



Birds of Ghaleh-Now Wetland, Southeastern Tehran: A Comparison of Avian Biodiversity between the 1970s and 2010s

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Abstract

Ghaleh-Now wetland, although small in size, is one of the most significant wetlands to the south of the Alborz Mountains, in the vicinity of the capital city of Tehran. A thorough study of the avifauna was carried out at this site during 65 field visits in two periods in the 1970s and 2010s, respectively. The results have revealed that Ghaleh-Now supports no fewer than 196 species of birds, of which 95 percent are migratory birds. This high ratio of migratory species underlines the importance of this wetland as a stop-over site for migrating birds. The difference between the number of species recorded (species richness) in each of the two study periods was not statistically significant (*t*-Test). However, because of fluctuations in water level, the number of wader species in autumn was lower in the 2010s than in the 1970s. We highlight the importance of such wetlands as vital staging areas for migratory birds and make some suggestions for conservation measures.

1. Introduction

Situated in the vicinity of the Alborz Mountains, Tehran is the largest city in Iran and also a familiar place for many ornithologists who have visited Iran. Tehran province supports as many as 338 species of birds (Khaleghizadeh *et al.* 2010), nearly 70% of the total of 534 species recorded in Iran (Kaboli *et al.*, in press). The Tehran region is one of the best known areas ornithologically in the country and one of the most popular for bird-watching activities (Scott 2007). Since the days of Meiklejohn (1947, 1948), dozens of ornithologists and amateur birdwatchers have visited parks and orchards in and around Tehran, the mountain ranges to the north of the city and the plains to the south. However, regular systematic surveys in Tehran province have been limited to the Latian Dam and Lashgarak area (Scott 2007; Khaleghizadeh & Sehatiasabet 2007) and Jajeroud area east of the city (Bakhtiari & Tohidifar 2007).

Migratory birds passing through the Tehran region on their southward migration in autumn face the great Dasht-e Kavir desert to the south, while birds on their northward migration in spring face the formidable barrier of the Alborz Mountains to the north. Ghaleh-Now marshes, situated on the plains between the Alborz foothills and the edge of Dasht-e Kavir, provide a suitable stop-over site for migrants both in spring and in autumn. This results in an unusually high concentration of migratory species in the vicinity of the capital at almost any time of the year. The Ghaleh-Now area was first visited for ornithological purposes by DAS in 1972 and quickly became a famous area for bird-watching and ringing activities (Argyle 1975) and also a research base for other biologists (Lessells 1976). Wader ringing was carried out on many occasions in this area during the 1970s, mainly in autumn (Argyle 1976). In recent years, Ghaleh-Now has become a very popular site for bird-watchers

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living in Tehran. The site contains various habitats including marshes and lagoons, agricultural fields and steppe which attract many species of waterbirds and terrestrial birds. There are several other similar habitats in the Tehran region, such as the Latian Dam and Lashgarak area (37 km to the north), Mamlo Dam (27 km to the northeast), and Band-Alikhan wetland (50 km to the south).

Globally, habitat degradation and decrease in biodiversity richness and abundance are increasing (Carrete *et al.* 2009). A similar situation is happening on a relatively small scale in Iran. Urbanization, development and modification of small villages into towns and cities are common trends, now widely seen in the country. It is very important to know what the impact of these developments is on biodiversity, and birds are considered to be key indicators for this purpose (Gregory *et al.* 2003). In this paper, we compare data from avifaunal surveys undertaken at Ghaleh-Now in the 1970s and in the 2010s. The aim of the paper is to understand how changes in the ecological conditions of this wetland have affected its bird fauna, and to promote Ghaleh-Now as a rich and important habitat for birds and ornithological research.

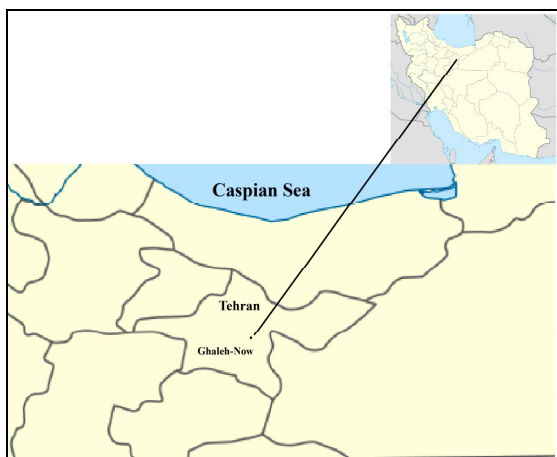


Fig. 1. Location of study area in SE Tehran.



Fig. 2. A view of Ghaleh-Now wetland in 2013 © M. Tohidifar.



Fig. 3. Agricultural fields, a resting place for herons and egrets, and reed-beds around Ghaleh-Now wetland © M. Tohidifar.



Fig. 4. A satellite image showing Ghaleh-Now wetland and fish ponds © Google Earth 2010.

