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Evaluation of the bird diversity in Al-Malih Marshland, Babylon, Iraq

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Abstract

This study aimed to evaluate bird diversity in Al Malih Marshland and identify endangered species in Babylon, Iraq from June 2022 to May 2023. A total of 117 species were documented in Al Malih Wetland, representing 17 orders and 38 families, with 7 species listed on the IUCN Red List. Relative abundance varied from 8.628% to 0.011%. Simpson diversity index ranged from 0.965 to 0.897, while Shannon–Weiner diversity index ranged from 3.711 to 2.894. Evenness index ranged from 0.979 to 0.768, and Richness index (Margalef) ranged from 12.25 to 4.19. Dominance index ranged from 0.291 to 0.072. The avian population appears semi-balanced, with moderate community status. In conclusion, the area's high diversity underscores its significance, warranting further research to designate it as an Important Bird Area (IBA), akin to others in Iraq.

Keywords: Birds of Iraq, Marshes of Iraq, Al Malih wetland, Babylon.

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Introduction

A wide variety of resident and migratory waterbirds are supported by wetlands. (Amezaga *et al*., 2002). They differ widely as a result of variations in the soil, terrain, climate, water regime, water chemistry, flora, and other factors. They consist of wetland areas, marshes, and other similar environments. (O'NEAL *et al*., 2008) Wetlands offer suitable habitats for plants and animals that are primarily found in these areas, which is one of its fundamental advantages, for instance, migratory birds are thought to be the primary users of wetlands as places to foraging, resting , and roosting(Ma *et al*., 2010). Iraq has a unique geographic location near the southeast corner of the Western Palearctic region, which also covers Europe, Asia (with the exception of the southern half), and North Africa, It is located along the routes taken by numerous migratory bird species from cold climates in the Siberian plateau and Europe to warm climates in Arabia and Africa, Additionally Iraq has a large number of breeding and resident birds, which contribute significantly to the nation's biodiversity(Al-Sheikhly, 2021). The Middle East's most important wetland for wildlife is located in Iraq, which is regarded as an important bird area (IBA)(Evans, 1994). According to (Birdlife International, 2023) the number of bird species in Iraq exceeds 398, with 245 land birds, 128 waterbirds, and 25 seabirds that species have been identified. The African-Eurasian Flyways and other bird migration pathways pass through Iraq; 312 migrating birds were counted overall. the Tigris and Euphrates basins' vast open lakes, rivers annual ponds, and marshes serve as important resting and staging grounds, there are numerous bird species of conservation concern in the lower Tigris and Euphrates River basin in central Iraq, A number of significant ornithological counts have shown that several locations scattered over the central Iraqi landscape appear to offer migratory birds ideal stop-over and/or congregating sites.(Al-Sheikhly, 2021). According to historical works of literature, there are Poor data on central Iraq region especially Babylon province. In (Kohring, 2019) discussed the key biodiversity areas of Iraq (KBA) project and showed two

areas in Babylon as IBA important bird and biodiversity areas (ibn Najim wetland, and hindiya bridge) and considered the Mussaib as KBA. Al Malih marshland has not study previously. This study aimed to assess the bird diversity in this area and determine endangered species in Babylon Province - Iraq.

Method and Materials

Study areas

Al-Malih marshland (Figure 1) is located in the northern part of Babylon province (N 32°48'56", E 44°20'37") and south of Baghdad (far about 54.78 km). However, it receives water from the Euphrates River through two channels that pass through it and cover approximately 20 km^2 area (2000 hectares) most of them convert to fish farms due to the low area that helps in capturing water easily and water available through it.

Two stations were chosen during bird survey to assess bird diversity in study area showed in (Figure. 1). First station (N 32°48'19", E 44°21'41") Located between the north and east parts of Al Malih wetland , extended to 8 km and there is a feeding channel pass through it from the Euphrates river , a lot of fish farms there and also wetlands especially in the winter season with a lot of migrant birds, many human activities like fishing and birds hunting, the plants cover featured by abundance the common reed *Phragmites australis* covered about 15% and other plants species scattered like salt cedar *Tamarix* spp.

Second station (N 32°48'03", E 44°20'30") located between the south and west parts of Al Malih wetland ,extended to 7 km and there is feeding small channels from human-made pass through it, a lot of fish farms there and also wetlands especially in the winter season with a lot of migrant birds, many human activities there like fishing and hunting, the plants cover featured by abundance the common reed *P. australis* , covered about 25% and other plants species scattered like and salt cedar *Tamarix spp.*

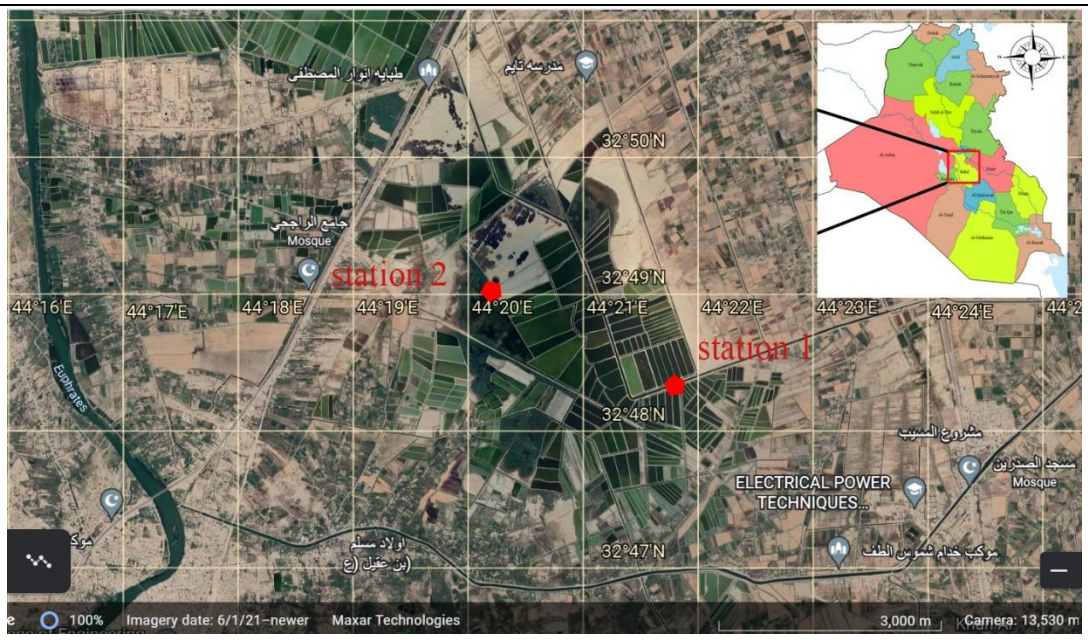

Figure 1: Map of the Al Malih wetland.

