Golden Eagle	R	B3	2
Accipiter brevipes	Levant Sparrowhawk	s, T	A1	11
Accipiter nisus	Eurasian Sparrowhawk	T, r	A1	3
Circus aeruginosus	Western Marsh Harrier	R, T	B9	4
Circus cyaneus	Hen Harrier	W, t	0	1
Circus macrourus	Pallid Harrier	t	0	2
Circus pygargus	Montagu's Harrier	S, T	B3	3
Milvus migrans	Black Kite	T	0	14
Buteo rufinus	Long-legged Buzzard	R	C14	12
Buteo buteo	Common Buzzard	T, r	A1	25

Table 1. (Continued)

Scientific Name & Order	Common English Name & Family	Regional Status	Breeding Codes	Highest Recorded Number
Strigiformes	Strigidae			
Otus scops	Eurasian Scops Owl	s, T	A2	1
Athene noctua	Little Owl	R	C13	2
Asio otus	Long-eared Owl	r	A1	1
Bucerotiformes	Upupidae			
Upupa epops	Eurasian Hoopoe	S, T	C14	4
Coraciiformes	Coraciidae			
Coracias garrulus	European Roller	S, T	C13	4
Coraciiformes	Alcedinidae			
Alcedo atthis	Common Kingfisher	T, r	A1	2
Coraciiformes	Meropidae			
Merops persicus	Blue-cheeked Bee-eater	S, T	C14	30
Merops apiaster	European Bee-eater	S, T	C14	150
Piciformes	Picidae			
Jynx torquilla	Eurasian Wryneck	T	0	1
Dendrocopos syriacus	Syrian Woodpecker	R	B3	3
Falconiformes	Falconidae			
Falco naumanni	Lesser Kestrel	t	A1	3
Falco tinnunculus	Common Kestrel	R, T	C13	4
Falco subbuteo	Eurasian Hobby	S, T	A1	1
Falco peregrinus	Peregrine Falcon	r	B3	2
Passeriformes	Laniidae			
Lanius collurio	Red-backed Shrike	S, T	C12	10
Lanius minor	Lesser Grey Shrike	s, T	C12	4
Lanius senator	Woodchat Shrike	s, t	A1	1
Passeriformes	Oriolidae			
Oriolus oriolus	Eurasian Golden Oriole	s, T	A2	10
Passeriformes	Corvidae			
Pica pica	Eurasian Magpie	R	C12	19
Pyrrhocorax pyrrhocorax	Red-billed Chough	R	B9	14
Coloeus monedula	Western Jackdaw	R	C12	30
Corvus frugilegus	Rook	R	C13	80
Corvus cornix	Hooded Crow	R	C13	20
Corvus corax	Northern Raven	R	A1	4
Passeriformes	Paridae			
Cyanistes caeruleus	Eurasian Blue Tit	r	A1	3
Parus major	Great Tit	R	A2	10
Passeriformes	Remizidae			
Remiz pendulinus	Eurasian Penduline Tit	R	C12	3
Passeriformes	Panuridae			
Panurus biarmicus	Bearded Reedling	r	A1	4
Passeriformes	Alaudidae			
Alauda arvensis	Eurasian Skylark	R	C12	10
Galerida cristata	Crested Lark	R	C12	12
Eremophila alpestris	Horned Lark	R	C12	4
Calandrella brachydactyla	Greater Short-toed Lark	T	A2	6
Alaudala rufescens	Lesser Short-toed Lark	T	A2	2

Table 1. (Continued)