2. Materials and Methods

2.1. Study Area

Ghaleh-Now (Galenow) wetland, also known as Eshgh-Abad (35°27'40.0"N, 51°31'15.0"E, 965 m a.s.l.), lies east of the small village of Ghaleh-Now, north of Rey and Kahrizak cities, and west and south of Qarchak within Rey district, where tributaries of the Shour River connect with each other (Fig 1). The features of the wetland have changed considerably during the past four decades. In the 1970s, the wetland areas included permanent streams with stands of *Phragmites* reeds, a number of small saline pools, an area of flooded brickpits and several temporary lagoons flooded with sewage from Tehran. By the 2010s, the wetland areas consisted of a main lagoon and seven to eight small satellite lagoons located to the southeast of the main lagoon (Figs. 2–4). There were also some lagoons to the west of the main lagoon a few years ago, but these no longer exist. The total area of the site is about 90 ha, less than 70 ha of which is wetland. In the 1980s, the site was under the control of military forces and was developed as fish ponds, but it is now under the control of the private sector. The main lagoon with a maximum depth of 4.5 m is still used to maintain fish stocks for harvesting, while the small lagoons are used to rear fish to the age of six months. Water levels are regularly manipulated for the rearing and harvesting of fish. Starting in late October, water is discharged from the main lagoon by the owner. The drainage process takes until mid-February and during this period a mud-covered landscape develops, especially after rainfall. By mid-February, water remains only in narrow, shallow streams which are eventually excluded from the main wetland area and flow into the Shour River. Large parts of the wetland, including several of the lagoons, are now covered with stands of the Common Reed *Phragmites australis* (Fig. 5). Because of the problems these reed-beds cause for fish farming, the owners cut back the reeds every autumn. Other plant species include *Alhagi cameron* and *Tamarix* spp. In the surrounding agricultural fields, crops such as wheat and barley are cultivated. Mammals such as European Hare *Lepus europaeus*, Striped Hyena *Hyaena hyaena*, Golden Jackal *Canis aureus*, Red Fox *Vulpes vulpes* and Grey Wolf *Canis lupus* have been seen in the area.

2.2. Methods

Ghaleh-Now wetland and adjacent areas were visited on a number of occasions throughout the year during two periods (1970s and 2010s). In the first period, data were collected by DAS, P.N. Paul and M. Smart at irregular intervals on 36 occasions between 18 February 1972 and 19 February 1976 and also on 23 July 1977. During this survey, no visit was made in May. In the second period, data collection was carried out regularly twice a month (generally with 14–15 day intervals) between April 2010 and April 2011, with two extra visits in July and November 2011, giving a total of 28 visits. Two visits were made to the site in every month except April (three visits), November (four visits) and December (three visits). The maximum number of individuals of each species in each month is presented in Table 1. We analyzed our data with SPSS and compared the number of species recorded in each month excluding May, for which no data were available from the 1970s.

3. Results

A total of 177 species of birds were recorded at Ghaleh-Now during the two surveys; 149 of these were recorded in the 1970s and 120 in the 2010s. The *t*-Test analyses of our data showed that the difference between the totals for the two study periods was not statistically significant. During the study periods, we identified eight species as resident breeding birds (5 percent), 14 species as breeding summer visitors (8 percent), seven as vagrants (3 percent) and the remaining 148 species (84 percent) as either passage migrants or winter visitors or both.



Fig. 5. A view of the mudflats and reed-beds at Ghaleh-Now. This constitutes suitable habitat for various species of waders © M. Tohidifar.

Birds of Ghaleh-Now between the 1970 and 2010s– *M. Tohidifar & D.A. Scott*

Table 1. Monthly maximum counts of birds at Ghaleh-Now wetland, southeastern Tehran, Iran. The 1970s counts were made between February 1972 and February 1976 and in July 1977; the 2010s counts were made between April 2010 and April 2011 and in July and November 2011. PNC indicates present but not counted. P= common passage migrant, p= rare passage migrant, W= common winter visitor, w= rare winter visitor, B= common breeding summer visitor, b= rare breeding summer visitor, R= common resident breeding bird, V= vagrant. The sequence and nomenclature follow Scott & Adhami (2006).

Month	January		February		March		April		May	June		July		August		September		October		November		December		Stat us	
	1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 8	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3		
Great Crested Grebe				2		13		5	2		3		11		36		11		7					B	
Little Grebe			1					2	3			3	1		1	1	1		5					B	
Black-necked Grebe			1												1	1	2							P	
Great Cormorant		1		1	2	37		3	1		2	1					3		7		2		2	W/P	
Little Egret	1				1		13	15	4		1		6	6	30	41	1	32	5		1			P/w	
Cattle Egret				2									1											P	
Grey Heron	2	27	3	32	2	16		8	2		1		1	9	26	15	43	4	27		53		23	W/P	
Purple Heron					2	1	1	3	5		4		1	1	1		3							P	
Great Egret	4	5	3	5	1	1			2								1		6		18		12	W/P	
Squacco Heron							5	2		1	2		1	3		1								P	
Black-crowned Night Heron													17	1	13	6	1	2							P
Little Bittern								1	2	10		12		5		4		1				1			P
Greater Flamingo						11		27																	P
Eurasian Spoonbill						5		2			1														P
White Stork					3		7	2		2		37		5		1									P
Glossy Ibis								11				1				1									P
Greater White-fronted Goose																			1						P
Gadwall				5		3											1		2		2				P/w
Ruddy Shelduck			2											1											P

