

# Check list of waterbirds at Wadi Djedi in Ziban Oasis–Algeria

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## Abstract

*Check list of waterbirds at Wadi Djedi in Ziban Oasis–Algeria.* This pioneering work is the first to document the aquatic avifauna community of the Wadi Djedi in the Ziban region in southeast of Algeria. We present results obtained through the monthly counts of waterbirds conducted from September 2013 to September 2016. On this wetland we recorded 36 species of water birds representing 11 families. The Anatidae family was the most numerous, with 11 species. From among all the species, 18 were wintering species, nine were visitors, eight were sedentary breeding species (including the ruddy shelduck *Tadorna furruginea* and Kentish plover *Charadrius alexandrinus*) and one species was migratory nesting (the white stork *Ciconia ciconia*). Two species (the teal marbled *Marmaronetta angustirostris* and ferruginous duck *Aythya nyroca*) are listed as Vulnerable on the IUCN Red List of endangered species.

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Key words: Waterbirds, Ziban region, Status, Algeria

## Resumen

*Lista de control de aves acuáticas del oasis de Wadi Djedi (Ziban, Argelia).* Este trabajo documenta por primera vez la comunidad de avifauna del oasis de Wadi Djedi, en Ziban, región situada en el sudeste de Argelia. Presentamos los resultados obtenidos a partir de los recuentos mensuales de aves acuáticas realizados desde septiembre de 2013 hasta septiembre de 2016. En este humedal se registraron un total de 36 especies de aves acuáticas correspondientes a 11 familias. La familia Anatidea, con 11 especies, es la más representada. Entre la totalidad de especies, 18 son invernantes, nueve migrantes, ocho especies criadoras residentes como el tarro canelo *Tadorna furruginea* y el chorlitejo patinegro *Charadrius alexandrinus* y una especie, la cigüeña blanca, criadora migratoria. Por otra parte, dos especies, cerceta pardilla *Marmaronetta angustirostris* y porrón pardo *Aythya nyroca*, están incluidas en la categoría VU de la Lista Roja de especies amenazadas de la Unión Internacional para la Conservación de la Naturaleza (UICN).

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Palabras clave: Aves acuáticas, Región de Ziban, Estatus, Argelia

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## Resum

*Llista de control d'ocells aquàtics de l'oasi de Wadi Djedi (Ziban, Algèria)*. Aquest treball documenta per primera vegada la comunitat d'avifauna de l'oasi de Wadi Djedi, a Ziban, regió situada al sud-est d'Algèria. Presentem els resultats obtinguts a partir dels recomptes mensuals d'ocells aquàtics fets des del setembre de 2013 fins al setembre de 2016. En aquesta zona humida es van registrar un total de 36 espècies d'ocells aquàtics corresponents a 11 famílies. La família Anatidea, amb 11 espècies, és la més representada. Entre el conjunt d'espècies, 18 són hivernants, nou migrants, vuit espècies criadores residents com ara l'ànec canyella *Tadorna furruginea* i el corriol camanegre *Charadrius alexandrinus* i una espècie, la cigonya blanca, criadora migratòria. D'altra banda, dues espècies, el xarret marbrenc *Marmaronetta angustirostris* i el morell xocolater *Aythya nyroca*, estan incloses a la categoria VU de la Llista Roja d'espècies amenaçades de la Unió Internacional per a la Conservació de la Natura (UICN).

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Paraules clau: Ocells aquàtics, Regió de Ziban, Estatus, Algèria.

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## Introduction

North Africa has a great variety of wetlands that are wintering and stopover sites for several Palearctic migratory birds (Fishpool and Evans, 2001). Algeria contains a wide variety of wetlands that are major staging posts and wintering grounds for migrating birds (Stevenson et al., 1988).

Waterbirds are an important component of the biotic community of aquatic ecosystems (Green and ElMBERG, 2014). In the Algerian Sahara, waterbirds are relatively well known due to data collected by several ornithologists in the past (Heim de Balsac and Mayaud 1962; Ledant et al., 1981; Isenmann and Moali, 2000). These early works were based on observations recorded intermittently in a few wetlands.