Scientific Name & Order	Common English Name & Family	Regional Status	Breeding Codes	Highest Recorded Number
Passeriformes	Hirundinidae			
Riparia riparia	Sand Martin	S, T	C13	50
Hirundo rustica	Barn Swallow	S, T	C13	500
Ptyonoprogne rupestris	Eurasian Crag Martin	S	C13	30
Delichon urbicum	Common House Martin	S, T	C13	20
Passeriformes	Cettiidae			
Cettia cetti	Cetti's Warbler	R	A2	8
Passeriformes	Phylloscopidae			
Phylloscopus trochilus	Willow Warbler	T	0	10
Phylloscopus sindianus	Mountain Chiffchaff	T	A2	2
Phylloscopus collybita	Common Chiffchaff	s, T	A2	4
Passeriformes	Acrocephalidae			
Acrocephalus arundinaceus	Great Reed Warbler	s, T	C14	3
Acrocephalus schoenobaenus	Sedge Warbler	t	A1	1
Acrocephalus agricola	Paddyfield Warbler	s, t	A2	2
Acrocephalus scirpaceus	Marsh Warbler	s, T	A2	3
Acrocephalus palustris	Eurasian Reed Warbler	T	A2	1
Iduna pallida	Eastern Olivaceous Warbler	S, T	A2	2
Hippolais languida	Upcher's Warbler	s	B3	2
Passeriformes	Locustellidae			
Locustella luscinioides	Savi's Warbler	t	A2	1
Passeriformes	Sylviidae			
Sylvia atricapilla	Eurasian Blackcap	T	A1	4
Sylvia borin	Garden Warbler	T	0	5
Curruca nisoria	Barred Warbler	T	A2	2
Curruca curruca	Lesser Whitethroat	T	C12	2
Curruca communis	Common Whitethroat	S	A2	5
Curruca mystacea	Menetries's Warbler	S	C12	2
Passeriformes	Sittidae			
Sitta neumayer	Western Rock Nuthatch	R	C13	6
Sitta tephronota	Eastern Rock Nuthatch	r	B3	2
Passeriformes	Sturnidae			
Pastor roseus	Rosy Starling	s, T	A2	75
Sturnus vulgaris	Common Starling	R, w	C13	30
Passeriformes	Turdidae			
Turdus merula	Common Blackbird	T	A1	2
Passeriformes	Muscicapidae			
Cercotrichas galactotes	Rufous-tailed Scrub Robin	s, t	C13	10
Muscicapa striata	Spotted Flycatcher	s, T	A1	1
Luscinia svecica	Bluethroat	T	A1	
Luscinia luscinia	Thrush Nightingale	T	0	2
Luscinia megarhynchos	Common Nightingale	s, T	A2	2
Ficedula parva	Red-breasted Flycatcher	T	0	2
Ficedula hypoleuca	European Pied Flycatcher	T	0	1
Ficedula albicollis	Collared Flycatcher	T	0	1
Phoenicurus ochruros	Black Redstart	S, T	C11	3
Phoenicurus phoenicurus	Common Redstart	s, T	B3	3

Table 1. (Continued)

Scientific Name & Order	Common English Name & Family	Regional Status	Breeding Codes	Highest Recorded Number
Monticola saxatilis	Common Rock Thrush	t	B3	1
Monticola solitarius	Blue Rock Thrush	s, T	C14	3
Saxicola rubetra	Whinchat	T	A1	3
Saxicola maurus	Siberian Stonechat	T	A1	2
Oenanthe oenanthe	Northern Wheatear	S, T	C12	8
Oenanthe isabellina	Isabelline Wheatear	S, T	C12	20
Oenanthe hispanica	Western Black-eared Wheatear	S, T	C12	4
Oenanthe finschii	Finsch's Wheatear	S, T	C12	9
Passeriformes	Cinclidae			
Cinclus cinclus	White-throated Dipper	r	A1	2
Passeriformes	Passeridae			
Passer domesticus	House Sparrow	R	C12	35
Passer hispaniolensis	Spanish Sparrow	s, T	A1	20
Passer montanus	Eurasian Tree Sparrow	R	B6	*8*
Carpospiza brachydactyla	Pale Rockfinch	s	A2	2
Petronia petronia	Rock Sparrow	R	C14	10
Montifringilla nivalis	White-winged Snowfinch	R	B3	25
Passeriformes	Prunellidae			
Prunella collaris	Alpine Accentor	r	A2	1
Passeriformes	Motacillidae			
Motacilla flava	Western Yellow Wagtail	S, T	B3	7
Motacilla cinerea	Grey Wagtail	S, T	B3	3
Motacilla alba	White Wagtail	r, S, T	C12	6
Anthus campestris	Tawny Pipit	S, T	A1	4
Anthus trivialis	Tree Pipit	T	0	1
Anthus spinoletta	Water Pipit	r, T	A1	3
Passeriformes	Fringillidae			
Fringilla coelebs	Common Chaffinch	W, t	C14	10
Rhodopechys sanguineus	Asian Crimson-winged Finch	s	A1	3
Bucanetes githagineus	Trumpeter Finch	s	B5	7
Bucanetes mongolicus	Mongolian Finch	s	A1	1
Carpodacus erythrinus	Common Rosefinch	s, T	B3	3
Chloris chloris	European Greenfinch	w, T	A2	4
Linaria flavirostris	Twite	S, t	A2	12
Linaria cannabina	Common Linnet	R, S	A2	14
Carduelis carduelis	European Goldfinch	R	B6	10
Serinus pusillus	Red-fronted Serin	r	A1	2
Passeriformes	Emberizidae			
Emberiza calandra	Corn Bunting	S, r	B3	10
Emberiza cia	Rock Bunting	R	C14	2
Emberiza buchanani	Grey-necked Bunting	s	B5	4
Emberiza hortulana	Ortolan Bunting	S, T	B5	6
Emberiza melanocephala	Black-headed Bunting	s, T	C12	3

