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Research Article

Distributions and Community Composition of Birds in Iraq's Central Marsh

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The Central Marsh (CM) in southern Iraq is known to provide important habitats for both resident and migrant birds. The CM has been used extensively by humans, in part due to its high levels of productivity and biodiversity. It was drained in the 1990s by the government and reflooded and restored in 2003. Recent brief surveys of the CM from 2005 to 2010 recorded 94 bird species. Our study combined transects and point counts in detailed monthly surveys from October 2013 to June 2014 in the CM. We found a total of 125 bird species in the CM across all surveys, with 31 species recorded for the first time in the CM and 11 species categorised as red listed by the IUCN. Fourteen species were confirmed breeding in the CM. Cluster analysis using NMDS ordination showed that the study area can be divided into three main clusters of bird assemblages which are presented here. We provide management recommendations based on our findings.

1. Introduction

The Iraqi Central Marsh (CM) is a globally important open water and freshwater marsh [1] located between three provinces (Missan: 31°10′N, 47°05E; Thi-Qar: 30°50′N to 31°30′N; and Basra: 46°45′E to 46°25′E) in the south of Iraq [2]. The CM is almost 300,000 ha in area and is part of a larger marshland complex [3]. The CM has always been used extensively by humans, in part due to its high levels of productivity and biodiversity [4]. The CM has long been known to provide important permanent habitat for large number of birds and is part of a flyway for thousands more migrating between Siberia and Africa [5, 6]. Eighty bird species were found in the CM in the last complete census in the 1970s [6] and the area was identified as one of 42 Iraqi Important Bird and Biodiversity Areas (IBAs) [3]. Despite its importance for both people and wildlife, the CM was totally drained in the 1990s by the government, which caused huge levels of biodiversity loss and the disappearance of nearly all bird species from the area [7]. The motivation for this drainage is not clear, with some sources stating political motivation [1] and others agricultural expansion, which had already begun in the 1970s [8].

Parts of the CM were reflooded and restored in 2003 using the River Euphrates water to feed the CM directly, resulting in a huge reverse migration of both local people and bird species [9, 10]. Concomitantly, there was a change in governmental attitudes and NGOs toward wildlife and the value of birds, especially regarding the maintenance of healthy ecosystem functioning [11]. Reflecting this change, 141,615 ha (47%) of the CM was declared as the country's first national park (NP) in 2013 (Mesopotamian National Park or MNP) [12, 13] and the CM was identified as one of 82 Iraqi Key Biodiversity Areas (KBAs), based largely on bird data collected between 2005 and 2008 [2]. While the difficult political situation in Iraq made it impossible to conduct bird surveys between 1980 and 2003 [1], the KBA assessment showed that bird species in the CM have begun to recover to predrainage levels (94 species recorded [4]). However, many of these surveys were rapid (visiting the area for one day in the season) (seasonal surveys were conducted between 2005 and 2010 by Nature Iraq (NI) and the Iraqi Ministry of Environment) and therefore need updating to better understand the conservation statuses of CM birds. Furthermore, the KBA assessment did not explicitly examine

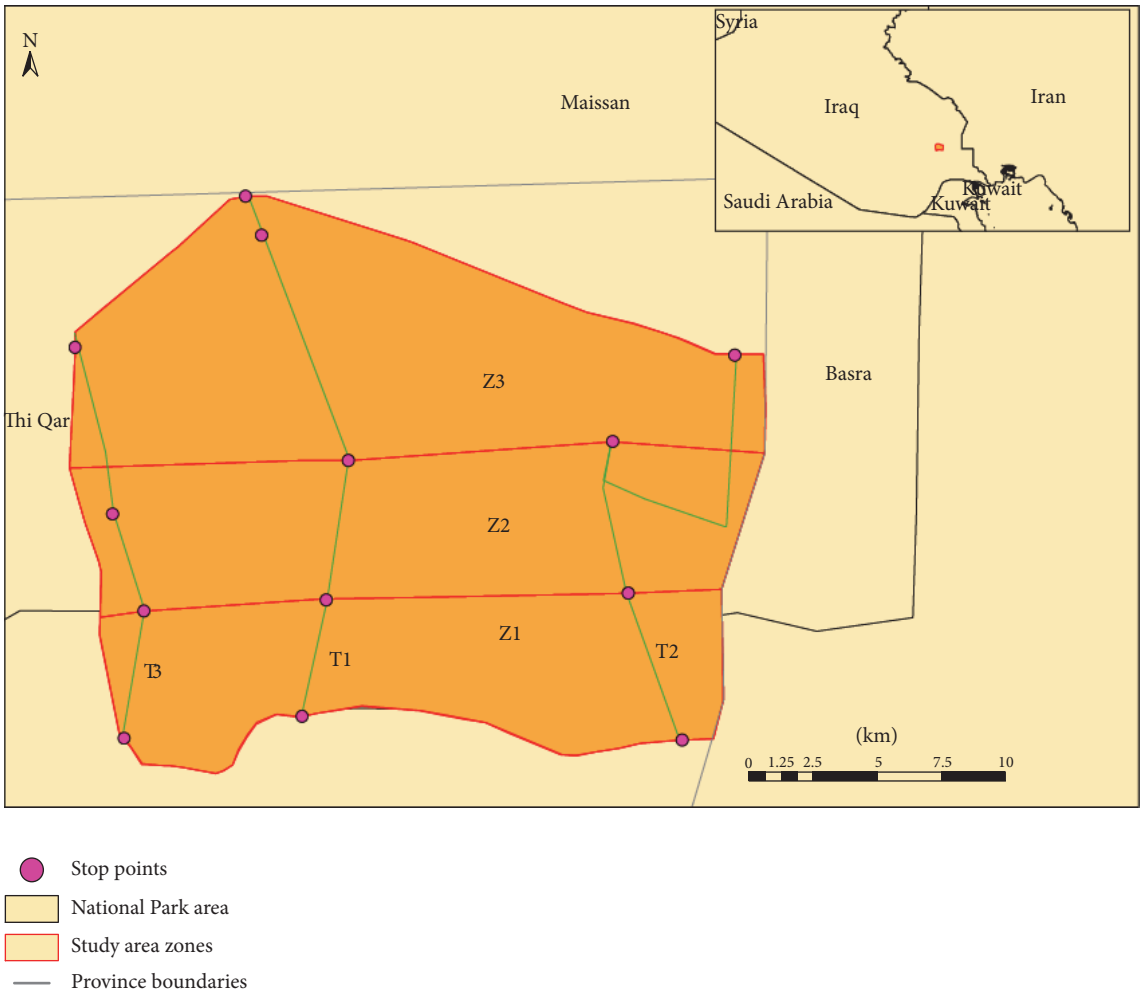

Figure 1: Area of study in the CM showing locations of transect surveys (T1: transect 1, T2: transect 2, and T3: transect 3) and the location of the CM within the Middle East within the overview map (as shown in orange).

the distributions or habitat associations of birds within the CM, treating the whole area as one conservation unit [4, 10]. Treating the whole of the CM in this way could hinder attempts to restore the CM's bird populations, as many of the significant threats that face birds in the CM are not distributed equally in space [7]. Here we present data from surveys across a nine-month period in 2013-2014.

Our study had three objectives: (i) to provide an inventory of bird species occurring in the CM; (ii) to investigate the spatial and temporal patterns of bird abundance and diversity across the CM; (iii) to describe bird assemblages within different areas of the CM. We use our findings to suggest management actions in the CM to benefit birds.

2. Methods

2.1. Study Site and Sampling Protocol. Three longitudinal water transects (each 30 km in length) were chosen inside the CM to identify and count birds in the marsh from both sides of transects [14]. These three transects ran approximately north-south and followed existing water courses, thus causing only minor disturbance to habitats whilst surveying (Figure 1). The area has historically been supplied with water from the north by the Tigress River. The Euphrates River crosses Chibayish City from the West to the East towards Modina City in Basra province [11]. The Euphrates River has been closed using soil embankments between Chibayish City and Modina City due to the scarcity of water in the river. Therefore, all water coming from the West of Iraq in the Euphrates River now goes directly to the CM.

To aid management, we subdivided the study area into three zones. We did this based on the dominant type of vegetation and similarities in the type of human activity that occurred in each zone (e.g., fishing, reed cutting, and the intensity of water buffalo used for distributing water buffalo milk). This classification was made by visual inspection of the CM and was descriptive only (based on qualitative impressions made during the survey work). Zone one started from the south in the Euphrates River and crossed Chibayish City, with zones two and three extending north inside the national park (Figure 1). Zone one had the most human activity, grazing by water buffalo, and dominance of the plant

species *Typha domingensis*. Zone two had intermediary levels of human activity and water buffalo grazing with *Typha domingensis* and *Phragmites australis* the dominant plant species, and zone three had the least amount of human activity and grazing with *Phragmites australis* the dominant plant species.

Nine surveys were carried out in the CM from October 2013 to June 2014 (for exact dates see Appendix). A motor canoe was for transport, with surveys starting from the riverside in the south of the national park and finishing in the north. Three days were spent in the area for each survey (one day/transect), and six–eight hours per day were spent moving along each transect. All field observations were conducted by the same observer and were started from the river in zone one in the morning and finished in the afternoon at the end of zone three (05:30–12:30/13:30 in the summer, and 07:00–14:00/15:00 in the winter). The stop points (point counts) are shown in Figure 1; time spent at each stop was 30–40 minutes (the survey included water and sediment sampling; therefore, almost 15–20 minutes were spent for bird records in each point). Our chosen survey time for bird counts was designed to maximise our chances of detecting as many cryptic species as possible, while minimising our chances of double-counting. Additionally, our sampling design was constrained by safety considerations and logistical difficulties, which, although making it impossible to conduct sampling in zone three in the morning, reduced our risk of double-counting further. A Canon 7D camera with Sigma lens 135 × 400 and Canon lens 100 × 400 and 8 × 42 binoculars were used to observe and count birds in the CM. No observations and counts were undertaken on the way back, apart from new species that were not recorded in the main survey. A Garmin GPS device was used to map the three transects digitally. We used official data from the Iraqi Ministry of Water Resources, Chibayish Branch, to record the monthly water level in the Euphrates River during the survey period.

2.2. Analysis of Species Richness and Abundance and Community Composition. To investigate the role of management zone, month (coded as Julian day), and transect in species richness and abundance, we used general linear models with a Gaussian error structure as our models with a Poisson, quasi-Poisson, and negative binomial error structure were severely overdispersed. To produce acceptable model residual plots, species abundance was square-root transformed but species richness was left untransformed. For each dependent variable, we constructed a full model and used a multimodel inference approach to define the relative importance of each independent variable, as recommended by Burnham and Anderson (2002) [15] and Grueber et al. (2011) [16]. We used the package "MuMIn" [17] to produce all possible candidate models, which were ranked by AICc. We then used model averaging across the full set of candidate models to produce parameter estimates and measures of the relative importance of each parameter [15].

Nonmetric Multidimensional Scaling (NMDS) ordination was conducted using the FactoMine R package [15] in R to identify whether there were differences in community composition between different management zones. To do this, nine different sites were identified based on the point where each of the three transects intersected each of the three management zones (see Figure 1). The rationale behind splitting up the zones further for this analysis was in response to preliminary analysis of our field observations, which suggested that there were distinct bird communities at finer scales than the three management zones that we originally identified. Then, a Bray-Curtis dissimilarity matrix and dendrogram were created to identify clusters of sites in the CM that were most similar in their bird species' communities (based on both species' identities and abundance). These clusters were then overlaid on the results of the ordination to help identify parts of the CM with similar bird communities. We chose to use both a dendrogram and NMDS ordination to identify clusters to ensure that our results were robust. All data manipulation and statistical analysis were undertaken in R version 3.1.3 (R Development Core Team 2015).