Bird Survey

The study was conducted for one year between (June 2022 – May 2023) by using the line transect count method, one visit per month in suitable weather conditions to avoid birds disturb and during bird activity time(7 a.m. – 1 p.m.) (Bibby *et al*., 2000,Sutherland *et al*., 2004) and by using a digital camera (Nikon coolpixp900s) , Binocular (Ansinna,12x40) and Spotting Scope (Svbony,25-75x70), finally Identifying the Bird species were according to (Svensson, 2010), (Allouse, 1961) and (Porter & Aspinall, 2013).

Data Analysis

To assess the birds Diversity, we used ecological indices and relative abundance indicators to examine the composition of these communities. The relative abundance (Ra) ,formula [Ra% = ni / N * 100], refers to the percentage of one species (ni) in relation to the total number of different species (N) in a specific community(Odum, 1971), the diversity indices were calculated by using the Shannon - Weiner index explain in formula [$H' = - \sum pi \ln pi$], H'= Shannon Diversity, pi = is the proportion of individuals found in *i*th species(Shannon & Weaver, 1949), and Simpson's index formula [$D= 1- \sum (pi)^2$] , pi = is the proportion of individuals found in *i*th species(Simpson, 1949), and Richness index was estimated by using the Margalef index formula [D_{mg}= S-1/ ln N],D_{mg}= species richness (Margalef) , S= the number of species recorded by N= total number of individuals in area, for evenness we used(Margalef, 1968), the evenness index indicated in formula [$j = H' / \ln S$] where j= Evenness index, H' = Shannon Diversity index, S= the number of species recorded by N, total number of individuals in area(Pielou, 1977). Dominance index (Berger and Parker index)using formula[$d=N_{max}/N$],d=Dominance index, N max= the number of individuals in the most abundant species, N= total number of individuals in area(Berger & Parker, 1970)(Magurran, 2004) .The PAST program (v.4.13) (Paleontological Statistics Software Package for Data Analysis) was used to calculate diversity indices. data analysis software (Hammer *et al*., 2001).

Result and Discussion

A total of 117 species were recorded in al Malih Wetland belonging to 17 orders and 38 families (Table.1) seven species within the red list of IUCN (The International Union for Conservation of Nature) (Birdlife International, 2023). Number of species were recorded near numbers from another study (125 species)conducted in the Iraqi Central Marsh which was known that provide important habitats for resident and migrant birds (Fazaa et al., 2017) and represents about 27% of the total number of Iraqi birds in the small wetland area.

Table 1: list of Bird species Recorded in Al Malih Wetland and relative abundance (Ra%).

Scientific name	English name	Order	Family	Station 2, Ra %	Station 1, Ra%
Francolinus francolinus	Black Francolin	Galliformes	Phasianidae	0.123	0.331
Tadorna tadorna	Common Shelduck	Anseriformes	Anatidae	0.078	0
Marmaronetta angustirostris	Marbled Teal	Anseriformes	Anatidae	0.795	0
Aythya ferina	Common Pochard	Anseriformes	Anatidae	0.056	0
A. nyroca	Ferruginous Duck	Anseriformes	Anatidae	0.930	0
Spatula querquedula	Garganey	Anseriformes	Anatidae	0.179	0
S. clypeata	Northern Shoveler	Anseriformes	Anatidae	2.129	0
Anas platyrhynchos	Mallard	Anseriformes	Anatidae	0.414	0
A. crecca	Common Teal	Anseriformes	Anatidae	1.882	0
Tachybaptus ruficollis	Little Grebe	Podicipediformes	Podicipedidae	1.131	2.128
Columba livia	Rock Dove	Columbiformes	Columbidae	1.523	1.243
C. palumbus	Common Woodpigeon	Columbiformes	Columbidae	0.358	0.690
Streptopelia decaocto	Eurasian Collared-dove	Columbiformes	Columbidae	1.961	3.510
Spilopelia	Laughing	Columbiformes	Columbidae	0.739	1.796

senegalensis	Dove				
Caprimulgus europaeus	European Nightjar	Caprimulgiformes	Caprimulgidae	0.033	0
C. aegyptius	Egyptian Nightjar	Caprimulgiformes	Caprimulgidae	0.067	0.304
Apus apus	Common Swift	Apodiformes	Apodidae	0.324	0
Porphyrio porphyrio	Purple Swamphen	Gruiformes	Rallidae	0.168	0
Gallinula chloropus	Common Moorhen	Gruiformes	Rallidae	1.255	2.100
Fulica atra	Common Coot	Gruiformes	Rallidae	0.022	0
Ciconia Ciconia	White Stork	Ciconiiformes	Ciconiidae	1.479	0
Plegadis falcinellus	Glossy Ibis	Pelecaniformes	Threskiornithidae	0.313	2.542
Ixobrychus minutus	Common Little Bittern	Pelecaniformes	Ardeidae	0.123	0.525
Nycticorax nycticorax	Black-crowned Night-heron	Pelecaniformes	Ardeidae	1.568	7.739
Ardeola ralloides	Squacco Heron	Pelecaniformes	Ardeidae	0.336	0.829
Bubulcus ibis	Cattle Egret	Pelecaniformes	Ardeidae	2.173	3.952
Ardea cinerea	Grey Heron	Pelecaniformes	Ardeidae	0.336	0.055
A. purpurea	Purple Heron	Pelecaniformes	Ardeidae	0.067	0.055
A. alba	Great White Egret	Pelecaniformes	Ardeidae	0.112	0
Egretta garzetta	Little Egret	Pelecaniformes	Ardeidae	1.333	2.183
Pelecanus onocrotalus	Great White Pelican	Pelecaniformes	Pelecanidae	0.717	0
Microcarbo pygmaeus	Pygmy Cormorant	Suliformes	Phalacrocoracidae	0.930	8.568**
Phalacrocorax carbo	Great Cormorant	Suliformes	Phalacrocoracidae	2.341	0.967
Recurvirostra avosetta	Pied Avocet	Charadriiformes	Recurvirostridae	8.628**	4.836
Himantopus Himantopus	Black-winged Stilt	Charadriiformes	Recurvirostridae	7.227	7.407
Charadrius hiaticula	Common Ringed Plover	Charadriiformes	Charadriidae	2.353	0.967
C. dubius	Little Ringed Plover	Charadriiformes	Charadriidae	0.672	1.133
C. alexandrines	Kentish Plover	Charadriiformes	Charadriidae	1.030	2.459
Vanellus vanellus	Northern Lapwing	Charadriiformes	Charadriidae	0.840	0
V. spinosus	Spur-winged Lapwing	Charadriiformes	Charadriidae	2.274	2.266
V. indicus	Red-wattled Lapwing	Charadriiformes	Charadriidae	0.649	1.133
V. leucurus	White-tailed Lapwing	Charadriiformes	Charadriidae	1.636	2.045
Limosa limosa	Black-tailed Godwit	Charadriiformes	Scolopacidae	1.042	0
Calidris pugnax	Ruff	Charadriiformes	Scolopacidae	2.879	0.884
C. temminckii	Temminck's Stint	Charadriiformes	Scolopacidae	0.302	0
C. minuta	Little Stint	Charadriiformes	Scolopacidae	0.717	0.718
Gallinago gallinago	Common	Charadriiformes	Scolopacidae	0.190	0