Since then, most ecological studies of the aquatic avifauna of the Saharan wetlands in the Oued Righ valley consist of ecological monitoring of wintering and breeding populations

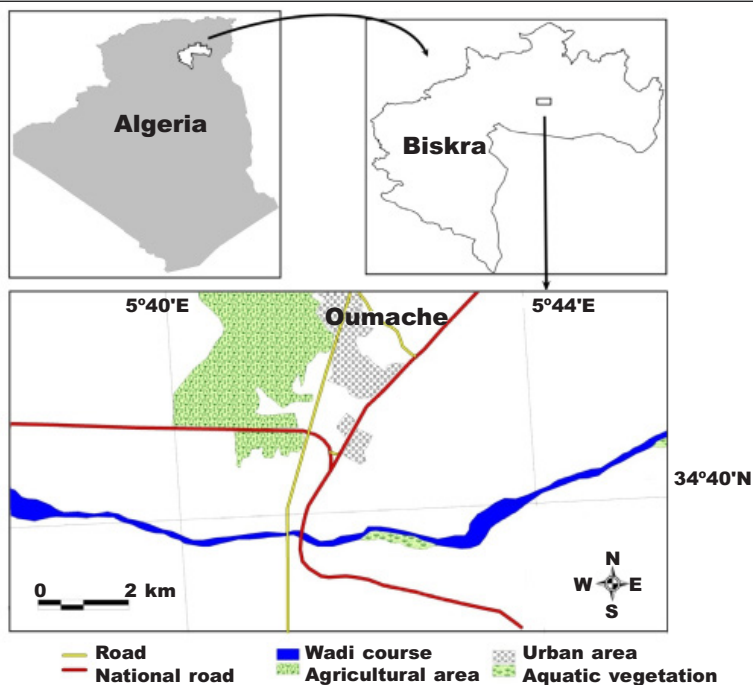


Fig. 1. Location of Wadi Djedi, Ziban region, southeast of Algeria.

Fig. 1. Localización de Wadi Djedi, Ziban, sudeste de Argelia.

of rare and endangered species (Houhamdi et al., 2008; Nouidjem et al., 2012, 2014, 2015, 2016; Bouzegag et al., 2013; Bensaci et al., 2010, 2013, 2015).

Few studies have been performed to determine the ecological importance and especially the ornithological value of Wadi Djedi. Here we present the preliminary data of our waterbird survey aiming to evaluate the status of species using this wetland.

## Material and methods

### Study area

The Ziban oasis is located in the east of Algeria, south of the Aurès Mountains (5° 44' 00" N, 35° 51' 00" E). The region is characterized by the arid Mediterranean climate. The average maximum temperature is 41.38 °C in August and the minimum temperature during January is 8.26 °C. Precipitation averaged about 128 mm over the last ten years (2004–2014). Wadi Djedi in the Ziban oasis is one of the largest Saharan rivers. It originates in the Saharan Atlas Mountains at an altitude of about 1,400 m and it flows for about approximately 480 km from west to east (fig. 1). During the rainy season (winter), the river helps to raise the water level of Chott Melhir (Ballais, 2010). The flora is dominated by *Tamarix gallica*, *Atriplex halimus*, *Phragmites australis*, *Typha elephantina* and *Juncus maritimus*.



Fig. 2. Phoenicopteridae Family in Wadi Djedi in the Ziban oasis.

*Fig. 2. Familia Phoenicopteridae en Wadi Djedi en el desierto de Ziban.*

### Data acquisition

This study was undertaken through monthly bird counts from September 2013 to September 2016 using binoculars and a telescope KOWA (20×60). Surveys were conducted at three stations on the edges of the Wadi (fig. 2) to obtain consistent data. Individual counts were conducted when the numbers of birds present was small. When more than 200 birds were present, total numbers were estimated by dividing the flock into small equal blocks (50–200 birds according to flock size) and counting the number of blocks (Blondel, 1975). This latter method is that most commonly used in the winter counts of waterfowl (Lamotte and Bourlière, 1969). The bird community was sampled by performing counts of waterbirds from vantage points with unlimited distance (Blondel, 1975; Legendre and Legendre, 1979). Three sampling points were chosen for the bird count.

## **Results**

The study revealed that the waterbird community of this wetland is composed of 36 species belonging to 11 families (table 1; GBIF dataset ([Doi:10.15470/6m0dyq](https://doi.org/10.15470/6m0dyq))). The Anatidae Family with 11 species was found to be the richest in species number, followed by Scolopacidae (nine species), and Ardeidae (four species). Four families were doubleton (two species): Rallidae, Recurvirostridae, Threskiornithidae and Charadriidae. Singleton families, that is, those represented by a single species, were Phalacrocoraciidae, Ciconiidae, Phoenicopteridae and Accipitridae (fig. 3).