3. Results

3.1. Which Bird Species Occur and Breed in the CM and Which Species Are of Conservation Concern?

3.1.1. Site Importance. A total of 125 bird species were recorded in the CM across all the surveys: 29 were resident species (recorded across all seasons of the survey); 87 were winter visitors and passage migrants; 9 species were noted as summering (Table 4). A total of 31 species were recorded for the first time in the CM. Notable records included (i) White Tailed Eagle *(Haliaeetus albicilla), which* was recorded in the December survey in transect two, zone two; this species has not been recorded in the CM for more than 40 years; (ii) Fourteen species which were confirmed breeding in the CM according to the BTO breeding evidence criteria (Little Grebe *Tachybaptus ruficollis*, Little Bittern *Ixobrychus minutus*, Squacco Heron *Ardeola ralloides*, Red-Wattled Lapwing *Vanellus indicus*, White-Tailed Lapwing *Vanellus leucurus,* Whiskered Tern *Chlidonias hybrida*, Eurasian Collared Dove *Streptopelia decaocto*, Pied Kingfisher *Ceryle rudis*, Basra Reed Warbler *Acrocephalus griseldis*, Great Reed Warbler *Acrocephalus arundinaceus*, Graceful Prinia *Prinia gracilis*, Iraq Babbler *Turdoides altirostris*, Purple Swamphen *Porphyrio porphyrio*, and House Sparrow *Passer domesticus*; see Table 1 for detailed information about breeding status and more details in the Appendix).

3.1.2. Important Bird Species for Conservation. The survey found 11 species that are important conservation priorities in the CM and are red listed by the IUCN (Table 2), and two endemic species (Basra Reed Warbler and Iraq Babbler), and three near endemic species (Black Francolin, Little Grebe, and Mesopotamian Crow) according to [18]. In addition, there are two species that are regionally threatened (Pygmy Cormorant and Sacred Ibis) and four species that are regionally near threatened (Grey Heron, Purple Heron, Western Marsh Harrier, and Common Kingfisher) in the Arabian Peninsula [19].

3.2. Spatial Distribution of Bird Abundance and Diversity across the CM. According to the raw data from the study

Table 1: Bird breeding statuses in the CM for April–June 2014. Key: T = transect and Z = zone.

Month	Species	Description
April	Red-Wattled Lapwing	One nest with two chicks and one egg in T2, Z2 (GPS coordinates: 0706280, 3436379)
	Purple Swamphen	One empty nest T2, Z2
	Graceful Prinia	We did not count the numbers of nests
	Warbler	One empty nest in T2, Z3
	House Sparrow	We did not count the numbers of nests
	Iraq Babbler	One nest in T1, Z2
May	Warbler spp.	(i) Two empty nests of Warbler spp. in T1, Z3 (coordinates: 0683694, 3441836) (ii) Two nests (with two chicks and one egg in each nest) of Basra Reed Warbler in T2, Z3 (coordinates: 0706003, 3441503 and 0705922, 3441499)
	Collared Dove	Nest (with two eggs) of Collared Dove in T2, Z1
	Whiskered Tern	Chicks and large numbers of Whiskered Terns (two colonies; each colony had over 50 nests) located in T2, Z3. Each nest was floating on water and all contained three eggs [coordinates: 0705878, 344280 and 0706394, 3437954].
	Little Bittern	Nest of Little Bittern with 4 eggs in transect two [coordinates: 0702287, 3430598].
	White-Tailed Lapwing	Two nests of White-Tailed Lapwing (one nest with four eggs and second with two eggs) [coordinates: 0684287, 3434033].
	Graceful Prinia	Nest of Graceful Prinia in T3
	House Sparrow	One nest and chicks of House Sparrow in T3
June	Warbler	(i) Three nests of Basra Reed Warbler with two chicks and one egg in T1, Z2 [coordinates: 0693162, 3436719 and 0684284, 3434030] (ii) Three nests of Basra Reed Warbler in T2, Z3 [coordinates: 0705880, 3441550 and 0705874, 3441525] (iii) All recorded nests of Basra Reed Warbler in our survey were built on reed stems only (iv) Basra Reed Warbler shares its preferred reed bed habitat with the similar Great Reed Warbler (v) Our survey highlighted dominancy of Great Reed Warbler in April (the number of individuals recorded of Basra Reed Warbler in the area of study was 14, 42, and 66 and for Great Reed Warbler was 38, 57, and 42 in April, May, and June 2014, resp.)
	Little Bittern	Nest with four eggs and chick of Little Bittern in T2, Z1 [coordinates: 0693170, 3436726]
	White Tailed Lapwing	Nest with four eggs of White-Tailed Lapwing in T2, Z1
	Collared Dove	Nest with two eggs of Collared Dove in T2, Z1
	Whiskered Tern	20 chicks of Whiskered Tern in T2, Z3
	Pied Kingfisher	One chick and 10 eggs of Pied Kingfisher in T1, Z2
	Little Grebe	Observation , 20 juveniles of Little Grebe subspecies *Tachybaptus ruficollis iraquensis* in T2, Z3

survey, the greatest bird species abundance was in winter (December, January, and February). The areas of the CM with the greatest abundance of birds was along transect two and in zone two. The highest species richness was in January and April along transect one, and in zone two (Figures 2, 3, and 4; see Tables 4, 5, and 7 for further details). We produced a candidate set of eight models based on our full, global model for each response variable. Across all eight species abundance models, zone had relative importance (RI) of 0.92, Julian day had RI of 0.71, and transect had an RI of 0.09. The model averaged parameter estimates highlighted how zone two had the highest overall species abundance ($\beta = 5.74$, SE = 1.87); however, species abundance did not appear to significantly decline from January to December ($\beta = -0.01$, SE = 0.01). Across all eight species richness models, zone had relative importance (RI) of 1.00, Julian day had RI of 0.74, and transect had RI of 0.18. The model averaged parameter estimates highlighted how zone two had

Table 2: Threatened bird species recorded in the CM by this study (details of numbers recorded are presented in the Appendix).

English name	Latin name	Conservation status
Marbled Duck	*Marmaronetta angustirostris*	Vulnerable (IUCN)
Basra Reed Warbler	*Acrocephalus griseldis*	Endangered (IUCN)
Greater Spotted Eagle	*Aquila clanga*	Vulnerable (IUCN)
Eastern Imperial Eagle	*Aquila heliacal*	Vulnerable (IUCN)
Ferruginous Duck	*Aythya nyroca*	Near threatened (IUCN)
Cinereous Vulture	*Aegypius monachus*	Near threatened (IUCN)
Pallid Harrier	*Circus cyaneus*	Near threatened (IUCN)
Little Grebe (subspecies)	*Tachybaptus ruficollis iraquensis*	Near threatened [4]
Iraq Babbler	*Turdoides altirostris*	Least concern (restricted-range) [4]
White-Tailed Lapwing	*Vanellus leucurus*	Least concern (Biome-restricted) [4]
Dead Sea Sparrow	*Passer moabiticus*	Least concern (Biome-restricted) [4]

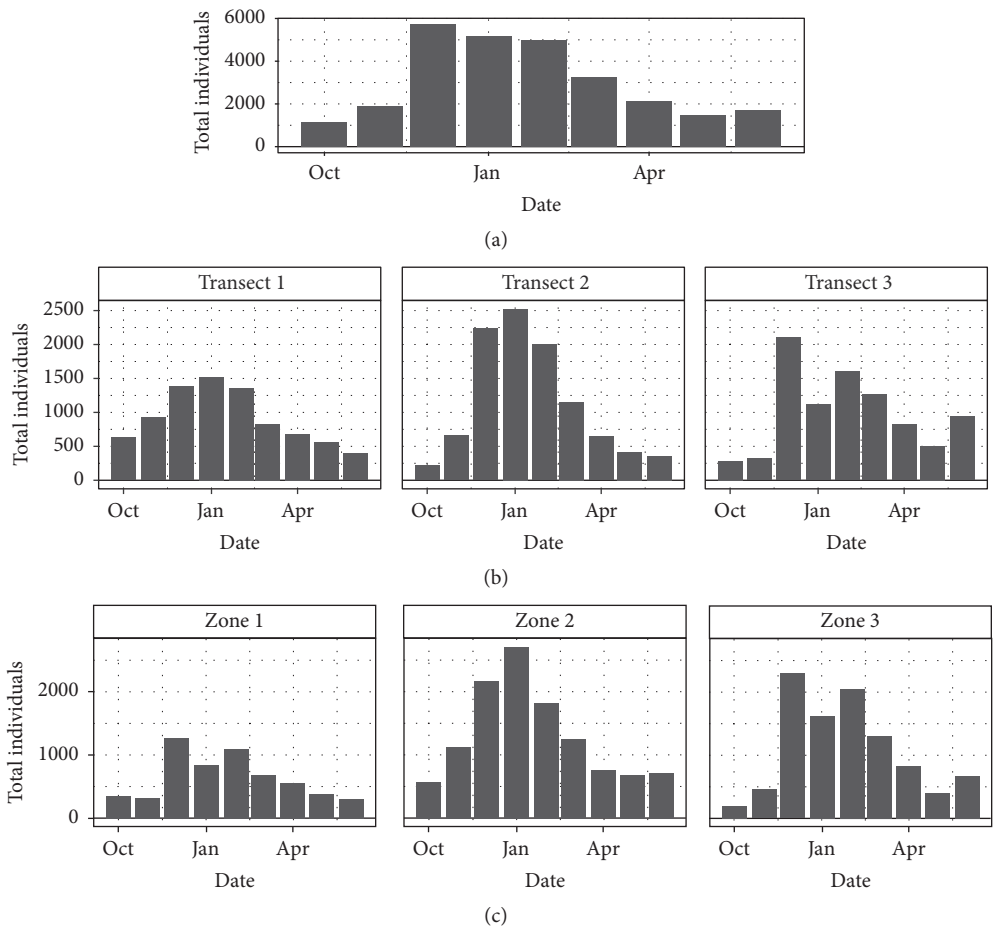

Figure 2: Bird species abundance (all species observations summed) in the Iraqi CM (monthly surveys from October 2013 to June 2014). (a) shows abundance for the whole CM, (b) shows abundance by transect, and (c) shows abundance by zone.

the highest overall species richness ($\beta = 9.37$, SE = 1.62); however, species abundance did not appear to significantly decline from January to December ($\beta = -0.01$, SE = 0.01).