	Snipe				
Actitis hypoleucos	Common Sandpiper	Charadriiformes	Scolopacidae	0.033	0
Tringa ochropus	Green Sandpiper	Charadriiformes	Scolopacidae	0.067	0
T. erythropus	Spotted Redshank	Charadriiformes	Scolopacidae	0.022*	0
T. tetanus	Common Redshank	Charadriiformes	Scolopacidae	1.434	0
T. glareola	Wood Sandpiper	Charadriiformes	Scolopacidae	0.571	0.663
T. stagnatilis	Marsh Sandpiper	Charadriiformes	Scolopacidae	2.207	0.801
Glareola pratincola	Collared Pratincole	Charadriiformes	Glareolidae	0.044	0
Chroicocephalus genei	Slender-billed Gull	Charadriiformes	Laridae	1.098	2.598
Larus ridibundus	Black-headed Gull	Charadriiformes	Laridae	3.742	2.072
L. ichthyaetus	Pallas's Gull	Charadriiformes	Laridae	1.008	0.221
L. armenicus	Armenian Gull	Charadriiformes	Laridae	3.384	2.763
Sternula albifrons	Little Tern	Charadriiformes	Laridae	0.324	0.663
Gelochelidon nilotica	Common Gull-billed Tern	Charadriiformes	Laridae	0.425	0.248
Hydroprogne caspia	Caspian Tern	Charadriiformes	Laridae	0.347	0.248
Chlidonias hybrida	Whiskered Tern	Charadriiformes	Laridae	0.470	0
C. leucopterus	White-winged Tern	Charadriiformes	Laridae	0.493	0
Tyto alba	Common Barn-owl	Strigiformes	Tytonidae	0.123	0
Elanus caeruleus	Black-winged Kite	Accipitriformes	Elanidae	0.067	0.359
Circaetus gallicus	Short-toed Snake-eagle	Accipitriformes	Accipitridae	0.011*	0
Gyps fulvus	Griffon Vulture	Accipitriformes	Accipitridae	0.011*	0
Clanga clanga	Greater Spotted Eagle	Accipitriformes	Accipitridae	0.100	0
Hieraaetus pennatus	Booted Eagle	Accipitriformes	Accipitridae	0.022	0
Circus aeruginosus	Western Marsh-harrier	Accipitriformes	Accipitridae	0.201	0.193
Accipiter nisus	Eurasian Sparrowhawk	Accipitriformes	Accipitridae	0.044	0.027 *
Milvus migrans	Black Kite	Accipitriformes	Accipitridae	0.224	0.635
M. migrans lineatus	Black-eared Kite	Accipitriformes	Accipitridae	0.280	0.469
Falco tinnunculus	Common Kestrel	Falconiformes	Falconidae	0.044	0
F. columbarius	Merlin	Falconiformes	Falconidae	0.011 *	0
F.alco peregrinus	Peregrine Falcon	Falconiformes	Falconidae	0.011 *	0
Merops persicus	Blue-cheeked Bee-eater	Coraciiformes	Meropidae	0.739	0
M. apiaster	European Bee-eater	Coraciiformes	Meropidae	0.179	0
Coracias	Indian Roller	Coraciiformes	Coraciidae	0.134	0