The species observed represent different phonologic status: wintering species accounted for over 50% of all the observed birds (52.78%), followed in order by migrants (25%), resident breeders (19.44%) and migratory breeders (2.78%) (fig. 4).

### Anatidae

Eleven duck species were noted (fig. 3, fig. 5). Three species were resident breeders: mallard *Anas platyrhynchos*, ruddy shelduck *Tadorna ferruginea* and shelduck *Tadorna tadorna*. Five

Table 1. Waterbirds recorded at Wadi Djedi from 2013 to 2016: +, status of waterbirds; RB, resident breeder; W, wintering; MB, migratory breeder; M, migrant; N, number.

Tabla 1. Aves acuáticas registradas en Wadi Djedi durante el periodo 2013–2016: +, estatus de las aves acuáticas; RB, criador residente; W, invernante; MB, criador migratorio; M, migrante; N, número.

Species		Status				N	Date
		RB	W	MB	M		
Family Anatidae							
<i>Anas platyrhynchos</i>	Mallard	+				35	January 2016
<i>Anas penelope</i>	Eurasian wigeon		+			114	December 2014
<i>Anas strepera</i>	Gadwall				+	08	February 2015
<i>Anas crecca</i>	Common teal		+			750	December 2014
<i>Anas querquedula</i>	Garganey				+	06	March 2015
<i>Anas clypeata</i>	Northern shoveler		+			550	October 2014
<i>Anas acuta</i>	Northern pintail				+	36	October 2014
<i>Tadorna ferruginea</i>	Ruddy shelduck	+				35	January 2015
<i>Tadorna tadorna</i>	Common shelduck	+				57	November 2014
<i>Aythya nyroca</i>	Ferruginous duck		+			25	February 2015
<i>Marmaronetta angustirostris</i>	Marbled teal		+			422	December 2014
Family Ardeidae							
<i>Bubulcus ibis</i>	Cattle egret		+			180	December 2013
<i>Egretta garzetta</i>	Little egret		+			25	October 2013
<i>Ardea alba</i>	Great egret				+	8	March 2014
<i>Ardea cinerea</i>	Grey heron		+			31	October 2015
Family Scolopacidae							
<i>Tringa nebularia</i>	Common greenshank		+			12	December 2014
<i>Tringa erythropus</i>	Spotted redshank		+			25	November 2014
<i>Tringa totanus</i>	Common redshank				+	16	March 2015
<i>Tringa stagnatilis</i>	Sandpiper				+	08	February 2014
<i>Tringa ochropus</i>	Green sandpiper		+			35	November 2014
<i>Actitis hypoleucos</i>	Common sandpiper		+			14	October 2014
<i>Gallinago gallinago</i>	Common snipe				+	10	April 2015
<i>Calidris alpina</i>	Dunlin				+	19	March 2015
<i>Calidris minuta</i>	Little Stint		+			45	October 2013
Family Rallidae							
<i>Gallinula chloropus</i>	Common moorhen	+				75	March 2014
<i>Fulica atra</i>	Common coot	+				62	April 2014
Family Recurvirostridae							
<i>Himantopus himantops</i>	Black-winged stilt	+				220	December 2014
<i>Recurvirostra avosetta</i>	Avocet	+				95	November 2014
Family Threskiornithidae							
<i>Plegadis falcinellus</i>	Glossy ibis		+			18	October 2013
<i>Platalea leucorodia</i>	Eurasian spoonbill		+			12	November 2013
Family Charadriidae							
<i>Charadrius hiaticula</i>	Ringed plover				+	65	December 2014
<i>Charadrius alexandrinus</i>	Kentish plover	+				135	December 2014
Family Phalacrocoraciidae							
<i>Phalacrocorax carbo</i>	Great cormorant		+			65	November 2015
Family Ciconiidae							
<i>Ciconia ciconia</i>	White stork			+		87	October 2013
Family Phoenicopteridae							
<i>Phoenicopterus roseus</i>	Greater flamingo		+			280	January 2014
Family Accipitridae							
<i>Circus aeruginosus</i>	Western marsh-harrier		+			07	November 2013