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Month	Sight period/No of visits	January		February		March		April		May	June		July		August		September		October		November		December		Stat us
		1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 8	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3	
Common Shelduck	<i>Tadorna tadorna</i>													1											P
Eurasian Teal	<i>Anas crecca</i>		21	90	14	1	25	25							1		1	2		23		4		2	P/W
Mallard	<i>Anas platyrhynchos</i>			150		1				3			1				1		1			2			P/W
Northern Pintail	<i>Anas acuta</i>			4			11								1		2	1					1		P/W
Garganey	<i>Anas querquedula</i>						8		4				1		18	46	18								P
Northern Shoveler	<i>Anas clypeata</i>	4		6	8		44								1		2		5	17					P/W
Tufted Duck	<i>Aythya fuligula</i>																					2	1		P
Eurasian Wigeon	<i>Anas penelope</i>				1		3													27					P
Common Pochard	<i>Aythya ferina</i>						6																		P
Osprey	<i>Pandion haliaetus</i>								1									1							P
White-tailed Eagle	<i>Haliaeetus albicilla</i>																							1	P
Black Kite	<i>Milvus migrans</i>		43		34	1	17		3								1	34		76		66		41	P/W
Eurasian Black Vulture	<i>Aegyptius monachus</i>																						1		P
Eurasian Griffon Vulture	<i>Gyps fulvus</i>				1																				P
Short-toed Eagle	<i>Circaetus gallicus</i>					1									1		1								P
Western Marsh Harrier	<i>Circus aeruginosus</i>	1	4	2	4	1	3	1	3	3		5		1		3	1	4		5		3		5	R
Hen Harrier	<i>Circus cyaneus</i>	8		2											1						5	1	3		P/W
Pallid Harrier	<i>Circus macrourus</i>	4				1													2		8				P/W
Montagu's Harrier	<i>Circus pygargus</i>														1										P
Levant Sparrowhawk	<i>Accipiter brevipes</i>																1								P
Eurasian Sparrowhawk	<i>Accipiter nisus</i>		1	2		1		1										2			1	1			P/W
Common Buzzard	<i>Buteo buteo vulpinus</i>																	1	1						P

Birds of Ghaleh-Now between the 1970 and 2010s– *M. Tohidifar & D.A. Scott*

Month		January		February		March		April		May	June		July		August		September		October		November		December		Stat us	
Sight period/No of visits		1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 8	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3		
Long-legged Buzzard	<i>Buteo rufinus</i>	6	1	3	3	3		2					1	2	1	1	1	2	4			2		2	R	
Rough-legged Buzzard	<i>Buteo lagopus</i>	1																							V	
Eastern Imperial Eagle	<i>Aquila heliaca</i>	3	1																2	1			2		P/W	
Golden Eagle	<i>Aquila chrysaetos</i>																							1	w	
Steppe Eagle	<i>Aquila nipalensis</i>																					1		1	P	
Common Kestrel	<i>Falco tinnunculus</i>	9	2	5		3	1	2							1	2			6	1			2	1	R	
Merlin	<i>Falco columbarius</i>	2		1		2															1				W	
Eurasian Hobby	<i>Falco subbuteo</i>														1	1	2	1	2							P
Saker Falcon	<i>Falco cherrug</i>																		1							P
Peregrine Falcon	<i>Falco peregrinus</i>																				1					P
Common Quail	<i>Coturnix coturnix</i>											1		1												B
Water Rail	<i>Rallus aquaticus</i>	2				2		1					2		13		2						1			P
Little Crake	<i>Porzana parva</i>												1		5		1		1							P
Spotted Crake	<i>Porzana porzana</i>					2	3								1											P
Common Moorhen	<i>Gallinula chloropus</i>	1		6	7	2	1	3	2		2	2	8	9	15	12	13	1	11		5			10	R	
Eurasian Coot	<i>Fulica atra</i>			16		4	3				4		4		4		36		3		6					R/P
Black-winged Stilt	<i>Himantopus himantopus</i>					25		50	2		10	105	3	59		21	1	1								P
Pied Avocet	<i>Recurvirostra avosetta</i>													1		3						1				P
Stone Curlew	<i>Burhinus oedicephalus</i>											1		5												b
Collared Pratincole	<i>Glareola pratincola</i>						150	9	2			2		9		6										P
Eurasian Golden Plover	<i>Pluvialis apricaria</i>																							4		V
Common Ringed Plover	<i>Charadrius hiaticula</i>							20	1						4	2	6		3			3				P

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Little Ringed Plover	<i>Charadrius dubius</i>					41		15	3	2			113		65	1	12		4						P	
Kentish Plover	<i>Charadrius alexandrinus</i>												25	1	12		10		4						P	
Greater Sand Plover	<i>Charadrius leschenaultii</i>												1												P	
Caspian Plover	<i>Charadrius asiaticus</i>												1		1										P	
Northern Lapwing	<i>Vanellus vanellus</i>	400	27	200									2				12		40	4		312	4	395	W	
White-tailed Lapwing	<i>Vanellus leucurus</i>		2		6	1	9	1	15	10		12	60	2	3	1	1	1		2		7		7	R	
Common Snipe	<i>Gallinago gallinago</i>	36	6	10	3	2	1	4					1		15		5	5	6	14	1	20	3	9	P/W	
Jack Snipe	<i>Lymnocyptes minimus</i>	2																							P	
Black-tailed Godwit	<i>Limosa limosa</i>	1		4								2			1	1	1						1		P	
Whimbrel	<i>Numenius phaeopus</i>								16																P	
Spotted Redshank	<i>Tringa erythropus</i>												2		1		1		3						P	
Common Redshank	<i>Tringa tetanus</i>	5	1	150			4						3		3	10	1					7	4		P	
Marsh Sandpiper	<i>Tringa stagnatilis</i>					1	4			2			3		13		8								P	
Common Greenshank	<i>Tringa nebularia</i>														1		10		2						P	
Green Sandpiper	<i>Tringa ochropus</i>	7	9	6	8	60	13	4	4		2	60	3	32	46	12	14	3	23	2	8	5	11		P/W	
Wood Sandpiper	<i>Tringa glareola</i>							20	2	7		1	66		56		65		3			1			P	
Terek Sandpiper	<i>Xenus cinereus</i>									4			2		1											P
Common Sandpiper	<i>Actitis hypoleucos</i>							8	1	1		1	24		45	1	11		1	2					P	
Ruddy Turnstone	<i>Arenaria interpres</i>														1		2									P
Little Stint	<i>Calidris minuta</i>							4	6	13			44		101	2	202		51	4					P	
Sanderling	<i>Calidris alba</i>									3																P
Temminck's Stint	<i>Calidris temminckii</i>		5										4		15		6		4	2		5			P/W	
Dunlin	<i>Calidris alpina</i>	6	10					2		3							1		6	1		24	13	13	P/W	