3.3. What Bird Assemblages Exist within Different Zones in the CM? The dendrogram based on the Bray-Curtis dissimilarity matrix showed that there were at least two main clusters of bird species, with potentially a third cluster in site nine. These results were aligned with the site cluster analysis undertaken using NMDS ordination (the linear fit from a stress plot was $R^2 = 0.98$), which shows that the study area can be categorised into three main clusters of bird species (cluster one = T1-Z1, T1-Z2, T2-Z1, and T3-Z1; cluster 2 = T1-Z3, T2-Z2, T2-Z3, T3-Z2, and T3-Z3; Figures 5 and 6). Some of the

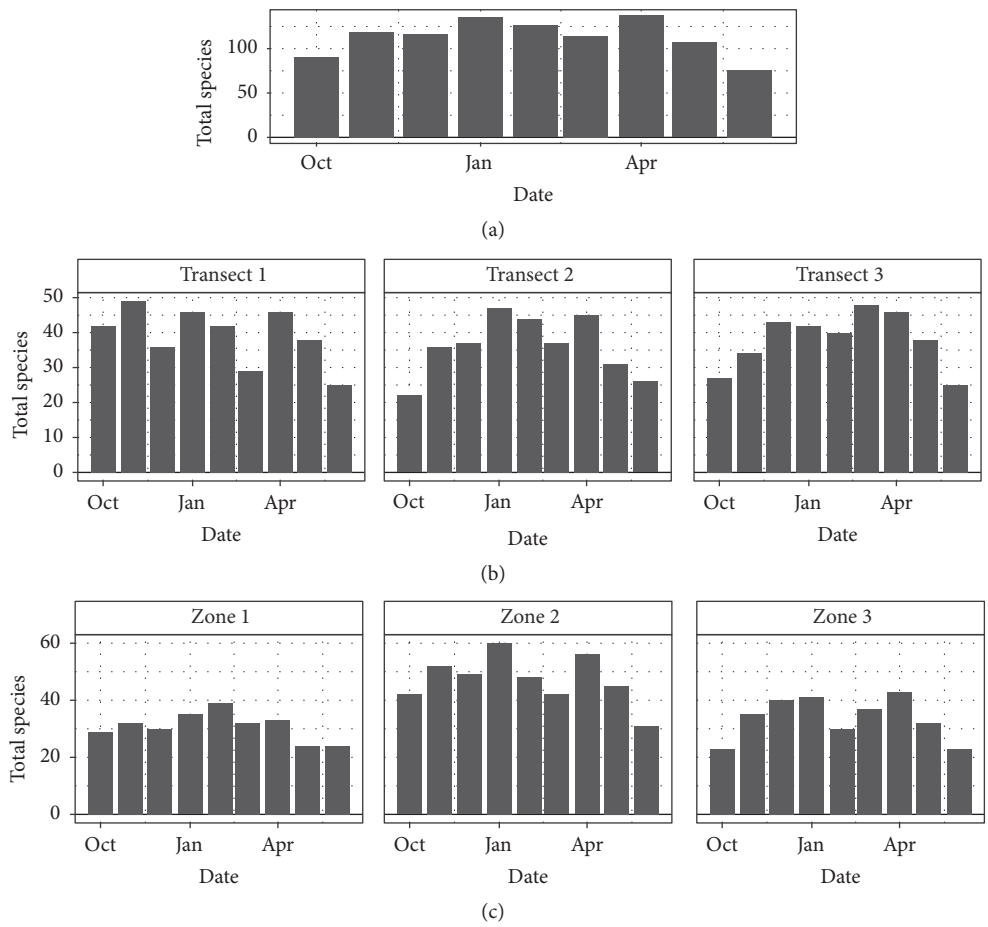

Figure 3: Bird species richness in the Iraqi CM (monthly surveys from October 2013 to June 2014). (a) shows species richness for the whole CM, (b) shows species richness by transect, and (c) shows species richness by zone.

Table 3: Maximum and minimum monthly water levels in the Euphrates River (Chibayish City station) from October 2013 to June 2014 (official data of the Iraqi Ministry of Water Resources- Chibayish Branch).

	October 2013	November 2013	December 2013	January 2014	February 2014	March 2014	April 2014	May 2014	June 2014
Min cm	129	147	158	154	176	165	167	165	165
Max cm	148	172	172	179	169	170	172	167	166
During the survey	147	157	160	170	170	165	168	167	166

bird species found in cluster one include Eurasian Bittern *(Botaurus stellaris)*, Cattle Egret *(Bubulcus ibis)*, Moorhen *(Gallinula chloropus)*, Little Tern *(Sternula albifrons)*, Water Pipit *(Anthus spinoletta)*, House Sparrow *(Passer domesticus)*, Cormorant *(Phalacrocorax carbo),* and Sedge Warbler *(Acrocephalus schoenobaenus)*. We found Common Babbler *(Turdoides caudata)*, Lesser Grey Shrike *(Lanius minor)*, Mallard *(Anas platyrhynchos)*, Armenian Gull *(Larus armenicus)*, Crested Lark *(Galerida cristata)*, Dead Sea Sparrow *(Passer moabiticus),* and Collared Pratincole *(Glareola pratincola)* among others within cluster two. Finally, cluster three contained Pallid Harrier *(Circus macrourus)*, Greylag Goose *(Anser anser)*, Grey Heron *(Ardea cinerea),* and Great White Pelican *(Pelecanus onocrotalus)*.

4. Discussion

We recorded 125 bird species in the CM over nine months of survey work, which increased the species list for the area by 24% and we confirmed the breeding of 14 species and coded 20 species as species observed in breeding season in suitable nesting habitat (H according to British Trust for Ornithology breeding status codes). Earlier work over a five-year period recorded 94 species using less intensive survey efforts [4]. Fifty-one breeding bird species were reported by Salim et al. [20] and 77 species were recorded by Salim and Porter [21] in the Iraqi southern marshland complex where the CM is found. In comparison to the wider region at large, 357 bird species were recorded in wetland conservation areas found

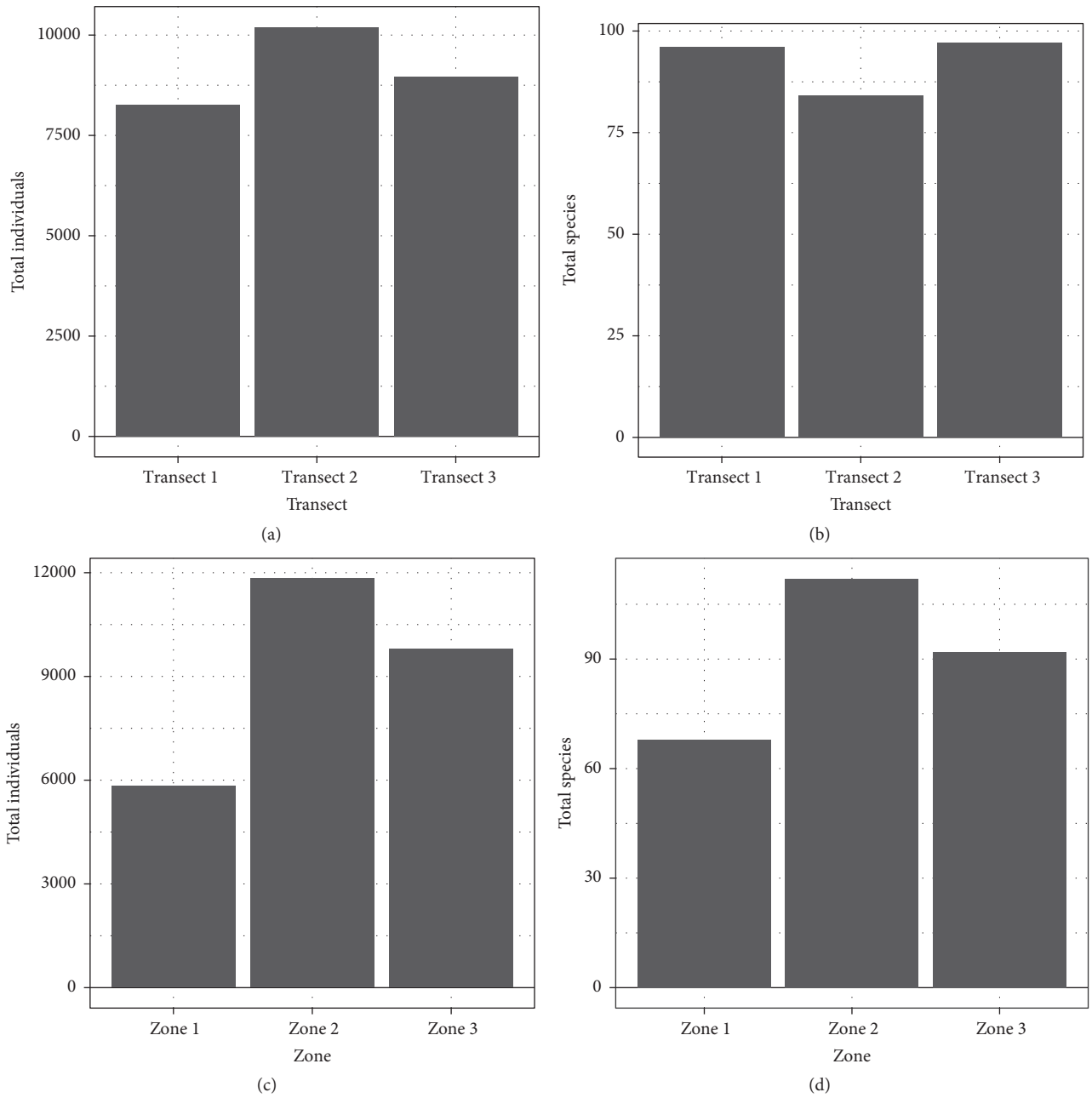

Figure 4: Bird species richness in the Iraqi CM (monthly surveys from October 2013 to June 2014). (a) and (b) show species abundance for the three transects and the three zones in the CM, and (c) and (d) show species richness by the three transects and the three zones.

in the Arabian Peninsula, Iraq, Syria, and Lebanon, covering an area of 3,000,000 km^2 [22].

Our survey recorded 31 more bird species versus the most recent, rapid assessment which is potentially due to the nature of the previous surveys, which were rapid assessments of bird species undertaken across the entirety of the Mesopotamian marshlands (Hawiza Marsh to the east of the Tigris River, Hammar Marsh to the south of the Euphrates River, and the Central Marsh between the Tigris and Euphrates Rivers) [4]. By focusing on one of the marshes, we were able to conduct more intensive surveys, which detected more bird species. For this reason, there is a clear need to undertake further, intensive surveys in the other two Mesopotamian marshes to provide accurate, up-to-date information. Recent national water and biodiversity strategies have indicated that it is no longer appropriate to consider all three marshes as one conservation unit, as the connections between the water bodies have severely declined due to extreme water scarcity [10]. As such, there is an urgent need to develop management plans for each of the three Mesopotamian marshes.