benghalensis					
Alcedo atthis	Common Kingfisher	Coraciiformes	Alcedinidae	0.336	0.165
Ceryle rudis	Pied Kingfisher	Coraciiformes	Alcedinidae	1.591	1.105
Halcyon smyrnensis	White-breasted Kingfisher	Coraciiformes	Alcedinidae	0.246	0.359
Upupa epops	Eurasian Hoopoe	Bucerotiformes	Upupidae	0.067	0
Lanius collurio	Red-backed Shrike	Passeriformes	Laniidae	0.067	0
L. phoenicuroides	Red-tailed Shrike	Passeriformes	Laniidae	0.056	0.110
L. isabellinus	Isabelline Shrike	Passeriformes	Laniidae	0.089	0.110
L. minor	Lesser Grey Shrike	Passeriformes	Laniidae	0.022	0
L. senator	Woodchat Shrike	Passeriformes	Laniidae	0.067	0
Corvus cornix	Hooded Crow	Passeriformes	Corvidae	0.067	0
C. Capellanus	Mesopotamian Crow	Passeriformes	Corvidae	0.918	1.686
Pica pica	Eurasian Magpie	Passeriformes	Corvidae	0.179	0.027 *
C. monedula	Eurasian Jackdaw	Passeriformes	Corvidae	0.044	0
C. frugilegus	Rook	Passeriformes	Corvidae	1.467	1.520
Ammomanes deserti	Desert Lark	Passeriformes	Alaudidae	0.033	0
Galerida cristata	Crested Lark	Passeriformes	Alaudidae	0.425	0.525
Prinia gracilis	Graceful Prinia	Passeriformes	Cisticolidae	0.112	0.193
Hippolais languida	Upcher's Warbler	Passeriformes	Acrocephalidae	0.033	0
Acrocephalus melanopogon	Moustached Warbler	Passeriformes	Acrocephalidae	0.212	0
Hirundo rustica	Barn Swallow	Passeriformes	Hirundinidae	1.030	2.266
Pycnonotus leucotis	White-eared Bulbul	Passeriformes	Pycnonotidae	0.268	0.663
Phylloscopus collybita	Common Chiffchaff	Passeriformes	Phylloscopidae	0.313	0.442
Argya huttoni	Afghan Babbler	Passeriformes	Leiotrichidae	1.042	2.377
A. altirostris	Iraq Babbler	Passeriformes	Leiotrichidae	1.210	1.630
Sturnus vulgaris	Common Starling	Passeriformes	Sturnidae	8.292	3.261
Cercotrichas galactotes	Rufous-tailed Scrub-robin	Passeriformes	Muscicapidae	0.112	0.248
Muscicapa striata	Spotted Flycatcher	Passeriformes	Muscicapidae	0.067	0
Luscinia svecica	Bluethroat	Passeriformes	Muscicapidae	0.011	0
Phoenicurus ochruros	Black Redstart	Passeriformes	Muscicapidae	0.022	0
Saxicola rubicola	European Stonechat	Passeriformes	Muscicapidae	0.179	0.193
S. maurus	Siberian Stonechat	Passeriformes	Muscicapidae	0.235	0.331
Hypocolius ampelinus	Hypocolius	Passeriformes	Hypocoliidae	0.168	0

Passer domesticus	House Sparrow	Passeriformes	Passeridae	3.103	2.653
P. hispaniolensis	Spanish Sparrow	Passeriformes	Passeridae	0.526	0
P. moabiticus	Dead Sea Sparrow	Passeriformes	Passeridae	0.896	0.967
Anthus spinoletta	Water Pipit	Passeriformes	Motacillidae	0.414	0.939
Motacilla flava	Western Yellow Wagtail	Passeriformes	Motacillidae	0.829	2.072
M. cinerea	Grey Wagtail	Passeriformes	Motacillidae	0.011	0
M. citreola	Citrine Wagtail	Passeriformes	Motacillidae	0.179	0
M. alba	White Wagtail	Passeriformes	Motacillidae	0.705	0.801
*Lowest value	** Highest value				

A percentage of birds species in each order in Al Malih wetland, Passeriformes represented 35%, Charadriiformes 12%, Pelecaniformes and Coraciiformes 7%, and other orders occupied 39 % each order 3% (Figure.2).

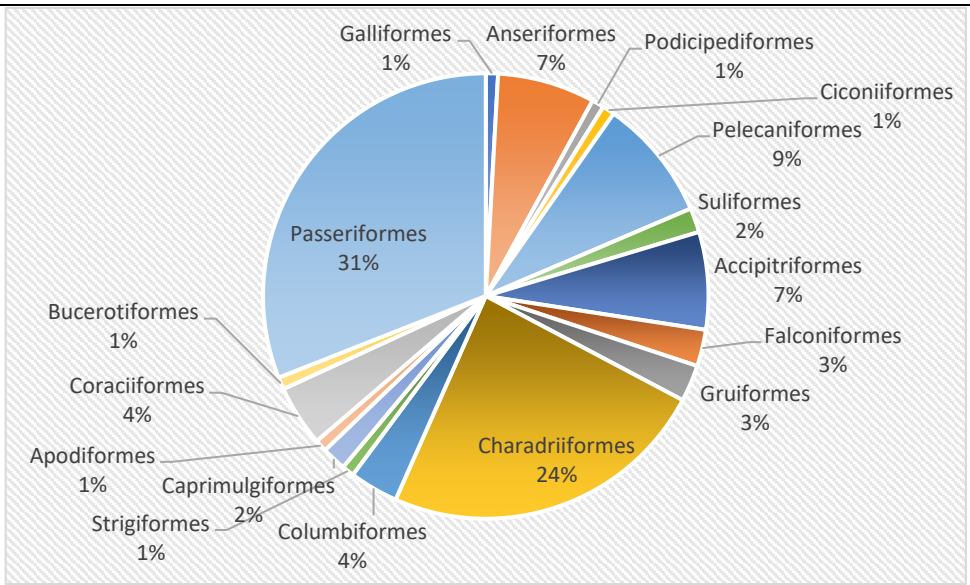

Figure 2: Percentage of species in each bird orders observe in Al Malih wetland.

The result of present study showed the total numbers of species was 117 bird species, the highest number of species in station 1 was 89 species in January 2023 whereas lowest number was 32 species in September 2022 in station 1 while the highest number in station 2 was 50 species in November 2022 and lowest number was 22 species in September 2022 (Figure 3), results of current study agree with provisional checklist of Iraq (Salim *et al*., 2010) that most species were winter visitors to Iraq (Autumn Migration) and results was showed the Little Grebe *T. ruficollis iraquensis* , Iraq babbler *Argya altirostris* , and Mesopotamian crow *C. cornix capellanus* were just a few of the bird species that are native to or have a restricted distribution in Iraq as refer (Al-Sheikhly, 2021).

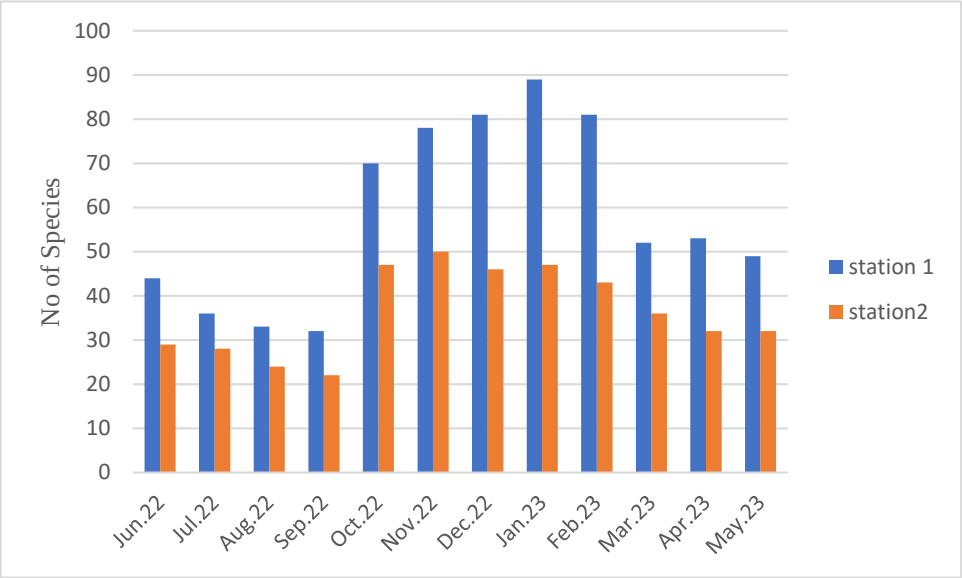

Figure 3: Number of species recorded in Al Malih wetland.