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		1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 8	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3		
Curlew Sandpiper	<i>Calidris ferruginea</i>									1				101		40		51		4					P	
Broad-billed Sandpiper	<i>Limicola falcinellus</i>									15				2		2									P	
Ruff	<i>Philomachus pugnax</i>			10		11	43	6	1	1				70		80		40	18	8	1		4		P	
Red-necked Phalarope	<i>Phalaropus lobatus</i>					2	25	28	50			3	5		9		18	1	6						P	
Common Gull	<i>Larus canus</i>	1		10																			5	1	P	
Black-headed Gull	<i>Larus ridibundus</i>	30	85	2	22	133	1,100	8	1						1	3							52	1	182	P/W
Slender-billed Gull	<i>Larus genei</i>					1	3																		P	
Caspian Gull	<i>Larus cachinnans</i>		270		6		28								11										18	P/W
Pallas's Gull	<i>Larus ichthyæus</i>		4		1																					W
Gull-billed Tern	<i>Sterna nilotica</i>										PNC															P
Common Tern	<i>Sterna hirundo</i>							1	2	2		2	1				1			2						P
Little Tern	<i>Sterna albifrons</i>							1		1	1	6														P
Whiskered Tern	<i>Chlidonias hybrida</i>							5	10	75		10	27	1	48	8	20	10	2							P
White-winged Tern	<i>Chlidonias leucopterus</i>								30	4					9		8									P
Black-bellied Sandgrouse	<i>Pterocles orientalis</i>													2												V
Rock Dove	<i>Columba livia</i>	PNC		PNC	19	PNC		PNC	PNC	2	PNC	PNC	PNC	5	PNC	5	PNC	40	PNC	23	PNC	800	PNC			R
Common Wood Pigeon	<i>Columba palumbus</i>																						95	100	P	
Stock Dove	<i>Columba oenas</i>		13																				18	56	P/W	
European Turtle Dove	<i>Streptopelia turtur</i>							3									2									P
Laughing Dove	<i>Streptopelia senegalensis</i>	present	5							1				2		1	4		PNC			2				R
Common Cuckoo	<i>Cuculus canorus</i>							1	2	4		1		1	2		3									B
Little Owl	<i>Athene noctua</i>	3		3				1						3		2		1		2						R
Short-eared Owl	<i>Asio flammeus</i>	2																				1				w

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Month		January		February		March		April		May	June		July		August		September		October		November		December		Stat us	
Sight period/No of visits		1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 8	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3		
Egyptian Nightjar	<i>Caprimulgus aegyptius</i>													1		1									P	
Alpine Swift	<i>Tachymarptis melba</i>											3					10		8						P	
Common Swift	<i>Apus apus</i>					80	30	32	350	PNC	PNC	100				50		6							B	
Common Kingfisher	<i>Alcedo atthis</i>	1														3		1	3	1	5		3		4	P/W
Blue-cheeked Bee-eater	<i>Merops persicus</i>												2	7	21	20	35	84	30	173					P	
European Bee-eater	<i>Merops apiaster</i>							4	2	4	2	8	50		10		1								B	
European Roller	<i>Coracias garrulus</i>							9	5	10	4	9	12	3	20	1	4								B	
Eurasian Hoopoe	<i>Upupa epops</i>					2		8	1	1			8		2		2	1							B	
Calandra Lark	<i>Melanocorypha calandra</i>	60		2									1												P/W	
Greater Short-toed Lark	<i>Calandrella brachydactyla</i>																1								P	
Lesser Short-toed Lark	<i>Calandrella rufescens</i>	PNC		PNC				10			1		12		3		4		1						R	
Crested Lark	<i>Galerida cristata</i>	50	9	PNC	7	PNC	3	PNC	2	2	PNC	3	PNC		PNC	10	PNC		PNC	10	PNC	5	PNC	7	R	
Eurasian Skylark	<i>Alauda arvensis</i>	50		100																		5			W	
Sand Martin	<i>Riparia riparia</i>					1		1	50	150			3		1	163	380	50	500	1					P	
Barn Swallow	<i>Hirundo rustica</i>				4	85	8	3	PNC	4	PNC	4	100s	15	2000	13	280	13	2000	15					B/P	
House Martin	<i>Delichon urbicum</i>					1																			P	
White Wagtail	<i>Motacilla alba</i>	40	2	15	4	100s	5		3		2		11		30		10		20	10	50	4		4	R/P	
Citrine Wagtail	<i>Motacilla citreola</i>		5		4	6		11	7			1	1		2		7		3	5		1		2	R/P	
Grey Wagtail	<i>Motacilla cinerea</i>		1		1		1													1				2	P	
Yellow Wagtail	<i>Motacilla flava</i>					17	3	55			1	2	1	95		200		22		1				3	P	
Tree Pipit	<i>Anthus trivialis</i>																1								P	
Meadow Pipit	<i>Anthus pratensis</i>	50	5	4		1		2															20		W	