4. Discussion

This study reports the breeding and transit migratory bird species, their regional status, and the highest breeding codes in Iğdır Province. A total of 192 species were recorded in the study area. Approximately 39% of the avifauna of Türkiye (Furtun et al., 2021) was recorded in this research. According to the literature review, 322 bird species were identified in Iğdır province (eBird, 2022;

Kirwan et al., 2010; Türkoğlu & Şekercioğlu, 2018). Approximately 60% of this number was reported in this study. About 900 species was recorded in the Western Palearctic (Beaman & Madge, 2010), 21.2% of this number was recorded in this study. There are two main reasons for the variety of birds on a regional scale being so high: (1) the location of the province on the African-Eurasian bird migration routes, (2) due to various habitat types, the existence of suitable breeding, wintering, and stopover sites for birds. Species such as *Circus pygargus*, *Pterocles orientalis*, and *Buteo rufinus* can be seen frequently in steppe habitats and such habitats are common throughout the province. The species with limited distribution in Türkiye such as *Bucanetes githagineus* and *Bucanetes mongolicus* breed in rocky areas in the steppes of Iğdır. *Tetraogallus caspius*, *Gypaetus barbatus*, and *Prunella collaris* are remarkable species of alpine and sub-alpine habitats. All waterfowl species observed during the study and a high number of other migratory species use the wetlands as suitable stopover and breeding sites in the province.

The number of confirmed breeders were 52. According to Boyla et al. (2019) 313 bird species breed regularly in Türkiye. 16.6% of all breeding bird species in Türkiye were recorded as confirmed breeders in Iğdır. However, this number is thought to be higher than the results of the study show. The reasons for this are the cryptic behaviors of some species and the difficulty of reaching their breeding habitats. No study presenting the breeding birds in the study area was found in the literature. There is only one published study with the list of recorded species in the province (Türkoğlu & Şekercioğlu, 2018). Therefore, this study is the first published one focused on Iğdır province about breeding birds.

The highest number of the species was recorded in Aras Valley (63.55% of all species). Different habitat types such as steep cliffs, deep valleys, floodplains, rivers, agricultural fields, reedbeds, sandy, and graveled islets, scrub areas, orchards, and mountain steppes through the valley offer suitable stopover and breeding areas for the species with different ecological demands (Eken et al., 2006; Türkoğlu & Şekercioğlu, 2018; Neate-Clegg et al., 2019). The area meets 4 Ramsar criteria (Neate-Clegg et al., 2019; Ramsar, 2020) and is a Key Biodiversity Area due to hosting fourteen globally and/or regionally endangered plant species (Eken et al., 2006). Among 10 globally threatened bird species reported in this study, 7 of them were recorded in the valley. Of these, *Haematopus ostralegus* is a possible breeder on the islets or graveled or sandy riverside. According to del Hoyo et al. (1996), the global population of the nominate subspecies *ostralegus* which breeds also in Türkiye declined at a rate of over 40% after the 1990s (BirdLife International, 2019). Although no active threat to this species in the valley was identified, a dam to be established in the river in the future may have potentially negative effects on its breeding habitat. *Neophron percnopterus* was also observed in the valley. The global population of this spectacular species has declined dramatically over the past few decades (Velevski et al., 2015) and it is listed as "Endangered" (BirdLife International, 2021). The largest European breeding population of *Neophron percnopterus* was reported from Türkiye (Iñigo et al. 2008). Therefore, determining the breeding pairs in the area would be essential for conservation and monitoring studies for the future of the species. A rubbish dump located very close to the Aras valley plays an important role as a feeding area for this species as well as 3 other vulture species. *Aegypius monachus* and *Gyps fulvus* died due to feeding on a poisoned animal carcass at this rubbish dump in 2015 (Buechley et al., 2018). Such a risk of poisoning is a fatal threat to the *Neophron percnopterus*. In order to prevent the use of poisonous carcasses against feral dogs, red foxes, and grey wolfs, it is of vital importance to raise the awareness of the local people, to have criminal sanctions in place, and to make regular inspections in the rubbish dump. The valley is also an important transit flyway for many raptors that follow the Northeast Anatolian route during their migration periods.