The greatest bird species abundance in the CM was in winter (December, January, and February). The area of the

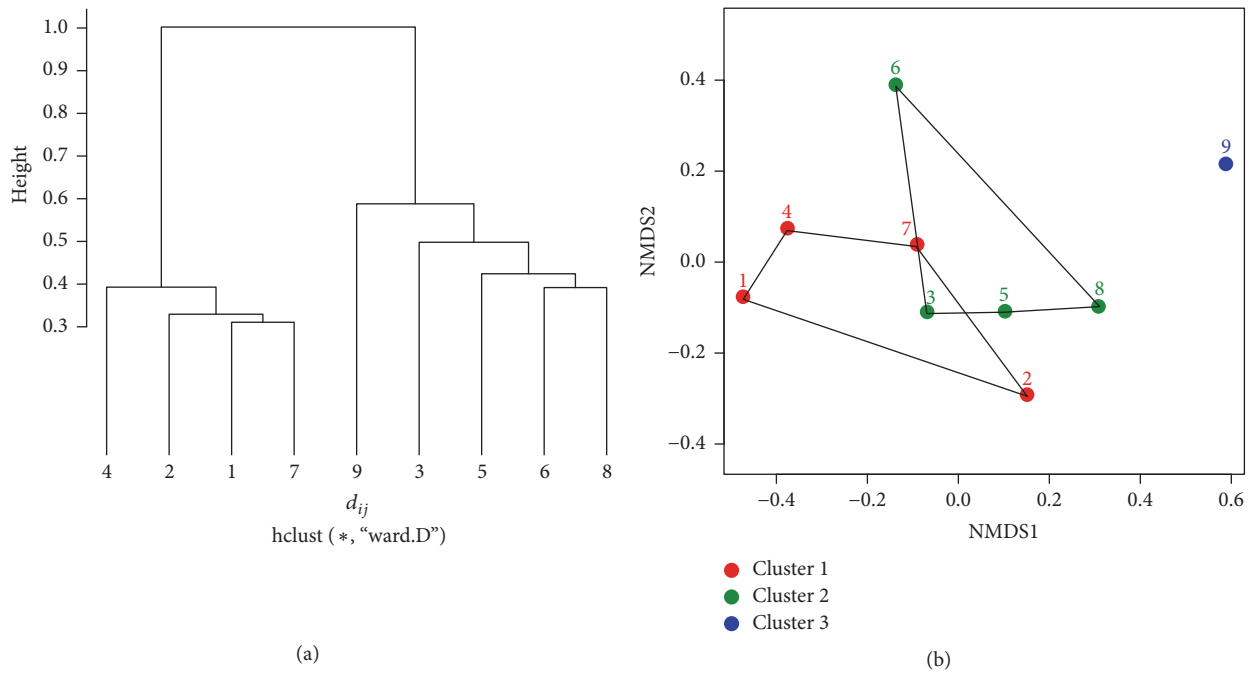

Figure 5: NMDS cluster analysis for birds in the CM. (a) shows a dendrogram based on a Bray-Curtis dissimilarity matrix. This dendrogram was then cut to give three groupings based on similarities in bird community composition as shown both by the dendrogram and by the NMDS ordination plot. (b) shows the results of the NMDS ordination, with each zone/transect complement (e.g., zone one transect one is site one and zone one transect two is site two) coloured according to grouping and surrounded by a convex hull. The ordination shows three different groupings of sites (note: the inclusion of site three within cluster one does not represent a failing with our method but a consequence of the way NMDS plots are visualized).

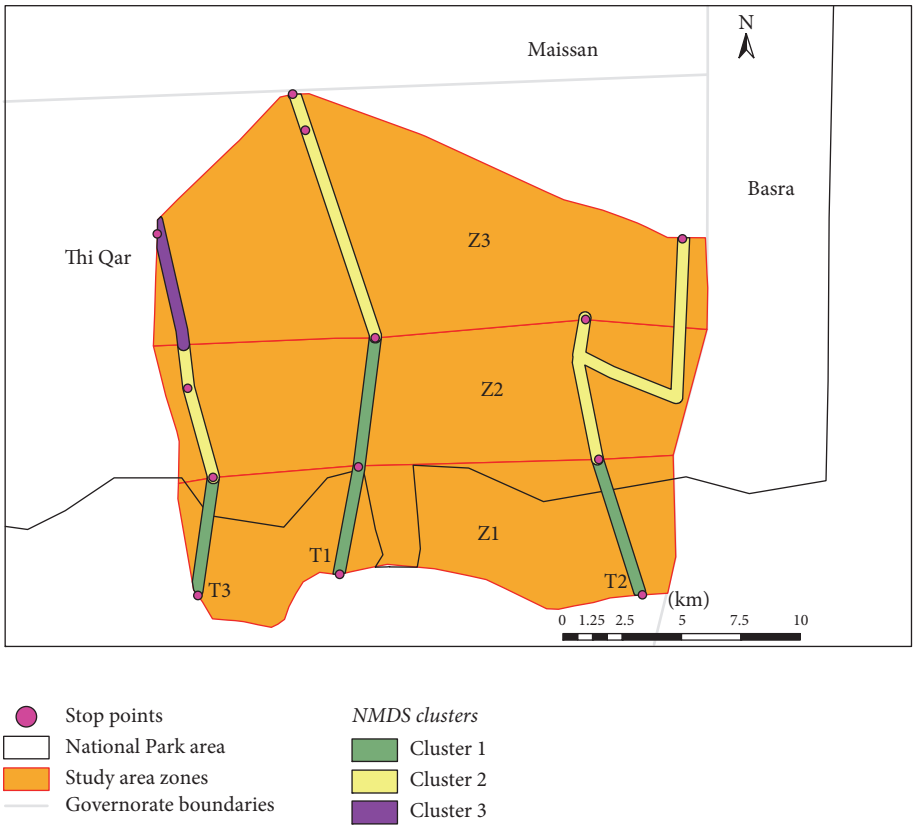

Figure 6: NMDS cluster analysis for birds in the CM, surveys from October 2013 to June 2014 showing the spatial locations of the three different bird communities identified by the NMDS analysis.

Table 4: Species observations and counts (October, 2013–June, 2014) in the Iraqi Central Marsh. Scientific names are provided in Appendix Table 7.

	Species English name	Species observations & counts (Oct, 2013–Jun, 2014)								
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
(1)	Black Francolin	0	2	4	6	1	0	4	2	2
(2)	Greylag Goose	7	0	77	10	0	0	0	0	0
(3)	Mallard	0	0	47	55	0	2	0	0	0
(4)	Northern Shoveler	0	0	46	0	0	0	0	0	0
(5)	Northern Pintail	0	0	400	175	15	0	0	0	0
(6)	Garganey	0	0	0	0	0	0	8	0	0
(7)	Eurasian Teal	0	0	66	168	45	47	0	0	0
(8)	Marbled Duck	0	0	35	5	10	0	22	0	0
(9)	Ferruginous Duck	0	8	21	0	10	0	0	0	0
(10)	Little Grebe	58	42	70	95	81	40	14	30	72
(11)	Great Crested Grebe	0	0	0	5	0	0	0	0	0
(12)	White Stork	0	0	380	200	40	0	0	0	0
(13)	African Sacred Ibis	0	0	0	2	0	0	0	0	0
(14)	Glossy Ibis	0	0	25	9	2	230	10	0	11
(15)	Eurasian Bittern	0	1	0	2	2	2	2	0	1
(16)	Little Bittern	0	1	0	0	0	0	111	203	143
(17)	Black-Crowned Night Heron	0	0	2	1	0	1	11	21	56
(18)	Squacco Heron	41	132	181	85	116	970	100	39	90
(19)	Cattle Egret	55	83	0	18	6	0	0	0	0
(20)	Grey Heron	3	13	1	0	51	23	11	0	0
(21)	Purple Heron	8	9	19	11	6	10	33	12	8
(22)	Great White Egret	0	0	0	0	10	12	0	0	0
(23)	Little Egret	74	68	1046	750	665	380	33	12	505
(24)	Great White pelican	0	0	533	500	150	0	0	0	0
(25)	Pygmy Cormorant	0	0	0	0	0	0	7	21	23
(26)	Great Cormorant	2	1	0	5	0	0	0	0	0
(27)	Black-Winged Kite	0	0	0	1	0	0	0	0	0
(28)	White-Tailed Sea Eagle	0	0	1	0	0	0	0	0	0
(29)	Cinereous Vulture	0	0	2	0	0	0	0	0	0
(30)	Short-Toed Snake-Eagle	0	0	0	0	2	0	0	0	0
(31)	Western Marsh Harrier	12	13	28	23	18	15	1	1	0
(32)	Pallid Harrier	0	1	0	1	0	1	0	0	0
(33)	Montagu's Harrier	0	0	0	0	1	0	0	0	0
(34)	Eurasian Sparrow hawk	0	1	0	0	2	1	0	0	0
(35)	Long-Legged Buzzard	0	0	0	1	0	0	0	0	0
(36)	Greater Spotted Eagle	0	0	0	1	0	2	1	0	0
(37)	Steppe Eagle	1	1	0	0	0	2	0	0	0
(38)	Common Kestrel	0	0	1	0	0	0	0	0	0
(39)	Eurasian Hobby	0	1	0	0	0	0	0	0	0
(40)	Water Rail	1	0	0	0	0	0	0	0	0
(41)	Little Crake	0	1	0	0	0	0	1	0	0
(42)	Spotted Crake	0	1	0	0	0	0	0	0	0
(43)	Purple Swamphen	0	8	0	3	0	7	18	0	2
(44)	Common Moorhen	15	17	10	22	13	2	3	2	11
(45)	Common Coot	0	4	87	245	125	14	0	0	0
(46)	Black-Winged Stilt	28	14	25	236	44	17	136	42	75
(47)	Spur-Winged Lapwing	1	0	0	0	0	2	19	9	7
(48)	Red-Wattled Lapwing	12	9	5	9	1	3	4	7	6
(49)	White-Tailed Lapwing	21	12	24	154	90	40	57	45	48

Table 4: Continued.

	Species English name	Species observations & counts (Oct, 2013–Jun, 2014)								
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
(50)	Common Ringed Plover	9	6	4	10	3	0	0	0	0
(51)	Little Ringed Plover	0	2	0	0	0	0	3	2	0
(52)	Kentish Plover	4	10	43	23	13	0	0	0	2
(53)	Common Snipe	1	0	0	1	0	2	21	0	0
(54)	Common Redshank	0	0	0	0	1	11	8	0	0
(55)	Marsh Sandpiper	0	6	0	19	8	28	0	0	0
(56)	Common Greenshank	1	0	0	0	0	0	2	0	0
(57)	Green Sandpiper	3	1	0	1	4	2	0	0	0
(58)	Wood Sandpiper	0	0	0	0	1	0	0	0	0
(59)	Terek Sandpiper	3	0	0	0	1	0	0	0	0
(60)	Common Sandpiper	3	6	8	4	5	4	8	7	0
(61)	Sanderling	0	0	0	1	0	0	0	0	0
(62)	Little Stint	0	1	0	5	1	0	6	3	0
(63)	Curlew Sandpiper	0	0	0	0	0	0	5	2	0
(64)	Ruff	0	0	0	0	0	1	85	6	0
(65)	Collared Pratincole	0	0	0	0	0	0	15	9	4
(66)	Slender-Billed Gull	17	165	480	487	891	163	164	78	90
(67)	Black-Headed Gull	0	35	130	246	685	232	149	17	0
(68)	Armenian Gull	0	2	2	5	6	21	5	0	0
(69)	Gull-Billed Tern	2	10	0	0	0	0	0	9	0
(70)	Little Tern	11	3	0	0	0	0	20	9	16
(71)	Common Tern	0	6	0	0	0	53	43	9	18
(72)	Whiskered Tern	53	81	639	741	279	113	61	125	63
(73)	White-Winged Tern	0	0	0	0	0	0	0	21	0
(74)	Pin-Tailed Sandgrouse	0	0	0	0	0	23	16	0	0
(75)	European Turtle Dove	0	0	0	0	0	0	0	5	0
(76)	Eurasian Collared Dove	16	21	36	26	35	23	17	14	6
(77)	Laughing Dove	0	1	2	13	3	5	7	2	0
(78)	Common Barn-Owl	0	0	0	1	0	0	0	0	0
(79)	Egyptian Nightjar	0	0	0	0	0	0	0	1	0
(80)	White-Breasted Kingfisher	9	17	25	38	30	25	10	4	7
(81)	Common Kingfisher	10	12	29	18	25	17	5	1	3
(82)	Pied Kingfisher	236	318	542	500	461	293	269	245	147
(83)	Blue-Cheeked Bee-Eater	10	9	0	0	0	0	28	0	0
(84)	European Bee-Eater	0	0	0	0	0	0	8	0	0
(85)	Eurasian Hoopoe	0	0	0	0	0	1	0	0	0
(86)	Red-Backed Shrike	3	0	0	0	0	0	0	52	0
(87)	Isabelline Shrike	6	8	12	25	5	2	0	0	0
(88)	Turkestan Isabelline Shrike	2	0	0	1	2	0	1	0	0
(89)	Lesser Grey Shrike	0	0	0	0	0	0	0	31	0
(90)	Eurasian Golden Oriole	0	0	0	0	0	0	0	1	0
(91)	Hooded Crow	0	0	2	0	5	2	0	0	0
(92)	Mesopotamian Crow	0	0	2	0	0	1	0	0	0
(93)	Crested Lark	32	3	10	4	6	4	9	19	24
(94)	White-Eared Bulbul	0	1	1	2	4	0	0	0	0
(95)	Sand Martin	0	2	0	0	0	27	54	5	2
(96)	Barn Swallow	5	0	0	0	11	29	38	35	12
(97)	Willow Warbler	0	0	0	0	0	0	1	0	0
(98)	Common Chiffchaff	7	20	38	48	34	8	18	0	0

Table 4: Continued.