Birds of Ghaleh-Now between the 1970 and 2010s– M. Tohidifar & D.A. Scott

Month		January		February		March		April		May	June		July		August		September		October		November		December		Stat us		
Sight period/No of visits		1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 8	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3			
Water Pipit	<i>Anthus spinoletta</i>	110	30	30	7	7	17	1												14	2	4	10	7	P/W		
Red-backed Shrike	<i>Lanius collurio</i>														1		2		1							P	
Lesser Grey Shrike	<i>Lanius minor</i>														3		2									P	
Southern Grey Shrike	<i>Lanius meridionalis</i>														1		1									P	
Isabelline Shrike	<i>Lanius isabellinus</i>																			1						P	
Radde's Accentor	<i>Prunella ocularis</i>																					1				P	
European Robin	<i>Erithacus rubecula</i>	1	1		2																	1		3		W	
Bluethroat	<i>Luscinia svecica</i>	1	2		1		4																	4		W	
Rufous-tailed Scrub-Robin	<i>Cercotrichas galactotes</i>									2		5	4	6	6												B
Common Redstart	<i>Phoenicurus phoenicurus</i>							9												1						P	
Common Stonechat	<i>Saxicola torquata</i>	4						2	1													1				P/W	
Pied Bush Chat	<i>Saxicola caprata</i>																	1								V	
Pied Wheatear	<i>Oenanthe pleschanka</i>																			1						P	
Isabelline Wheatear	<i>Oenanthe isabellina</i>											10		3		10	1	3								P	
Red-throated Thrush	<i>Turdus ruficollis ruficollis</i>			1																						V	
Fieldfare	<i>Turdus pilaris</i>			2																						P	
Bearded Reedling	<i>Panurus biarmicus</i>	3																								w	
Cetti's Warbler	<i>Cettia cetti</i>																					1				P	
Moustached Warbler	<i>Acrocephalus melanopogon</i>	4	3		3	14	2	10		8	1	PNC			1		2	2	1	2			2		4	R	
European Reed Warbler	<i>Acrocephalus scirpaceus</i>						1	16			17		14		20		2									B	
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>							20	10	20	3	20	7	12		2	3	1	1							B	

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Month	January		February		March		April		May	June		July		August		September		October		November		December		Stat us
	1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 8	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3	
Eastern Olivaceous Warbler													1											P
Willow Warbler							8																	P
Common Chiffchaff		2		2			3												2		1		3	P
Wood Warbler							1																	V
Blackcap							2																	P
Common Whitethroat							3							1		1								P
Spotted Flycatcher															2			4						P
Semi-collared Flycatcher							1																	P
Eurasian Penduline Tit								3									1							P
Black-headed Bunting										1	1			100	1									b/P
Common Reed Bunting	50	13	10	12	3	7														30	5	100	15	W
Corn Bunting	51		60		6		1							3				1		300				P/W
Common Chaffinch			1																				4	w
European Goldfinch			15																					w
Common Linnet	53																							w
Desert Finch	15																							w
Common Rosefinch																3								P
Red Avadavat																		1						V
House Sparrow	PNC	PNC	PNC	3	PNC	5	PNC		3	PNC		PNC		PNC		PNC	2	PNC	15	PNC	PNC	PNC		R
Eurasian Tree Sparrow																			3		3			P
Spanish Sparrow	1	PNC											100		113		50		PNC		PNC		12	P/W

Birds of Ghaleh-Now between the 1970 and 2010s– *M. Tohidifar & D.A. Scott*

Month	January		February		March		April		May	June		July		August		September		October		November		December		Stat us	
	1970s/ 4	2010s/ 2	1970s/ 3	2010s/ 2	1970s/ 2	2010s/ 2	1970s/ 1	2010s/ 3	2010s/ 2	1970s/ 1	2010s/ 2	1970s/ 2	2010s/ 2	1970s/1 0	2010s/ 2	1970s/ 2	2010s/ 8	1970s/ 2	2010s/ 3	1970s/ 1	2010s/ 4	1970s/ 2	2010s/ 3		
Common Starling	<i>Sturnus vulgaris</i>	50		300		20	20	PNC		3	6	2	52	1	10	2970	PNC		2	1,000s		100	2	P/W	
Eurasian Magpie	<i>Pica pica</i>	PNC	4	PNC	4	PNC	3	PNC	1	2	PNC	1	PNC	2	PNC	1	PNC	3	PNC	5	PNC	3	PNC	3	R
Rook	<i>Corvus frugilegus</i>	100s		PNC		PNC			3	2					100			11		3	PNC	2	PNC		W
Hooded Crow	<i>Corvus (corone) cornix</i>	PNC	2	PNC	2	PNC	6	PNC		4	PNC		PNC		PNC		PNC		PNC	3	PNC	5	PNC	3	R
Total number of recorded species		50	37	45	35	46	46	58	49	51	21	36	60	30	81	37	84	46	57	49	21	50	24	41	-

Table 2. Species recorded in Ghaleh-Now by other observers or outside the two study periods.