total number of individuals were 12542 individuals in study area, the highest number in station 1 was 1749 individuals in November 2022 whereas lowest number was 187 in July 2022 in station 1, total number of individuals 8924, while the highest number in station 2 was 508 individuals in January 2023 and lowest number was 149 individuals in September 2022, total number of individuals was 3618 in station 2 (Figure4).

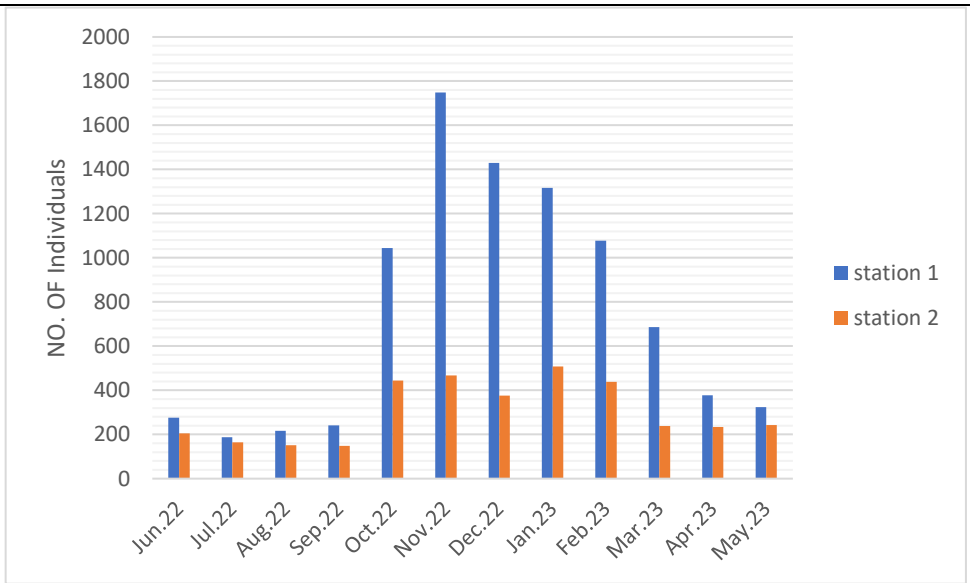

Figure 4: Number of Individuals recorded in Al Malih wetland.