	Species English name	Species observations & counts (Oct, 2013–Jun, 2014)								
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
(99)	Basra Reed Warbler	0	0	0	0	0	0	14	42	66
(100)	Great Reed Warbler	1	2	0	0	0	0	38	57	42
(101)	Sedge Warbler	0	2	0	0	0	0	1	2	0
(102)	Eurasian Reed-Warbler	0	0	0	0	1	0	0	2	0
(103)	Graceful Prinia	13	9	11	23	73	41	78	104	61
(104)	Iraq Babbler	5	7	11	25	27	9	58	17	11
(105)	Afghan (Common) Babbler	0	0	0	16	6	18	0	4	0
(106)	Common Starling	0	42	105	252	549	47	2	1	0
(107)	Song Thrush	0	0	0	1	0	0	0	0	0
(108)	European Robin	0	2	5	1	0	0	0	0	0
(109)	Bluethroat	0	1	1	1	1	0	0	0	0
(110)	Rufous-Tailed Scrub-Robin	0	1	0	0	0	0	0	0	0
(111)	Common Redstart	0	0	0	0	0	0	1	0	0
(112)	Whinchat	0	5	0	0	0	0	0	4	0
(113)	Common Stonechat	0	0	3	3	0	0	0	0	0
(114)	Northern Wheatear	0	0	0	0	0	6	8	0	0
(115)	Black-Eared Wheatear	0	0	0	0	0	0	1	0	0
(116)	House Sparrow	221	142	158	102	158	75	140	70	58
(117)	Spanish Sparrow	0	0	0	0	0	6	8	0	0
(118)	Dead Sea Sparrow	50	450	54	0	30	10	15	4	0
(119)	Yellow Wagtail	0	2	0	0	0	43	86	1	0
(120)	Citrine Wagtail	1	0	0	1	1	4	4	0	0
(121)	White Wagtail	51	25	134	80	61	74	9	0	0
(122)	Water Pipit	5	26	22	20	16	2	1	0	0
(123)	Corn Bunting	0	0	0	1	0	0	0	0	0
(124)	Ortolan Bunting	0	0	0	0	0	0	1	0	0
(125)	Reed Bunting	0	0	0	0	1	0	0	0	0

Table 5: Field notes and breeding evidence of birds from Oct, 2013, to Jun, 2014, in the Iraqi Central Marsh.

Survey	Important notes
Oct, 2013	(i) Wide distribution of Pied Kingfisher, Cattle Egret (especially on the back of the water buffalos), Crested Lark, House Sparrow (ii) Recording Greylag Goose as first arrival in this month to the CM (iii) Recording Red-Backed Shrike (we just recorded this species in Oct and May) (iv) Recording Water Rail just in this month
Nov, 2013	(i) Wide distribution of Pied Kingfisher, Cattle Egret (especially on the back of the water buffalos), Crested Lark, House Sparrow (ii) Recording Starling, Coot, Yellow Wagtail, Robin, Arminian Gull, Ferruginous Duck, Bluethroat as first arrival in this month to the CM (iii) Large number of Dead Sea Sparrow, Winchat comparing with the observations of same species in the 9 surveys (iv) Recording Little and Spotted Crake
Dec, 2013	(i) Reduction of Cattle Egret observations (ii) Dominance of Little Egret (iii) Appearance/presence of Eagles and Vultures in the area of study (e.g., White-Tailed Eagle and Black Vulture) (iv) First arrivals of huge number of water birds and ducks to the area of study (e.g., Teal, Northern Pintail, Mallard, Shoveler). (v) Increasing of Common Kingfisher, White-Breasted Kingfisher, White Wagtail, Marsh Harrier, Kentish Plover, Starling, Slender Bill and Black-Headed Gulls, Coot, Chiffchaff (vi) First arrival of White Stork and Pelican White (vii) First observation of Spanish Sparrow, Marbled Teal, Common Kestrel, Glossy Ibis of the 9 surveys (viii) Increasing of birds hunting

Table 5: Continued.

Survey	Important notes
Jan, 2014	(i) Dominance of Whiskered Tern and Little Egret (ii) Wide distribution of Black-Winged Stilt (iii) Increasing of White-Tailed Lapwing, Coot, Chiffchaff, Isabelline Shrike, Gulls (iv) First observation of Great Crested Grebe, Sacred Ibis, Song Thrush (v) Overhunting
Feb, 2014	(i) Fishing is forbidden in this month. Therefore, locals overhunt birds in the CM (ii) First observation of Grey Heron (iii) Dominance of Slender Billed and Black-Headed Gulls (iv) Decrease in numbers of Mallard and ducks (v) First observation of Barn Swallow, Terek Sandpiper, Common Red Shank, Reed Bunting, Wood Sandpiper, Montagne's Harrier, European Reed Warbler, Great White Egret, Short-Toed Snake Eagle
Mar, 2014	(i) Dominant and wide distribution of Squacco Heron in all transects and zones (ii) Decrease in the numbers of Little Egret (iii) Decrease of hunting (iv) Decrease in numbers of Starling, Water Pipit, Coot, ducks (v) Disappearing of Kentish Plover, Common Ringed Plover, Cattle Egret, White Stork, Pelican White, White-Cheeked Bulbul, Bluthroat (vi) Highest observations/numbers of Marsh Sand Piper, Yellow Wagtail, Common Tern, Glossy Ibis, Common Red Shank (vii) First observation of Spur-Winged Lapwing, San Marten, Pin-Tailed Sandgrouse, Northern Wheatear, Hoopoe, Ruff
Apr, 2014	(i) Start of nesting of Iraq Babbler and House Sparrow (ii) Arrival of Warblers (Great Reed Warbler being higher in numbers than Basra Reed Warbler) (iii) Disappearing of Marsh Harrier (iv) Dominance of Little Bittern and Great Reed Warbler (v) Marbled Duck can be seen easily compared to other months (vi) Decrease in numbers of Squacco Heron, Common Kingfisher, White-Breasted Kingfisher, Starling, Glossy Ibis, Little Egret (vii) Increasing numbers of Glassful Prinia, Purple Swamphen, Northern Wheatear, Ruff, Spur-Winged Lapwing, Purple Heron compared to other months (viii) Night Heron can be seen easily (ix) Observation of Blue-Cheeked Beater just in this month (x) Disappearing of Great White Egret, Common Babbler, Coot, Teal, Marsh Sandpiper (xi) First observation of Pygmy Cormorant, Willow Warbler, Collared Pratincole, European Bee-Eater, Garganey, Curlew Sandpiper (xii) Recording Greater-Spotted Eagle (xiii) Breeding evidences (a) Nest with chicks of Red-Wattled Lapwing (GPS coordinates 0706280, 3436379) (b) Empty nest of Purple Swamphen (c) Nests of Graceful Prinia (d) Empty nest of Warbler in transect 2 (e) Nest of House Sparrow (f) Nest of Iraq Babbler
May, 2014	(i) Increase in numbers of Graceful Prinia, Basra Reed Warbler, Pygmy Cormorant (ii) Decrease in numbers of Gulls and Whiskered Tern (iii) Arrival of Red-Backed Shrike (iv) Recording Winchat, Golden Oriole, White-Winged Black Tern, European Reed Warbler (v) First observation of Lesser Grey Shrike, European Nightjar, Turtle Dove (vi) Disappearing of Grey Heron, Chiffchaff, Citrine Wagtail, Red Shank, Northern Wheatear, White Wagtail (vii) Breeding evidences (a) Empty 2 nests of Warbles in transect 1, zone 3 (coordinates: 0683694, 3441836) (b) Two nests (with 2 chicks and one egg in each nest) of Basra Reed Warbler in Transect 2, zone 3 (coordinates: 0706003, 3441503 and 0705922, 3441499) (c) Nest (with 2 eggs) of Collared Dove in transect 2, zone 1 (d) Chicks and huge numbers (2 colonies; each colony has more than 50 nest) of Whickered Tern nests in transect 2, zone 3 (each nest is floating on the water with 3 eggs) coordinates: 0705878, 344280 and 0706394, 3437954 (e) Nest of Little Bittern with 4 eggs in transect 2 (coordinates: 0702287, 3430598) (f) Two nests of White-Tailed Lapwing (one nest with 4 eggs and the second with 2 eggs), coordinates: 0684287, 3434033 (g) Nest of Graceful Prinia in transect 3 (h) Nest and chicks of House Sparrow in transect 3

Table 5: Continued.

Survey	Important notes
Jun, 2014	(i) Increasing in numbers of Night Heron and Pygmy Cormorant (especially in transect 3), Little Grebe, Moorhen, Crested Lark (ii) Assemblage of Little Egret in one huge group in transect 3 (iii) Disappearing of Marsh Harrier, Starling, Black-Headed Gull, Red-Backed Shrike, Yellow Wagtail, Arminian Gull, European Reed Warbler, Ruff, Lesser Grey Shrike (iv) Breeding evidences (a) Three nests of Basra Reed Warbler with 2 chicks and one egg in transect 1, zone 2 (coordinates: 0693162, 3436719 and 0684284, 3434030) (b) Three nests of Basra Reed Warbler in transect 2, zone 3 (coordinates: 0705880, 3441550 and 0705874, 3441525) (c) Nest with 4 eggs and chick of Little Bittern in transect 2, zone 1 (coordinates: 0693170, 3436726) (d) Nest with 4 eggs of White-Tailed Lapwing in transect 2, zone 1 (e) Nest with 2 eggs of Collared Dove in transect 2, zone 1 (f) Chicks of Whiskered Tern in transect 2, zone 3 (g) Chick and eggs of Pied Kingfisher (h) Observation, juveniles of Little Grebe subspecies *Tachybaptus ruficollis iraquensis* in transect 2, zone 3

Table 6: List of survey dates in the Central Marsh.

Month	Oct, 2013	Nov, 2013	Dec, 2013	Jan, 2014	Feb, 2014	Mar, 2014	Apr, 2014	May, 2014	Jun, 2014
Day of the survey	28	9	16	17	17	19	16	17	9
	29	10	17	19	18	20	17	18	10
		11	18	20	19	21	18	19	11

CM with the greatest abundance of birds was along transect two and in zone two. The highest species richness was in January and April along transect one and in zone two. However, there is potential of seasonal and observer bias. In winter, larger birds often form flocks in open areas and are therefore easy to detect. In summer many breeding birds may be less easy to detect (i.e., hidden from view in the reeds). Similarly in spring and autumn there will be huge numbers of migrant passerines using the marshes as a "stop-over" site to rest and feed. Our analysis is useful for comparing abundance and richness between areas within the same season but is perhaps less useful for comparing between seasons.