English name	Scientific name	Date of observation	Number	Observer	Reference
Horned Grebe	<i>Podiceps auritus</i>	29 Sep. 2011	1	A. Sangchooli	Personal comm. with MT
Pygmy Cormorant	<i>Phalacrocorax pygmeus</i>	29 Oct. 2013, 12 Dec. 2013	1	A. Sangchooli	Personal comm. with MT
Eurasian Bittern	<i>Botaurus stellaris</i>	November 2012	1	M. Tohidifar	
Black Stork	<i>Ciconia nigra</i>	25 Mar. 1977	1	G.N. Langfield	D.A. Scott unpubl. data
Greylag Goose	<i>Anser anser</i>	unknown	unknown	P. Bakhtiari & A. Hashemi	Khaleghizadeh et al 2010
Red-crested Pochard	<i>Netta rufina</i>	unknown	unknown	P. Bakhtiari & A. Hashemi	Khaleghizadeh et al 2010
Bonelli's Eagle	<i>Hieraaetus fasciatus</i>	Many occasions in winter 2013	1	M. Tohidifar	
Black-winged Pratincole	<i>Glareola nordmanni</i>	6 May 1977	1	F.B. Argyle, G.N. Langfield	Scott 2008
Sociable Lapwing	<i>Vanellus gregarius</i>	February 2009	1	F. Eskandari	Khaleghizadeh et al. 2011
Grey Plover	<i>Pluvialis squatarola</i>	15 Feb. 2012, 16 May. 2014	1	A. Sangchooli and M. Tohidifar	
Caspian Tern	<i>Sterna caspia</i>	unknown	unknown	P. Bakhtiari & A. Hashemi	Khaleghizadeh et al 2010
European Nightjar	<i>Caprimulgus europaeus</i>	unknown	1	Ringling programme in 1970s	Khaleghizadeh et al 2010
Pied Kingfisher	<i>Ceryle rudis</i>	Few occasions in 2013-2014	1	P. Bakhtiari	Personal comm. with MT
Horned Lark	<i>Eremophila alpestris</i>	29 Oct. 2013	1	A. Sangchooli	Personal comm. with MT
Whinchat	<i>Saxicola rubetra</i>	unknown	1	Ringling programme in 1970s	Khaleghizadeh et al 2010
Black-eared Wheatear	<i>Oenanthe hispanica</i>	5 Apr. 2013	1	A. Sangchooli	Personal comm. with MT
Garden Warbler	<i>Sylvia borin</i>	unknown	1	Ringling programme in 1970s	Khaleghizadeh et al 2010
Common Myna	<i>Acridotheres tristis</i>	10 Nov. 2012, 19 May. 2013	6 & 1	A. Sangchooli	Personal comm. with MT
Ortolan Bunting	<i>Emberiza hortulana</i>	unknown	unknown	Ringling programme in 1970s	Khaleghizadeh et al 2010

The commonest species in the Ghaleh-Now area were Rock Dove *Columba livia*, Crested Lark *Galerida cristata*, Barn Swallow *Hirundo rustica*, House Sparrow *Passer domesticus*, Common Starling *Sturnus vulgaris*, Eurasian Magpie *Pica pica* and Hooded Crow *Corvus cornix*. Of these, Barn Swallow and Common Starling were the most abundant, with counts exceeding 1,000 birds (Table 1).

4. Discussion

As the capital Tehran continues to expand, it is likely that urban development will one day encroach upon Ghaleh-Now wetland. However, for the time being at least, the Ghaleh-Now area continues to support wonderful avian diversity which is unique in the Tehran area. The high productivity of this ecosystem and wide diversity of habitats have attracted 196 species of birds, or about 37 % of the total bird fauna of Iran (Tables 1–2). Since Ghaleh-Now wetland is located in the vicinity of Tehran, many ornithologists and bird-watchers have visited the site both in the 1970s and the 2010s. In addition, ringing activities were carried out by personnel of the Department of Environment in the 1970s. Table 2 shows details of an additional 19 species of birds not recorded during the two periods of the present study but recorded by others.

4.1. Water fluctuations and birds

The most conspicuous change at Ghaleh-Now since the 1970s has been an increase in the area of water bodies. This has occurred mainly because of the development of fish rearing/farming ponds which have provided suitable habitat for breeding waterbirds such as the Great Crested Grebe *Podiceps cristatus*. Furthermore, the large ponds not only attract fish-eating raptors such as Western Osprey *Pandion haliaetus* and White-tailed Eagle *Haliaeetus albicilla*, but have also led to an increase in the numbers of other piscivorous birds such as herons, egrets, cormorants, gulls and terns. During the 2010s study period, up to 53 Grey Herons *Ardea cinerea* and 18 Great White Egrets *Casmerodius albus* were observed at the site. More recently, there has been an even higher count of Grey Herons, with 90 being recorded on 19 October 2012. It is

rewarding to note that this count equals 2.5–3.2% of the total wintering population of Grey Herons in Iran (Scott 2010).