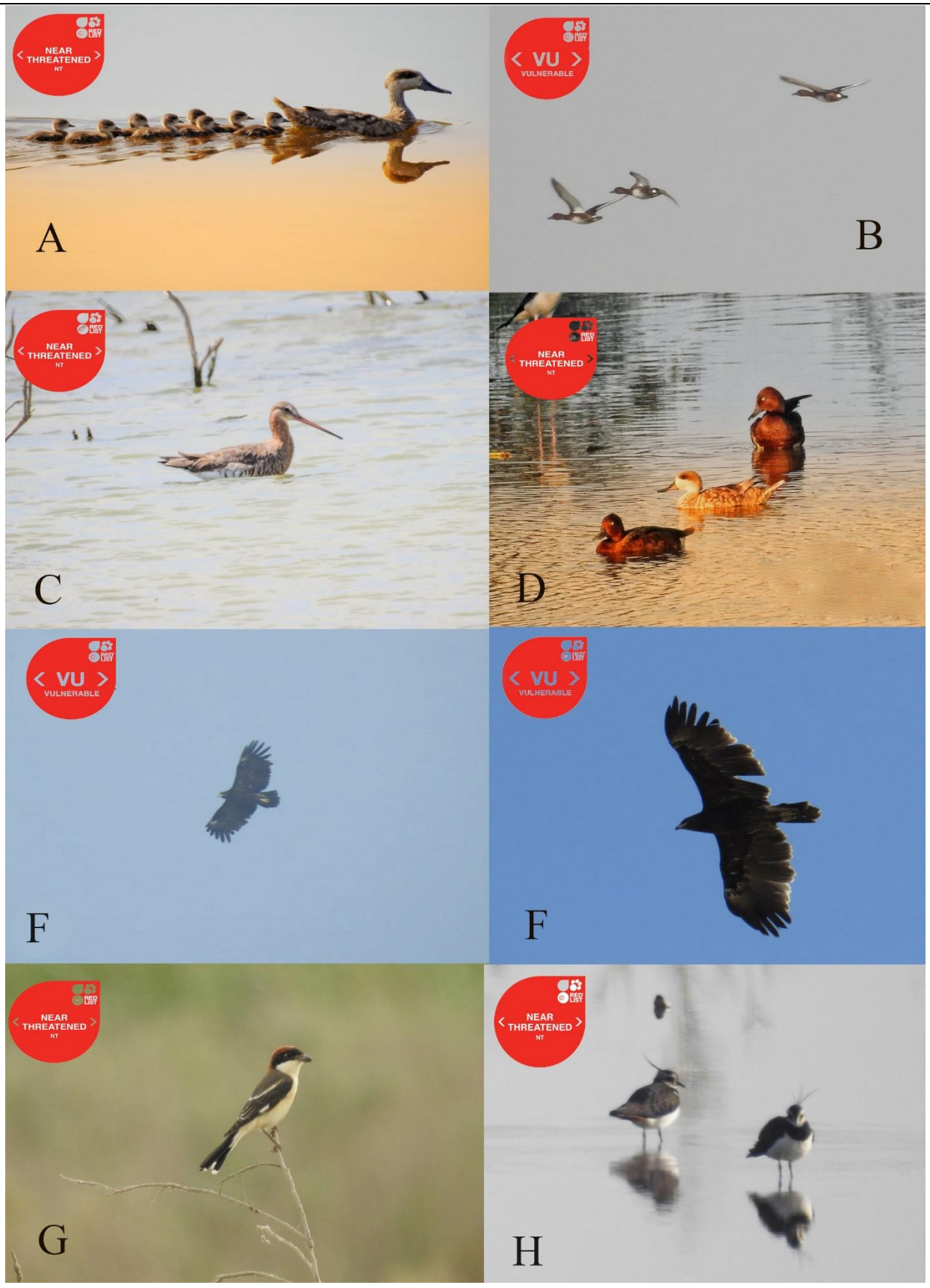

Figure 5: A: Marbled teal *M. angustirostris* (Near threatened), B: Common Pochard *A. ferina* (Vulnerable), C: Black tailed Godwit *L. limosa* (Near threatened) , D: Ferruginous Duck *A. nyroca*, F: Greater spotted eagle *C. clanga* two age (Vulnerable), G: Woodchat shrike *L. senator* (Near threatened), H: Northern lapwing *V. vanellus* (Near threatened).

Relative abundance %

The relative abundance percentage were recorded in each station in (Table 1), station 1 recorded highest value in Pied Avocet *R. avosetta* (8.628) and lower value in many species like Merlin *Falco columbarius*, Peregrine Falcon *Falco peregrinus* (0.011). in station 2 recorded highest value in Pygmy Cormorant *P. pygmeus* (8.568) and participate lower value between many species like Eurasian Sparrowhawk *A. nisus* (0.027).

The monthly relative abundance in the Malih wetland was showed in (Figure 6) The highest relative abundance was 19.251% recorded in July 2022 in station 1, whereas, the lowest abundance was 5.668 % in December 2022. while station 2 was recorded highest relative abundance 16% in July 2022 and lowest 9.252% in January 2023. The relative number of birds may depend on the species migratory season, habitat conditions, and food availability(Bibi & Ali, 2013).

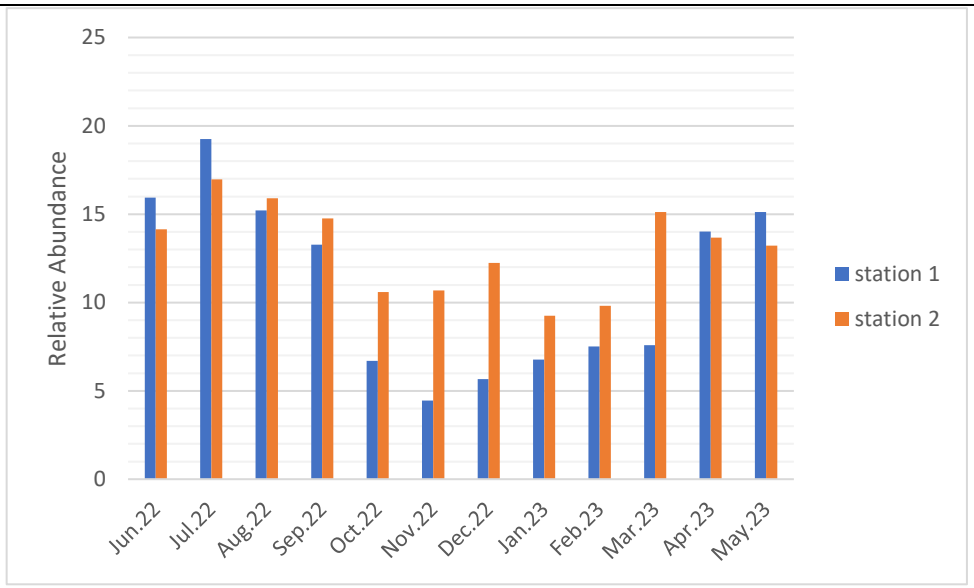

Figure 6: monthly variation in Relative abundance % in Al Malih wetland.

Simpson diversity index

The monthly variation values in Simpson diversity index were showed in (Figure 7). in station 1, The peak value was 0.962 recorded in July 2022 and lowest value was 0.897 in march 2023, While in station 2 was recorded highest value in 0.965 in November 2022 and lowest value was 0.932 in September 2022. The variety of the bird species was evaluated using the Simpson index, which had values between 0 to 1(Magurran, 2004).

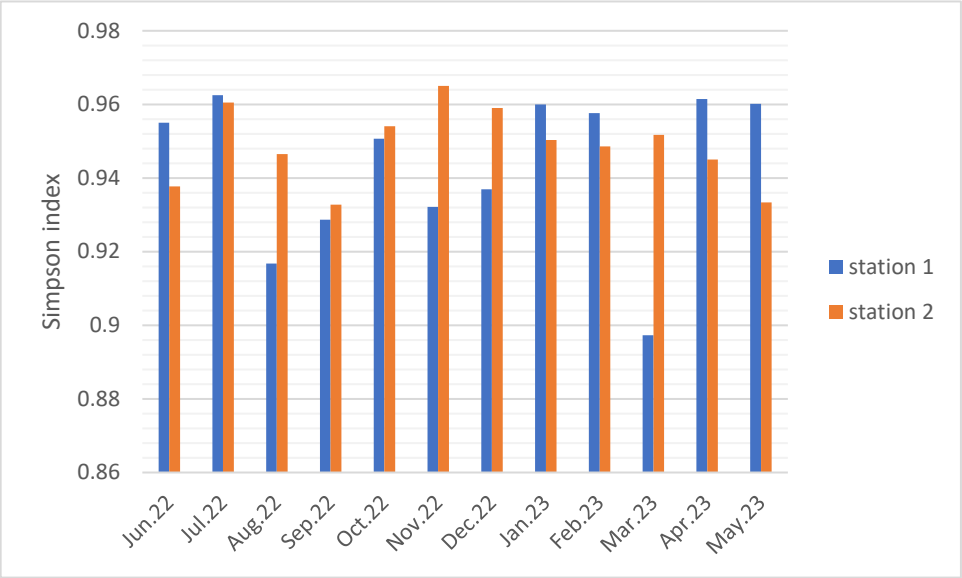

Figure 7: monthly variation in Simpson Diversity index in Al Malih wetland.