There has been recent interest in the potential population size of one of the most threatened species we recorded, the globally endangered Basra Reed Warbler, with major discrepancies of opinion regarding breeding population size (e.g., between [18, 19] and [23]). We recorded 11 nests in our study area (10 of them were independent nests; one in April, four in May, and five in June 2014). All recorded nests of Basra Reed Warbler in our surveys were built on reed stems only. Basra Reed Warbler shares its preferred reed bed habitat with the similar Great Reed Warbler. Our survey highlighted the dominance of Great Reed Warbler in April (the number of individuals recorded of Basra Reed Warbler in the area of study was 14, 42, and 66 and for Great Reed Warbler 38, 57, and 42 in April, May, and June 2014, resp.). It is unsafe to extrapolate from the numbers of nesting Basra Reed Warblers that we detected in our survey to the whole site, but clearly the Iraqi Marshlands holds a substantial population of this globally endangered species.

Although the CM is the first national park to be designated in Iraq [11] there is still a lack of detailed information on bird distribution across the site or in current management plans [4]. The CM area was considered as a Key Biodiversity Area (KBA) and an Important Birds Areas site and was divided into two main areas: core and buffer zones [4, 7, 13]. Our study provides more detailed information about bird abundance, richness, and assemblages. Three bird clusters were suggested for the first time in the area with zone two identified as containing large numbers of breeding birds. In contrast zone one had fewer species and a lower overall abundance; due to the proximity of human settlements zone one is also likely to receive more human disturbance (fishing, reed cutting, and buffalo grazing) than the other zones. More analysis is needed for the data to highlight differences between the 3 clusters.

Water levels in the Euphrates River, the main source of the CM's water, varied between autumn, winter, and summer (1.29 m, 1.79 m, and 1.66 m in October 2013 and January and June 2014, resp.; see Table 3), which is the main source of control of water levels and water quality inside the CM [11]. Rising water levels in the winter expand the flooded area away from Chibayish City and provide more suitable habitats for water birds in zone three. In addition, rising water levels in the Euphrates enable easier access for local people in zone one. Thus, keeping the minimum water level at 1.29 m in summer and winter could help and support wildlife in the CM, especially in zone two and zone three.

Our results clearly show that the CM provides habitat for many bird species and that more intensive survey methods are needed for other two marshes found within the Mesopotamian marshland complex. Owing to national water scarcity, there is a real danger that the Mesopotamian marshlands will shrink in size, reducing the effective area of suitable habitat for many wetland species. We provide detailed information on the bird species found within the

Table 7: The status of birds in the Central Marshes, southern Iraq. Survey from Oct, 2013–Jun, 2014 Key: IUCN Red List category (ver. 3.1.); Status in Iraq (Salim et al. 2012); Months recorded; highest count; Status in the CM based on the study survey; Breeding status in CM with BTO breeding code.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(1)	Phasianidae	Black Francolin	*Francolinus francolinus*	Least Concern	Breeding resident, mainly in the north, northeast and along the Tigress and Euphrates Rivers	Resident	Nov, Dec, Jan, Feb, Apr, May, and Jun	Almost same number 2–6	H
(2)	Anatidae	Greylag Goose	*Anser anser*	Least concern	Local breeding resident in small numbers in the southern marshes; widespread winter visitor to wetlands and agricultural land	Winter visitor	Oct, Dec, and Jan	Dec. 77	not seen in the breeding season
(3)		Mallard	*Anas platyrhynchos*	Least Concern	Fairly widespread passage migrant and winter visitor, some remain in summer	Winter visitor	Dec, Jan, and Mar	Jan. 55	Not seen in the breeding season
(4)		Northern Shoveler	*Spatula clypeata*	Least Concern	Fairly widespread passage migrant and winter visitor, especially frequent in southern marshes, some remain in Summer	Winter visitor	Dec	Dec. 46	Not seen in the breeding season
(5)		Northern Pintail	*Anas acuta*	Least concern	Fairly widespread passage migrant and winter visitor, especially frequent in southern marshes	Winter visitor	Dec, Jan, Feb	Dec. 400	Not seen in the breeding season
(6)		Garganey	*Spatula querquedula*	Least Concern	Fairly widespread passage migrant, rare in winter, may breed	Passage migrant	Apr	Apr. 8	M, H
(7)		Eurasian Teal	*Anas crecca*	Least Concern	Fairly widespread passage migrant and winter visitor, especially frequent in southern marshes	Winter visitor	Dec, Jan, Feb, and Mar	Jan. 168	Not seen in the breeding season
(8)		Marbled Duck	*Marmaronetta angustirostris*	Vulnerable	Local breeding resident in wetlands in central Iraq, more widespread in southern marshes, where wintering population is probably largest in the world	Winter visitor and possible breeds	Dec, Jan, Feb, and Apr	Dec. 35	H
(9)		Ferruginous Duck	*Aythya nyroca*	Near Threatened	Local breeding resident in Southern and Central Iraq; uncommon passage migrant and winter visitor	Winter visitor	Nov, Dec, and Feb	Dec. 21	Not seen in the breeding season

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(10)	Podicipitidae	Little Grebe	*Tachybaptus ruficollis*	Least concern	Widespread breeding resident in the southern Marshes and Central wetlands; widespread winter visitor. Resident birds are of the endemic race *iraquensis*	Resident	Oct to Jun Jan, Feb, and Jun	Jan.95	H, FL juveniles were seen, especially for endemic *iraquensis*
(11)		Great Crested Grebe	*Podiceps cristatus*	Least Concern	Very local breeding resident in Marshes and lakes of Southern Iraq; widespread winter visitor	Winter visitor	Jan	Jan.5	Not seen in the breeding season
(12)	Ciconiidae	White Stork	*Ciconia ciconia*	Least concern	Breeding summer visitor to northern and eastern Iraq; passage migrant, occasional in winter	Passage migrant and winter visitor	Dec, Jan, Feb	Dec.380	Non –breeding (not seen in the breeding season)
(13)	Threskiornithidae	African Sacred Ibis	*Threskiornis aethiopicus*	Least Concern	Very local breeding resident in dense reedbeds in the southern marshes. The southern marshes hold the only regular breeding colony in the Middle East, though there is feral colony in the United Arab Emirates.	Winter visitor	Jan	Jan. 2	Not seen in the breeding season
(14)		Glossy Ibis	*Plegadis falcinellus*	Least concern	Resident, breeding very locally in dense reed vegetation in the southern marshes; also a passage migrant and winter visitor	Winter visitor	Dec, Jan, Feb, Mar, and Apr	Mar. 230	Non-breeding (not seen in the breeding season)

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(15)		Eurasian Bittern	*Botaurus stellaris*	Least concern	Passage migrant and winter visitor to the southern and central marshes, also occasionally in north Iraq; may breed in southern marshes	Resident	Nov, Jan, Feb, Mar, Apr, and Jun	Same number of individuals in each month. 2	U, H
(16)		Little Bittern	*Ixobrychus minutus*	Least concern	Breeding, summer visitor to many wetlands throughout Iraq, but rather local outside the southern marshes; also passage migrant, with a few wintering	Breeding and summer visitor	Apr, May, and Jun	May. 203	NE, NY, FF, ON, FL, UN,
(17)		Black-crowned Night Heron	*Nycticorax nycticorax*	Least concern	Breeding summer visitor or resident in southern and central wetlands; local breeding summer visitor in north; passage migrant and winter visitor	Resident	Dec, Jan, Mar, Apr, May, Jun	Jun. 56	U, H
(18)		Squacco Heron	*Ardeola ralloides*	Least concern	Breeding, summer visitor to southern marshes, more local in central and north Iraq; widespread passage migrant, occasional in winter	resident	Oct to Jun	Mar. 970	FL
(19)	Ardeidae	Cattle Egret	*Bubulcus ibis*	Least concern	Local breeding resident in central and southern wetlands, widespread passage migrant, occasional in winter	Winter visitor	Oct, Nov, Jan, and Feb	Oct and Nov. 83	Non – breeding (Not seen in breeding season)
(20)		Grey Heron	*Ardea cinerea*	Least concern	Fairly widespread passage migrant and winter visitor to southern marshes	Passage migrant and winter visitor	Oct to Apr	Feb. 51	M
(21)		Purple Heron	*Ardea purpurea*	Least concern	Breeding, summer visitor to southern marshes and probable breeder, very locally, in central and northern wetlands; passage migrant, a few in winter	Resident	Oct to Jun	Apr. 33	H, U
(22)		Great White Egret	*Ardea* alba	Least concern	Passage migrant and winter visitor, most common in southern marshes, where some remain in summer	Passage migrant and winter visitor	Fab and Mar	Fab and Mar. 10–12	Non breeding (not seen in breeding season)
(23)		Little Egret	*Egretta garzetta*	Least concern	Resident or breeding summer visitor to the dense reed beds of the southern marshes, also to one site in northern Iraq; widespread passage migrant and winter visitor	Resident	Oct to Jun	Dec and Jan. 1046	U, H

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(24)	Pelecanidae	Great White pelican	*Pelecanus onocrotalus*	Least Concern	Fairly widespread passage migrant also winter visitor to southern and central wetlands	Passage migrant and winter visitor	Dec, Jan, Feb	Dec and Jan. 500–533	Not seen in the breeding season
(25)	Phalacrocorcidae	Pygmy Cormorant	*Microcarbo pygmaeus*	Least Concern	Breeding resident in dense reed vegetation in southern marshes; fairly widespread winter visitor.	Resident	Apr, May, and Jun	May and June. 21–23	U, H
(26)		Great Cormorant	*Phalacrocorax carbo*	Least Concern	Fairly widespread passage migrant and winter visitor	Winter visitor	Oct, Nov, Jan	Jan. 5	Not seen in the breeding season
(27)	Accipitrida	Black - winged Kite	*Elanus caeruleus*	Least Concern	Uncommon and local breeding resident in central and south Iraq; number increasing and recently recorded in northern Iraq. Breeds near cultivated fields nesting especially in *Eucalyptus* and date palm	Passage	Jan	Jan. 1	Not seen in the breeding season
(28)		White –tailed Sea Eagle	*Haliaeetus albicilla*	Least Concern	Former winter visitor in small numbers, not recorded since 1940s	Passage migrant	Dec	Dec. 1	Not seen in the breeding season
(29)	Accipitridae	Cinereous Vulture	*Aegypius monachus*	Near Threatened	Rare winter visitor to southern and central Iraq with one in summer in northeast	Passage migrant	Dec	Dec. 2	Not seen in the breeding season
(30)		Short-toed Snake-eagle	*Circaetus gallicus*	Least Concern	Breeding summer visitor to the mountains of north Iraq; also a passage migrant	Passage migrant and winter visitor	Feb	Feb. 2	Not seen in the breeding season
(31)	Accipitrida	Western Marsh Harrier	*Circus aeruginosus*	Least Concern	Local breeding resident in southern marshes and possibly central wetlands; also a passage migrant and winter visitor	Resident	Oct to May Dec and Jan	Dec. 28	M
(32)		Pallid Harrier	*Circus macrourus*	Near Threatened	Passage migrant and winter visitor, fairly widespread	Passage migrant and winter visitor	Nov, Jan, and Mar	Same number. 1	Not seen in the breeding season
(33)		Montagu's Harrier	*Circus pygargus*	Least Concern	Fairly widespread passage migrant; some winter	Passage migrant	Feb	Feb. 1	Not seen in the breeding season
(34)		Eurasian Sparrowhawk	*Accipiter nisus*	Least Concern	Widespread passage migrant and winter visitor	Passage migrant and winter visitor	Nov, Feb, and Mar	Feb. 2	Not seen in the breeding season
(35)		Long-legged Buzzard	*Buteo rufinus*	Least Concern	Breeding resident in the mountains and hills of northern Iraq; widespread passage migrant and winter visitor	Passage migrant and winter visitor	Jan	Jan. 1	Not seen in the breeding season