As mentioned above, Ghaleh-Now ponds have regularly been drained and re-flooded, and as might be expected, this has had an effect on waterbird numbers. The scarcity of waterbirds in January and February 2010 most probably relates to the lack of water in the main pond. Mudflats in the vicinity of the main pond dry up completely or almost so during October to March, leaving little suitable habitat for waders, although a few areas of satellite ponds have mudflats which attract migrant and breeding waders such as the White-tailed Lapwing *Vanellus leucurus*.

The numbers of species of birds recorded each month at Ghaleh-Now differs quite strikingly between the two study periods. In the 1970s, the highest species counts were in August and September (81 and 84 species, respectively), when water levels were ideal for waders and the site was visited on many occasions. Forty-four of the species recorded in August and September in the 1970s were waterbirds and over 30 species were waders. At this time of year in the 2010s, suitable habitat for waders was quite rare due to high water levels, and the number of wader species was low; only 13 in August and nine in September. The number of visits was also important (10 in August and eight in September during the 1970s, but just two visits in each of the same month in the 2010s). In the 2010s, the month with the highest number of species recorded was May (51 species), followed by November (50 species) and October (49 species). Species diversity was at its lowest in the 1970s in June and November, when only 21 species were recorded in both months. In the 2010s, the number of species dropped to 30 and 35 in July and February, respectively. The satellite ponds are small and all waterbirds are sensitive to the presence of hunters so they generally remain out of sight during the daytime. These ponds, however, are favoured by many passerines chiefly because of the extensive reed-beds which provide good cover both for marsh-loving species and shy birds such as Bluethroat *Luscinia svecica* and European Robin *Erithacus rubecula*. The White Stork *Ciconia ciconia*

bred in the area in the 1970s (Ashtiani 1974), but we found no evidence of breeding at Ghaleh-Now in the 2010s, although a nest was observed in Rey, 15 km west of the wetland, in spring 2011.

4.2. Significant changes in the number of scavengers

A comparison of the numbers of birds recorded in each of the two study periods revealed considerable differences in some species such as Black Kite *Milvus migrans*, Black-headed Gull *Larus ridibundus* and Caspian Gull *Larus cachinnans*. Figures 6-8 show the numbers of these three species during the 1970s and 2010s. Given the fact that the human population of the city of Tehran increased from 4,530,000 in 1977 to 8,154,000 in 2011 (Statistical Centre of Iran, 2014, available at <http://amar.org>) and the production of waste materials increased in parallel, and considering that Ghaleh-Now wetland is only 16 km from the rubbish dump of Arad-Kuh, it is not surprising to find these scavenging species in large numbers. The open spaces with fresh litter at the dump site offer free access to edible waste, while the relatively large open water bodies now present at Ghaleh-Now provide safe bathing and roosting sites, at least for the gulls. We were unable to determine if there had been a similar increasing trend in the numbers of Common Starlings (which are also attracted to landfill sites) as the counts of this species were incomplete on several occasions in both the 1970s and 2010s.

4.3. Rare birds

Several vagrant species were recorded in the Ghaleh-Now area. These included a Rough-

legged Buzzard *Buteo lagopus* on 23 January 1976, a Sociable Lapwing *Vanellus gregarius* in February 2009, a Black-winged Pratincole

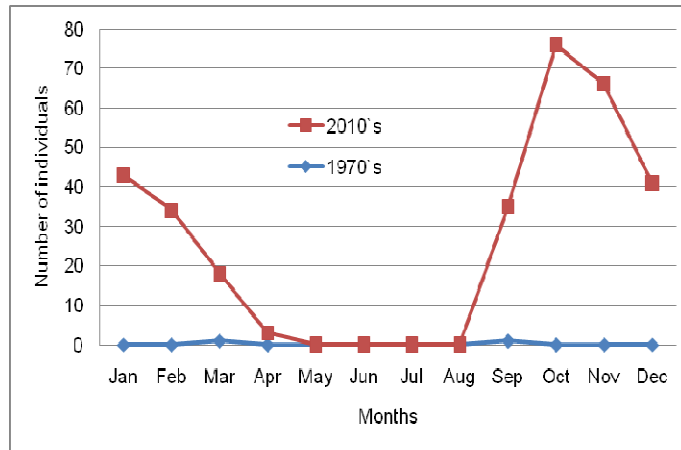


Fig. 6. Comparison of the numbers of Black Kite at Ghaleh-Now in the 1970s and 2010s.

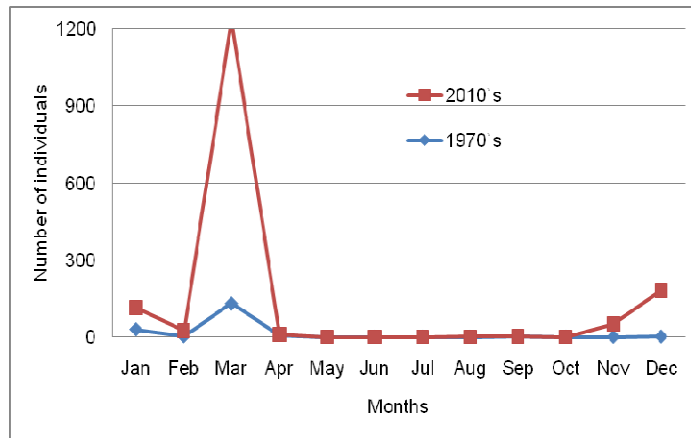


Fig. 7. Comparison of the numbers of Black-headed Gull at Ghaleh-Now in the 1970s and 2010s.