Shannon-Weiner Diversity index

The monthly variations in Shannon –Weiner diversity values were showed in (Figure 8) in station 1, values fluctuated between highest value 3.711 in January 2023 and lowest value in 3.003 while in station 2 was recorded highest value in 3.6 in November 2022 and lowest value in 2.894 in September 2022. The Shannon-Weiner index was used in the current study to evaluate the diversity of bird species; its values range from 0 to 5, although average values fall between 1.5 and 3.5, and the index seldom rises over 4 (Magurran, 2004). If the Shannon-Weiner value is near to 4.5, it means that the individuals are distributed evenly among all the species. In this case, the status of the birds' communities is moderate, and their habitat is not degrading. Values over 3.0 indicate that the composition of the habitat is stable and balanced; values under 1.0 indicate that the habitat is unstable where pollution and degradation occur according to (Bibi & Ali, 2013)

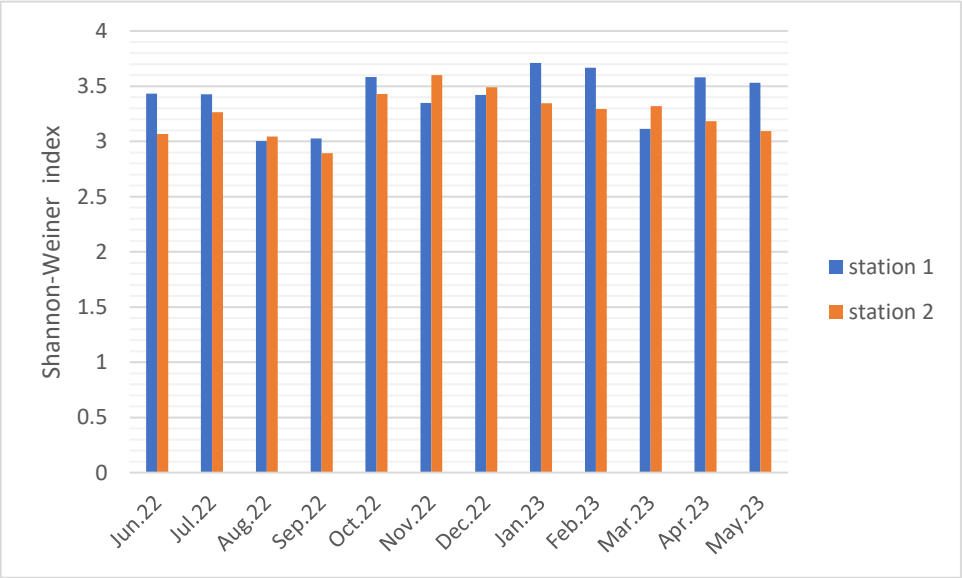

Figure 8: monthly variation in Shannon-Weiner Diversity index in Al Malih wetland.

Evenness index

monthly variations in Evenness index showed in (Figure 9), in station 1, the highest value recoded in 0.956 in July 2022 and lowest value in 0.768 in November 2022, while station two was recorded highest value in 0.979 in July 2022 and lowest value in 0.868 in January 2023. Diversity and evenness are inversely correlated. When the importance of variety is highly valued and evenness is highly valued ranged from (0 - 1) are the values. Individuals of all species are dispersed equally when the values are close to 1, whereas a low value for evenness indicates a severe variation in the distribution of individuals, in other words, a species or a small number of species dominates the community of other species. Results of current study ranged between 0.956 – 0.768 in station 1 and ranged between 0.979 - 0.868 in station 2, the high number indicates that everyone has been distributed more evenly(close 1) and lower value refer to dominance one species on other, as result the avian population can be thought of as being semi-balanced. (Habeeb *et al*., 2018).

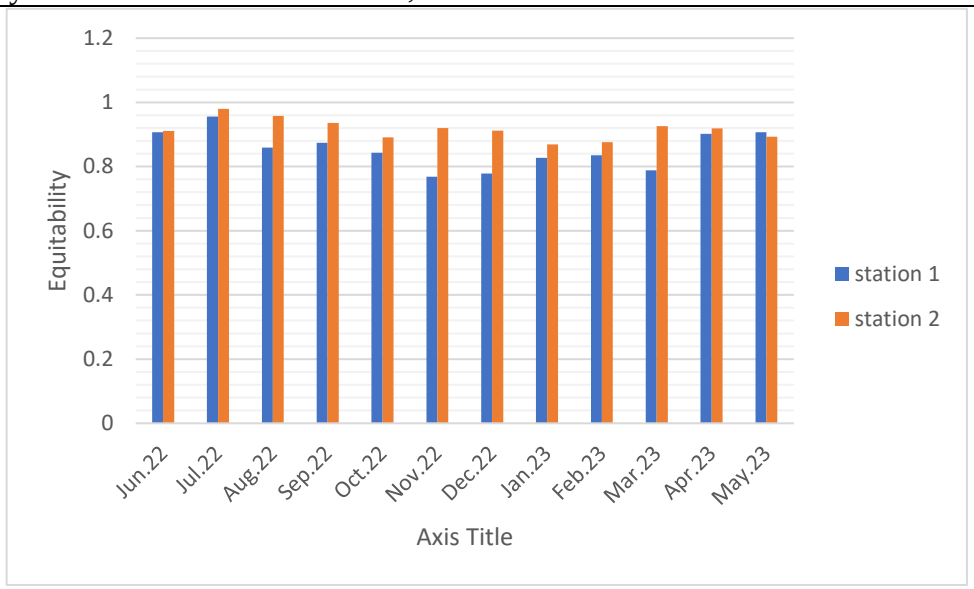

Figure 9: monthly variation in Evenness index in Al Malih wetland.

Richness index

Monthly variations in Richness index (Margalef) showed in (Figure 10), in station 1 was recorded highest value 12.25 in January 2023 and lowest value 5.652 in September 2022, while in station 2 was the highest value 7.969 in November 2022 and lowest value 4.197 in September 2022. The Margalef index determines the diversity linking a specific richness to all individuals; nevertheless, the absence of a limit value makes it extremely difficult to establish reference values when using this index(Jørgensen *et al*., 2005).Results of current study was high species richness (R>4).