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(36)		Greater Spotted Eagle	*Clanga clanga*	Vulnerable	Rather uncommon passage migrant and winter visitor, widespread but most frequent in the southern marshes	Passage migrant	Jan, Mar, and Apr	Mar. 2	M
(37)		Steppe Eagle	*Aquila nipalensis*	Least Concern	Fairly widespread passage migrant and winter visitor	Passage migrant and winter visitor	Oct, Nov, and Mar	Mar. 2	Not seen in the breeding season
(38)	Falconidae	Common Kestrel	*Falco tinnunculus*	Least Concern	Widespread breeding resident; also winter visitor	Passage migrant	Dec	Dec. 1	Not seen in the breeding season
(39)		Eurasian Hobby	*Falco subbuteo*	Least Concern	Fairly widespread passage migrant; there is no evidence of breeding, though this is likely as birds have been observed during the summer in northern Iraq, and the species breeds fairly commonly in southeast Turkey	Passage migrant	Nov	Nov. 1	Not seen in the breeding season
(40)	Rallidae	Water Rail	*Rallus aquaticus*	Least concern	Fairly wide spread passage migrant and winter visitor	Passage migrant and winter visitor	Oct	Oct. 1	Not seen in the breeding season
(41)		Little Crake	*Zapornia parva*	Least concern	Passage migrant and winter visitor, one breeding record from central Iraq	Passage migrant and winter visitor	Nov and Apr One individual recorded in each month	Nov and Apr One individual recorded in each month	M
(42)		Spotted Crake	*Porzana porzana*	Least concern	Passage migrant, but rarely observed	Passage migrant and winter visitor	Nov	Nov. 1	Not seen in the breeding season
(43)		Purple Swamphen	*Porphyrio porphyrio*	Least Concern	Breeding resident in dense reed beds and dense aquatic vegetation along rivers in southern and central Iraq, very locally in wetlands in the north	Resident	Nov, Jan, Mar, Apr, and Jun	Apr. 18	H, UN
(44)		Common Moorhen	Gallinula chloropus	Least Concern	Widespread breeding resident in wetlands in southern and central Iraq, locally in north; also a passage migrant and winter visitor	Resident	Oct to Jun Jan	Jan. 22	H

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(45)		Common Coot	*Fulica atra*	Least Concern	Breeding resident in very small numbers mainly in the south; widespread passage migrant and winter visitor, especially in the Southern Marshes	Winter visitor	Nov to Mar Jan and Feb	Jan. 245	Not seen in the breeding season
(46)	Recurvirostridae	Black-winged Stilt	*Himantopus himantopus*	Least concern	Widespread breeding resident in southern, Central and Western wetlands, passage migrant and winter visitor	Resident	Oct to Jun, Jan	Jan. 236	U, H
(47)	Charadriidae	Spur-winged Lapwing	*Vanellus spinosus*	Least concern	Breeding resident in Central and Southern Iraq; passage migrant	Summer visitor and possible breeding	Oct, Mar, Apr, May, Jun	Apr. 19	H, S, T, U
(48)		Red- wattled Lapwing	*Vanellus indicus*	Least concern	Widespread breeding resident in South, Central, WESTERN AND Northeast Iraq in wetlands and farmlands; may breed in North where present in Summer	Resident	Oct to Jun Oct	Oct. 12	NY, NE, FF, ON, FL, UN
(49)		White-tailed Lapwing	*Vanellus leucuraus*	Least concern	Local breeding resident in the wetlands of southern, central and western Iraq; more widespread passage migrant, including to northern Iraq were also found in summer and maybe breed	Resident	Oct to Jun Jan and Feb	Jan. 154	NY, NE, FF, ON, FL, UN,
(50)		Common Ringed Plover	*Charadrius hiaticula*	Least concern	Widespread passage migrant and winter visitor	Passage and winter visitor	Oct, Nov, Dec, Jan*, Feb	Jan. 10	Non-breeding
(51)		Little Ringed Plover	*Charadrius dubius*	Least concern	Widespread breeding summer visitor mostly to northern and central Iraq, maybe breed in the south passage migrant with some remaining in winter	Passage migrant	Nov, Apr, May, and Jun	almost same number in each month 2-3	U

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(52)		Kentish Plover	*Charadrius alexandrinus*	Least concern	Breeding resident in central and southern Iraq; passage migrant and winter visitor	Resident, but not seen in Mar, Apr, and May	Oct, Nov, Dec, Jan, Feb, and Jun	Dec. 43	H
(53)		Common Snipe	*Gallinago gallinago*	Least concern	Widespread passage migrant and winter visitor	Passage migrant and winter visitor	Oct, Jan, Mar, and Apr	Apr. 21	M
(54)		Common Redshank	*Tringa totanus*	Least concern	Widespread passage migrant and winter visitor, some remain in summer	Passage migrant and winter visitor	Feb, Mar, and Apr	Mar. 11	M
(55)	Scolopacidae	Marsh Sandpiper	*Tringa stagnatilis*	Least concern	Passage migrant and winter visitor mainly in South and East	Passage migrant and winter visitor	Nov, Jan, Feb, and Mar	Mar. 28	M
(56)		Common Greenshank	*Tringa nebularia*	Least Concern	Widespread passage migrant and winter visitor	Passage migrant and winter visitor	Oct and Apr	Almost same number. 1-2	M
(57)		Green Sandpiper	*Tringa ochropus*	Least concern	Widespread passage migrant and winter visitor	Passage migrant and winter visitor	Oct, Nov, Jan, Feb, and Mar	Feb. 4	Non breeding (not seen in the breeding season)
(58)		Wood Sandpiper	*Tringa glareola*	Least concern	Passage migrant and winter visitor in small numbers mainly to the South	Passage migrant and winter visitor	Feb	Feb. 1	Not seen in breeding season
(59)		Terek Sandpiper	*Xenus cinereus*	Least Concern	Passage migrant and winter visitor mainly in southern Iraq	Passage migrant and winter visitor	Oct and Feb	Oct. 3	Not seen in the breeding season
(60)		Common Sandpiper	*Actitis hypoleucos*	Least concern	Fairly widespread passage migrant and winter visitor, a few remaining in summer, may breed in the mountains of Northern Iraq	Passage migrant and winter visitor	Oct to May	Almost same numbers 6–8	U

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(61)		Sanderling	*Calidris alba*	Least Concern	Passage migrant mainly in the southern tidal areas, some remaining in winter	Passage migrant and winter visitor	Jan	Jan. 1	Not seen in the breeding season
(62)		Little Stint	*Calidris minuta*	Least concern	Passage migrant and winter visitor to Southern and Central Iraq	Passage migrant and winter visitor	Nov, Jan, Feb, Apr, and May	Jan and Apr. 5-6	M
(63)		Curlew Sandpiper	*Calidris ferruginea*	Least concern	Passage migrant and winter visitor mainly to Central and Southern Iraq	Passage migrant	April and May	April. 5	M
(64)		Ruff	*Calidris pugnax*	Least concern	Fairly widespread passage migrant and winter visitor	Passage migrant and winter visitor	Mar, Apr, and May	Apr. 85	M
(65)	Glareolidae	Collared Pratincole	*Glareola pratincola*	Least concern	Widespread breeding summer visitor to dry grassland areas near wetlands; passage migrant	Summering site, and possible breeding site	Apr, May, and Jun	Apr. 15	U, H, S
(66)	Laridae	Slender-billed Gull	*Larus genei*	Least concern	Breeding resident in Central and southern Iraq; breeding resident or summer visitor to the North; passage migrant and winter visitor	Resident	Oct to Jun	Feb. 891	M, H
(67)		Black-headed Gull	*Larus ridibundus*	Least concern	Local breeding resident or summer visitor in northern Iraq; widespread winter visitor	Winter visitor	Nov to May	Feb. 685	M
(68)		Armenian Gull	*Larus armenicus*	Least concern	Wide spread winter visitor and passage migrant	Winter visitor	Nov to Apr	Mar. 21	M

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(69)		Gull – billed Tern	*Gelochelidon nilotica*	Least concern	Local breeding summer visitor in the extreme south; passage migrant, a few in winter	Passage migrant	Oct, Nov, and May	almost same number 9-10	U
(70)		Little Tern	*Sternula albifrons*	Least concern	Fairly widespread breeding summer visitor and passage migrant	Summer visitor	Oct, Nov, Apr, May Jun	Apr. 20	U, H
(71)		Common tern	*Sterna hirundo*	Least concern	Local breeding summer visitor to inland wetlands; passage migrant with a few remaining in winter	Summering site, and possible breeding site	Nov, Mar, Apr, May, Jun	Mar. 53	H, M
(72)		Whiskered Tern	*Chlidonias hybrida*	Least concern	Resident and breeding summer visitor to wetlands in Southern Iraq; fairly widespread passage migrant; winter visitor, but not in the North	Resident and breeding	Oct to Jun	Jan. 741	NY, NE, FF, ON, FL, UN Colonise, and large number of nesting
(73)		White –winged Tern	*Chlidonias leucopterus*	Least Concern	Local breeding summer visitor to wetlands in southern Iraq, fairly widespread passage migrant	Summer visitor	May	May. 21	U, H
(74)	Pteroclidae	Pin-tailed Sandgrouse	*Pterocles alchata*	Least Concern	Widespread but local breeding resident in dry grasslands	passage	Mar and Apr	same number 16–23	F
(75)	Columbidae	European Turtle-dove	*Streptopelia turtur*	Least Concern	Local breeding summer visitor to woodlands, orchards and date palms; winter visitor	Summer visitor and possible breeds	May	May. 5	H
(76)		Eurasian Collared Dove	*Streptopelia decaocto*	Least Concern	Widespread breeding resident	Resident and breeds	Oct to Jun*	almost same number 20–36	NY, NE, FF, ON, UN,
(77)		Laughing Dove	*Spilopelia senegalensis*	Least Concern	Fairly widespread breeding resident. Until at least 1969s it was a rare winter visitor	Resident and possible breeds	Nov to may	Jan. 13	H
(78)	Tytonidae	Common Barn-owl	*Tyto alba*	Least Concern	Local, but fairly widespread breeding resident	passage	Jan	Jan. 1	Not seen in the breeding season
(79)	Caprimulgidae	Egyptian Nightjar	*Caprimulgus aegyptius*	Least Concern	Breeding summer visitor to semi-deserts and arid areas of southern and central Iraq, and possibly northeast; passage migrant in south and central Iraq	Passage migrant	May	May. 1	H (This bird is on its breeding territory)
(80)	Halcyonidae	White-breasted Kingfisher	*Halcyon smyrnensis*	Least concern	Breeding resident on rivers and in wetlands of southern, central and northeast Iraq, very local elsewhere	Resident	Oct to Jun	Jan and Feb. 30–38	H, S
(81)	Alcedinidae	Common Kingfisher	*Alcedo atthis*	Least concern	Uncommon breeding resident in the southern and central Iraq; possibly in the northern Iraq. Winter visitor and passage migrant	Resident	Oct to Jun	Dec. 29	H, U
(82)	Cerylidae	Pied King Fisher	*Ceryle rudis*	Least concern	Widespread Breeding resident in wetland and water courses	resident	Oct to Jun (Dec* and Jan*)	Dec and Jan 500–542	UN, ON, FF, NY