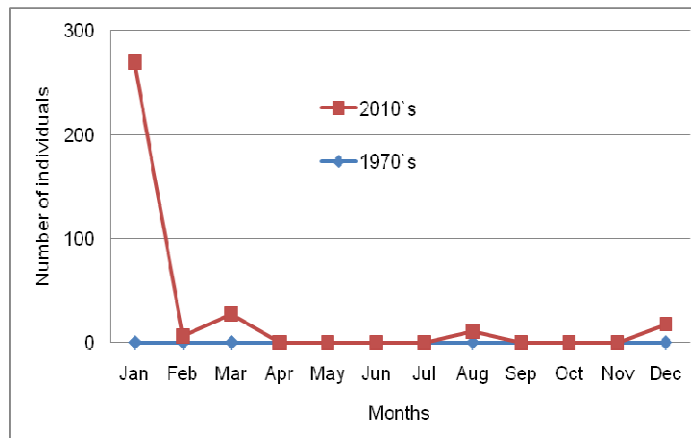


Fig. 8. Comparison of the numbers of Caspian Gull at Ghaleh-Now in the 1970s and 2010s.

Glareola nordmanni on 6 May 1977, a Red-throated Thrush *Turdus ruficollis ruficollis* on 17-19 February 1976, a Wood Warbler *Phylloscopus sibilatrix* on 19 April 1974 and a Red Avadavat *Amandava amandava* on 3 October 1975 (Scott 2008, Khaleghizadeh *et al.* 2011). Other unusual records included a Horned Grebe *Podiceps auritus* on 29 September 2011, a Pygmy Cormorant *Phalacrocorax pygmeus* on 29 October and 12 December 2013, four Eurasian Golden Plovers *Pluvialis apricaria* on 15 December 2010, single Grey Plovers *Pluvialis squatarola* on 15 February 2012 and 16 May 2014, a Pied Bush Chat *Saxicola caprata* on 10 September 2010. Horned Grebe, Pygmy Cormorant and Eurasian Golden Plover are all rare south of the Alborz, while Grey Plover is rare inland in Iran. Although Pied Bush Chat is a common summer visitor to eastern Iran, it is extremely rare bird as far west as Tehran. The occurrence of two Black-bellied Sandgrouse *Pterocles orientalis* on 14 July 2011 was also surprising, given the unsuitability of the habitat. Sighting of single Pied Kingfishers *Ceryle rudis* on a few occasions in 2013–2014 is presumably part of a recent increase in the range of this species in northern Iran, supported by observations recorded at Mamlo dam (P. Bakhtiari, pers. comm.).

4.4. Conservation

Seven globally threatened or near-threatened species of birds have been recorded at Ghaleh-Now: Eurasian Black Vulture (NT), Pallid Harrier *Circus macrourus* (NT), Eastern Imperial Eagle *Aquila heliaca* (VU), Saker Falcon *Falco cherrug* (EN), Black-tailed Godwit *Limosa limosa* (NT), European Roller *Coracias garrulus* (NT) and Semi-collared Flycatcher (NT) (BirdLife International 2009). The first and foremost function of Ghaleh-Now and similar sites is, however, their vital role as staging areas for migrant species. As mentioned in several recent publications, the complete destruction of some of the most important wetlands in Fars, Azarbaijan, Esfahan and Sistan and the extensive drainage of other wetlands such as the Howr-al-Azim in Khuzestan have greatly increased the importance of the remaining wetlands, even small sites such as Ghaleh-Now, for many

migratory birds (Tohidifar & Kaboli 2012, Khani *et al.* 2015). Unlike the avifauna of many other areas, the proportion of resident breeding species in the avifauna of the Ghaleh-Now area is surprisingly low (5 percent), giving an indication of the significance of this wetland for migratory birds. Although it is unlikely that the area will ever be given official protection because of its small size and private ownership, its function should not be neglected (Lessells 1976). If managed appropriately, this site, like many other artificial habitats, could continue to support a wide diversity of passage migrants and provide important habitat for migratory waterbirds, compensating in some small way for the loss of natural wetlands elsewhere in the country (Khani *et al.* 2015). There is, however, some conflict between the many piscivorous species of birds and the owner of the fish ponds who believes that the birds are taking a large proportion of the fish and regularly attempts to scare the birds away with gun shots. Another method used to reduce the amount of fishing by piscivorous birds involves stretching strings 1.5–2 m row spacing above the water surface to distract the birds. This technique is, however, expensive, time-consuming and hard to implement, and is therefore only used in some of the satellite ponds in which the owner keeps fingerling fishes before they are released into the main pond. The use of other bird deterrent methods such as gas bombs has also been proposed, but has not been welcomed by the owner. Since the area is not protected by the DOE, no regular visits have been carried out by game-guards to control the number of ducks or other waterbirds that are hunted. Empty shotgun shells are commonly found around Ghaleh-Now wetland, along with dead or dying egrets, cormorants and other waterbirds. Regular visits by the DOE guards would hopefully curb the hunting pressure on birds in this wetland. Because of the proximity of Ghaleh-Now to Tehran city, bird-watching is popular in the area. Many bird-watchers have been visiting the area in recent years and this has helped to improve the attitudes of both the local landowners and the hunters towards wildlife. Various NGOs should now be encouraged to implement public awareness campaigns amongst the hunters and landowners to reduce the level of hunting.

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