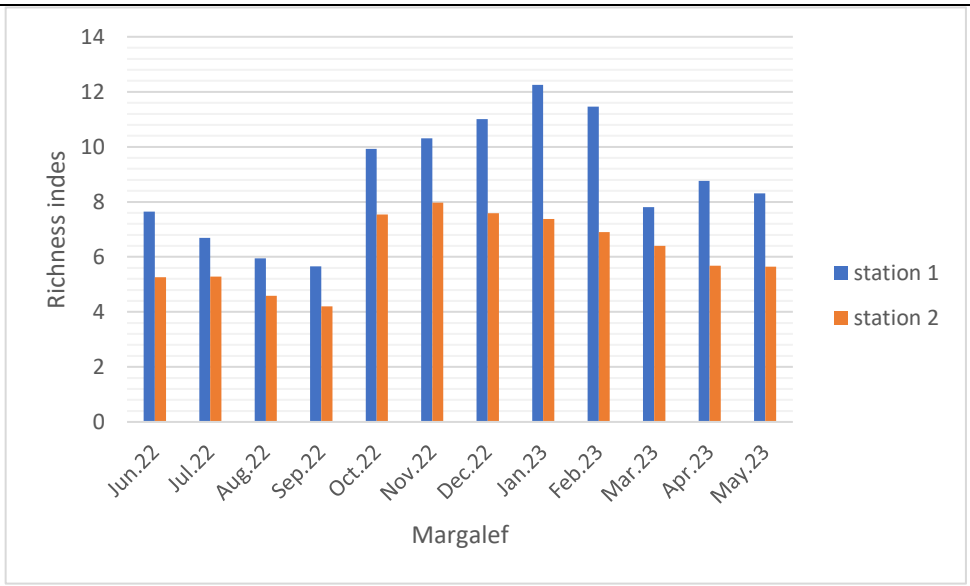

Figure 10: monthly variation in Richness index in Al Malih wetland.

Dominance index

Monthly variations in Dominance index were showed in (Figure 11), in station 1 was the highest value 0.291 in March 2023 and lowest value 0.09259 in May 2023, while station 2 was recorded highest value 0.147 in September 2022 and lowest value 0.0727 in July 2022. The dominant species' (most abundant) equal abundance is expressed by the Berger-Parker index. The dominance index (more than 100 species) is independent of the number of species in large assemblages, while in smaller communities, its values tend to decline as species richness increases, When the Berger-Parker value increases, the diversity decreases because the values of the dominance index are inversely related to the values of diversity (Magurran, 2004).

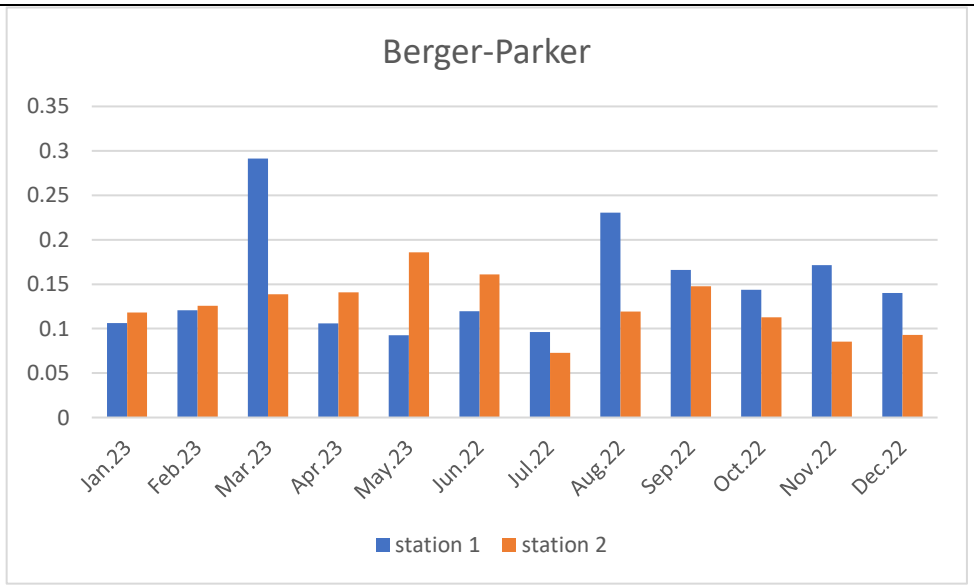

Figure 11: monthly variation in Dominance index (Berger-Parker) in Al Malih wetland.

Conclusion

we conclude that the study area is a very important wetland due the to the high diversity found in this initial study and need more research to make it IBAs (important bird areas) with others areas in Iraq to protect it. The current study lends support to the idea that wetlands

serve as valuable buffer wetlands for migrating birds, act as supplemental feeding areas, and provide as a place for many resident species to breed. They attracted numerous birds as a result of this value, especially in the winter. We are able to draw the conclusion that the Malih wetland is home to a variety of bird species.

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تقييم تنوع الطيور في هور المالح – بابل – العراق

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المستخلص

هدفت هذه الدراسة الى تقييم تنوع الطيور في هور المالح وتحديد الانواع المهددة بخطر الانقراض في محافظة بابل – العراق، من حزيران 2022- ايار 2023. سجل ما مجموعه 117 نوع تعود الى 17 رتبة و 38 عائلة و 7 انواع ضمن القائمة الحمراء للاتحاد الدولي لصون الطبيعة. تراوحت الوفرة النسبية بين (8.628 % - 0.011 %) . سجل مؤشر سمبسون قيم تتراوح بين (0.965 – 0.897) بينما مؤشر شانون سجل قيم تتراوح بين (3,711 – 2.894) . سجل دليل التكافؤ قيم تراوحت بين (0.965-0.768), سجل مؤشر الغنى قيم تراوحت بين (12.25- 4.19).سجل مؤشر السيادة قيم تراوحت بين (0.291-0.072). يمكن اعتبار اعداد الطيور على أنها شبه متوازنة وأن حالة مجتمعات الطيور كانت معتدلة. نستنتج أن المنطقة منطقة مهمة للغاية بسبب التنوع الكبير الموجود فيها وتحتاج إلى مزيد من البحث لجعلها مناطق هامة للطيور مثل المناطق الأخرى في العراق..

الكلمات المفتاحية: طيور العراق، أهوار العراق، أرض المالح الرطبة، طيور بابل.