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(83)	Meropidae	Blue-cheeked Bee-eater	*Merops persicus*	Least concern	Breeding, summer visitor to northern and eastern Iraq, widespread passage migrant	Passage Migrant	Oct, Nov, and Apr	Apr. 28	M
(84)		European Bee-eater	*Merops apiaster*	Least Concern	Breeding summer visitor to northern and eastern Iraq; widespread passage migrant	Passage Migrant	Apr	Apr. 8	M
(85)	Alaudidae	Eurasian Hoopoe	*Alaemon alaudipes*	Least Concern	Widespread breeding resident in the western, central and southern deserts	Passage migrant	Mar	Mar. 1	Not seen in the breeding season
(86)	Laniidae	Red-backed Shrike	*Lanius collurio*	Least Concern	Widespread passage migrant	Passage migrant	Oct and May	May. 52	M
(87)		Isabelline Shrike	*Lanius isabellinus*	Least Concern	Passage migrant and winter visitor, more frequent in south and central Iraq	Passage migrant and winter visitor	Oct to Mar	Jan. 25	Not seen in the breeding season
(88)		Turkestan Isabelline Shrike	*Lanius phoenicuroides*	—	Uncommon passage migrent	Passage migrant and winter visitor	Oct, Jan, Feb, and Apr	almost same number 1-2	M
(89)		Lesser Grey Shrike	*Lanius minor*	Least Concern	Fairly widespread passage migrant	Passage migrant	May	May. 31	M
(90)	Oriolidae	Eurasian Golden Oriole	*Oriolus oriolus*	Least Concern	Breeding summer visitor to woodlands of northern Iraq; widespread passage migrant	Passage migrant	May	May. 1	M
(91)	Corvidae	Hooded Crow	*Corvus cornix*	—	Uncommon breeding resident in northern Iraq	Winter visitor	Dec, Feb, and Mar	Feb. 5	Not seen in the breeding season
(92)		Mesopotamian Crow	*Corvus capellanus*	—	Breeding resident of the plains and date orchards of southern and central Iraq; also found in stable and floating reedbeds of the southern marshes	Winter visitor	Dec and Mar	almost same number 1-2	Not seen in the breeding season
(93)	Alaudidae	Crested Lark	*Galerida cristata*	Least Concern	Widespread breeding resident	Resident	Oct to Jun	Oct. 32	T, H, A
(94)	Pycnonotidae	White -eared Bulbul	*Pycnonotus leucotis*	Least Concern	Widespread breeding resident in woodland groves, especially palm, in central, western, southern and northeast Iraq; appears to be spreading north as now found in northern areas where absent in 1940s	Resident	Nov to Feb	almost same number 2–4	Not seen in the breeding season

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(95)	Hirundinidae	Sand Martin	*Riparia riparia*	Least Concern	Breeding summer visitor, mainly along major river courses; passage migrant	Summer visitor and possible breeds	Mar to Jun	Apr. 54	H, U
(96)		Barn Swallow	*Hirundo rustica*	Least Concern	Fairly widespread breeding summer visitor; widespread passage migrant; very few winter in southern Iraq	Passage migrant and breeding summer visitor	Feb to Jun	Apr and May 35–38	ON, B, T, H
(97)	Sylviidae	Willow Warbler	*Phylloscopus trochilus*	Least Concern	Widespread passage migrant	Passage migrant	Apr	Apr. 1	M
(98)	Phylloscopidae	Common Chiffchaff	*Phylloscopus collybita*	Least Concern	Widespread passage migrant and winter visitor	Passage migrant and winter visitor	Nov to Apr	Jan. 48	Not seen in the breeding season
(99)	Acrocephalidae	Basra Reed Warbler	*Acrocephalus griseldis*	Endangered	Breeding summer visitor to the extensive reedbeds of the Southern Marshes and recently discovered further north in the marshes of central Iraq and at one site in Western Iraq. Endemic species.	Summer visitor and breeds	Apr, May, and Jun	Jun. 66	NY, NE, FF, ON, UN
(100)		Great Reed Warbler	*Acrocephalus arundinaceus*	Least Concern	Rather local breeding summer visitor to wetlands and water course with reedbeds throughout Iraq; also a widespread passage migrant; birds recorded in the southern marshes in early February maybe overwintering or early migrants.	Passage migrant and breeding summer visitor	Oct, Nov, Apr, May, Jun	May. 57	NE, ON, UN
(101)	Sylviidae	Sedge Warbler	*Acrocephalus schoenobaenus*	Least Concern	Passage migrant; found at one riverine site in breeding season in northern Iraq	Passage migrant	Nov, Apr, and May	almost same number 1-2	M
(102)		Eurasian Reed-Warbler	*Acrocephalus scirpaceus*	Least Concern	Passage migrant with one proven record of breeding in the southern marshes. The status of this species has been complicated by the earlier confusion with Basra Reed Warbler. Many early references to Reed Warbler probably referred to Basra Reed Warbler	Passage migrant	Feb and May	Feb and May 1-2	M, H
(103)	Cisticolidae	Graceful Prinia	*Prinia gracilis*	Least Concern	Widespread breeding resident in central and southern Iraq, very local in North and northeast Iraq	Resident and breeds	Oct to Jun	May. 104	ON, UN, P,T, B
(104)	Leiothrichidae	Iraq Babbler	*Turdoides altirostris*	Least Concern	Breeding resident in reedbeds, mainly along the Tigress and Euphrates Rivers, and extending its range northwards along the later. Endemic, thought now recorded along the Euphrates in Syria and South Turkey	Resident and breeds	Oct to Jun	Apr. 58	ON, B, H
(105)		Afghan (Common) Babbler	*Turdoides caudata*	Least concern	Breeding resident in Southern, Western, and Central Iraq, mainly in arid areas with scrub	Resident	Jan, Feb, Mar, and May	almost same numbers 16–18	U, H
(106)	Sturnidae	Common starling	*Sturnus vulgaris*	Least Concern	Very local breeding resident in open wood land in the North of Iraq, widespread winter visitor	Winter visitor	Nov to Mar	Feb. 549	Not seen in the breeding season

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(107)	Turdidae	Song Thrush	*Turdus philomelos*	Least Concern	Irregular winter visitor	Winter visitor	Jan	Jan. 1	Not seen in the breeding season
(108)		European Robin	*Erithacus rubecula*	Least Concern	Fairly widespread winter visitor	Passage migrant and winter visitor	Nov, Dec, and Jan	Dec. 5	Not seen in the breeding season
(109)	Muscicapidae	Bluethroat	*Luscinia svecica*	Least Concern	Fairly wide spread passage migrant and winter visitor	Passage Migrant and winter visitor	Nov to Feb	Same number. 1	Not seen in the breeding season
(110)		Rufous-tailed Scrub-robin	*Erythropygia galactotes*	Least Concern	Fairly widespread breeding summer visitor, but absent from western Iraq; passage migrant	Passage migrant	Nov	Nov. 1	Not seen in the breeding season
(111)	Muscicapidae	Common Redstart	*Phoenicurus phoenicurus*	Least Concern	Local breeding summer visitor to woodlands in north Iraq with both *Phoenicurus*and *samamisicus* recorded; otherwise wide a widespread passage migrant	Passage migrant	Apr	Apr. 1	M
(112)		Whinchat	*Saxicola rubetra*	Least Concern	Passage migrant, references to past winter records have not been confirmed in recent surveys	Passage migrant	Nov and May	same number 4-5	M
(113)		Common Stonechat	*Saxicola torquatus*	Least Concern	Fairly widespread passage migrant and winter visitor	Passage migrant and winter visitor	Dec and Jan	same number 3	Not seen in the breeding season
(114)	Muscicapidae	Northern Wheatear	*Oenanthe oenanthe*	Least concern	Very local breeding summer visitor to mountain slopes and foothills in northeast; widespread passage migrant	Passage migrant	Mar and Apr	Same number 6–8	M
(115)		Black-eared Wheatear	*Oenanthe hispanica*	Least Concern	Breeding summer visitor to northern hilly country; widespread passage migrant	Passage migrant	Apr	Apr. 1	M
(116)		House Sparrow	*Passer domesticus*	Least Concern	Widespread breeding resident	Resident	Oct to Jun	Oct. 221	NY, NE, FF, ON, UN,
(117)	Passeridae	Spanish Sparrow	Passer hispaniolensis	Least Concern	Local breeding resident in North and Central Iraq; widespread winter visitor	Winter visitor	Nov, Dec, Jan, Feb, and	Dec. 30	M
(118)		Dead Sea Sparrow	*Passer moabiticus*	Least Concern	Local breeding resident found especially, along major water course, widespread in winter	Resident	Oct, Nov, Dec, Feb Mar, Apr, and May	Nov. 450	U, H, B
(119)	Motacillidae	Yellow Wagtail	*Motacilla flava*	Least Concern	Widespread passage migrant.	Passage migrant	Mar, Apr, May	Apr. 86	M
(120)		Citrine Wagtail	*Motacilla citreola*	Least Concern	Uncommon passage migrant and winter visitor	Passage migrant and winter visitor	Oct, Jan, Feb, Mar, Apr	Mar and Apr. 4	M
(121)		White Wagtail	Motacilla alba	Least Concern	Local breeding resident in northern Iraq; widespread passage migrant and winter visitor	Passage migrant and winter visitor	Oct to Apr Dec and Jan	Dec. 134	M
(122)		Water Pipit	Anthus spinoletta	Least Concern	Probably breeds as found in suitable breeding habitat at mountain site in northeast Iraq in Jun, 2011; Fairly widespread passage migrant and winter visitor	Passage migrant and winter visitor	Oct to Apr	Nov. 26	M
(123)	Emberizidae	Corn Bunting	*Emberiza calandra*	Least Concern	Breeding resident in Northern farmland and open woodland; fairly widespread passage migrant and winter visitor	Winter visitor	Jan	Jan. 1	Not seen in the breeding season

Table 7: Continued.

No.	Family	English Name	Scientific name	IUCN Red List category	Status in Iraq (Salim et al. 2012)	Status in the CM based on the survey by Nadheer Fazaa	Month of observation	Highest Count	Breeding status in CM with BTO breeding code
(124)		Ortolan Bunting	*Emberiza hortulana*	Least Concern	Breeding summer visitor to the hills of northern Iraq widespread passage migrant	Passage migrant	Apr	Apr. 1	M
(125)		Reed Bunting	*Emberiza schoeniclus*	Least Concern	Uncommon winter visitor	Winter visitor	Feb	Feb. 1	Not seen in the breeding season

CM, which could help form the basis of a management plan for their conservation.

We make the following recommendations for management and future work relating to bird conservation in the CM:

(1) Limit local human activities in zone one and support the designation of zone one as a buffer for zones 2 and 3.

(2) Future bird monitoring studies should repeat our methods, although if possible, the direction of survey (north-south versus south-north) should be randomized.

(3) Ensure that water levels in the Euphrates River are maintained because this is the main source for CM's water during summer and winter and is needed for bird populations.

(4) Following the establishment of a soil embankment between Chibayish City in Nasiriyah Province and Modina City in Basra Province, we recommend detailed analysis of water quality and sediments to evaluate the concentration of pesticides and heavy metals and their effects on bird species and other fauna in the CM.

(5) Evaluate local threats (e.g., hunting) and global potential threats (e.g., climate change) on the CM as a site and bird species in the area.

(6) Extend our findings on key species, for example, Basra Reed Warbler, to provide more precise estimates of population sizes within the CM.

Appendix

See Tables 4–7.

Disclosure

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Competing Interests

The authors declare that they have no competing interests.

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