A significant part of Aras Valley is located in the Iğdır Plain which is an Important Bird Area (hereafter: IBA). There are 5 IBA trigger species in this area (BirdLife International, 2020). Only two of these were recorded in this study: *Microcarbo pygmaeus* and *Gyps fulvus*. *Microcarbo pygmaeus* and other many water birds use Karasu and Aralık Wetlands in the plain for stopover and wintering. These wetlands are the biggest wetlands with slow-flowing and standing freshwaters in the province. The ponds, reeds, and seasonal wetlands in the area are suitable stopover sites for a large number of waders especially during migration periods. *Merops persicus* and *Curruca mystacea*, species have limited distribution in Türkiye (Kirwan et al., 2010; Boyla et al., 2019) and breed in/around these areas. One or two pairs of *Marmaronetta angustirostris* listed as "Vulnerable" globally have been reported from these wetlands in 1999 (IUCN, 2022). This species was also an IBA trigger species for the plain. The other IBA trigger species *Vanellus gregarious* listed as "Critically Endangered" globally have been reported these areas in the past from (IUCN, 2022). These two threatened bird species have not been recorded in this study. The last pair of *Marmaronetta angustirostris* was recorded in Göksu Delta in Türkiye between 2011-2013 but, as of 2014, all breeding pairs in Anatolia have disappeared (Kuş Araştırmaları Derneği, 2010). For this reason, it was expected that it was not recorded in the Aras Valley. In a study in which the migration routes of this highly site-faithful *Vanellus gregarious* were determined by attaching a satellite transmitter, none of the documented stopover sites were in the Aras Valley (Donald et al., 2021). However, since the migration route includes a corridor that also includes the Aras Valley, it is likely to be seen occasional. *Vanellus vanellus* is another threatened species around Aralık Wetland. Overgrazing and agriculture are potential threats to this species in hatching areas. Iğdır Plain is also one of only a few regular wintering sites of *Ciconia ciconia* in Türkiye and there is a great breeding colony throughout the area. Pollution caused by solid domestic waste has been observed as a common problem in the area. Using these materials in the nest by *Ciconia ciconia* is the most noticeable threat. Using artificial materials such as string, foil, fabric, and such for nesting material may result in the mortality or injuries of fledglings (Jagiello et al., 2018). A juvenile *Ciconia ciconia* killed by this type of material by getting tangled around its neck was observed on the Aralık Plain. Throughout the

study period, *Tadorna ferruginea* and *Larus armenicus* were regularly observed in large numbers in all wetlands in Iğdır. *Larus armenicus* use wetlands for feeding and resting. *Tadorna ferruginea* is the most common anatid breeder in wetlands of Iğdır Plain and also in Aras Valley and Abbasgöl Pond (border of Ağrı Province).

Tetraogallus caspius is one of the IBA trigger species. An important part of Mount Ağrı has potential breeding areas of this species. Unfortunately, the area was visited only once, due to safety, and the habitat of this species could not have been reached. No breeding record of the species was found in the available literature (Kirwan et al., 2010; eBird, 2022). In the oral interviews with ornithologists, bird watchers active in the region and the locals, it was learned that this species breeds in Mount Tekaltı. However, no confirmed breeding behavior was recorded during the observations. Therefore, the breeding status of this species is unclear, and it needs further research. It was noted that it was under the threat of illegal hunting. Mount Ağrı isolates the province from the harsh continental climate of the Eastern Anatolian region during the winter and causes a unique microclimate, making the province a more temperate shelter for birds. Nevertheless, the area which lays between the slopes of Mount Ağrı and northeast of Iğdır plain (Aralık District) is among the highest-risk areas of desertification in Türkiye (Türkeş et al., 2020). This habitat degradation will undoubtedly affect the species composition and abundance in the area in the future.

In conclusion, the province is important to have different habitats for birds such as the high mountains, alpine meadows, plains, riparian habitats, arid and semi-arid steppe, and standing freshwaters. It is clear that the riverine habitats along Aras River represent a hotspot for avian diversity in Asia Minor. Many migratory bird species with high numbers in different groups such as raptors, passerines, and waterfowls use the area as breeding, stopover, and wintering sites. The bird ringing station running in the area is a very important ornithological study that reveals the importance of the area in terms of bird migration and the continuity of its activities has a very high value. Determining the breeding population of *Neophron percnopterus* in the area and constant monitoring studies are vital for the species. The conservation of Aralık and Karasu Wetlands, which are very suitable stopover sites for many songbirds and waders during migration periods, is a high priority. The high ecotourism potential of the province for bird watching and wildlife photography was emphasized by Çelik et al. (2021). If bird watching and photography can be combined with the potential of other ecotourism activities in the region, Iğdır province may evolve into a major tourist destination for both Türkiye and Eastern Anatolia.

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