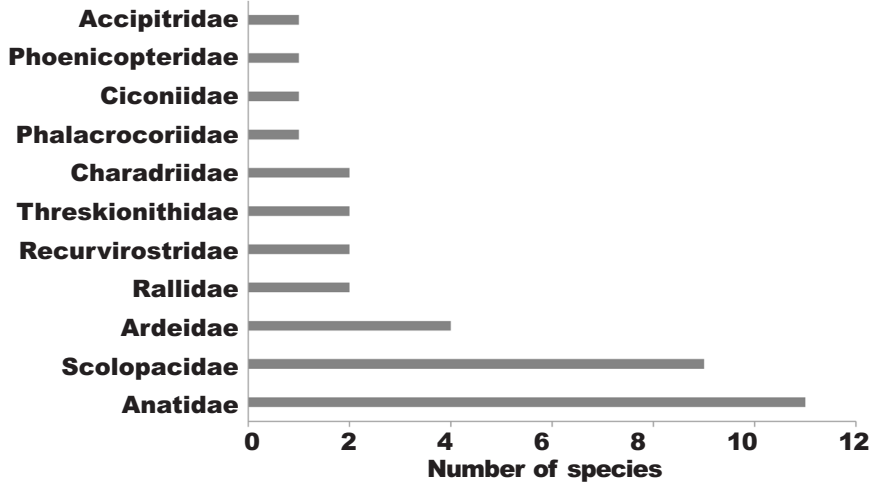


Fig. 3. Species richness of waterbirds from different families during the study period at Wadi Djedi.

Fig. 3. Riqueza específica de aves acuáticas pertenecientes a diferentes familias durante el periodo de estudio en Wadi Djedi.

species were wintering birds: Northern shoveler *Anas clypeata*, Eurasian wigeon *Anas penelope*, common teal *Anas crecca*, marbled teal *Marmaronetta angustirostris* and ferruginous duck *Aythya nyroca*.

The three remaining species were migrants: Northern pintail *Anas acuta*, gadwall *Anas strepera* and garganey *Anas querquedula* (table 1). The maximum count of Anatidae recorded at the study site (all species included) was over 2,000 individuals.

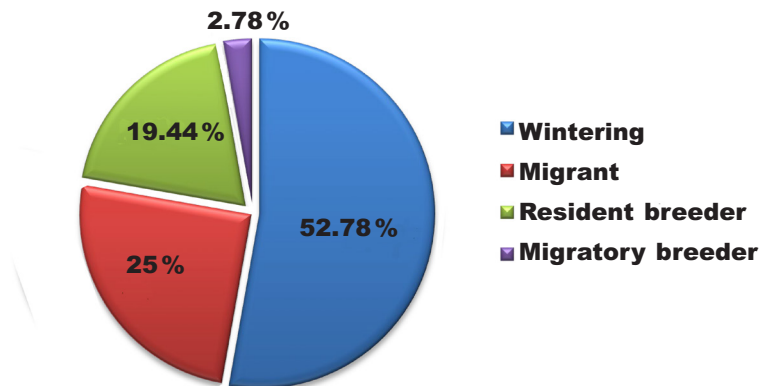


Fig. 4. Status of waterbirds at Wadi Djedi from 2013 to 2016.

Fig. 4. Estatus de las aves acuáticas de Wadi Djedi de 2013 a 2016.



Fig. 5. Anatidae Family in Wadi Djedi.

Fig. 5. Família Anatidae en Wadi Djedi.

#### Ardeidae

Four species were observed, only one of which, the great egret *Ardea alba*, was a migrant species. The others were wintering species: cattle egret *Bubulcus ibis*, little egret *Egretta garzetta*, and grey heron *Ardea cinerea*. They were poorly represented and usually seen on shallow shorelines.

#### Scolopacidae

Nine species of this small wader family were observed. Four were migrant species: common snipe *Gallinago gallinago*, dunlin *Calidris alpina*, sandpiper *Tringa stagnatilis*, and common redshank *Tringa tetanus*. These four species were mainly observed only once or twice during the study period, especially during their post–breeding passage. Five wintering species were noted: spotted redshank *Tringa erythropus*, common greenshank *Tringa nebularia*, little stint *Calidris minuta*, green sandpiper *Tringa ochropus*, and common sandpiper *Actitis hypoleucos*.

#### Rallidae

Only two species of the Rallidae family were observed: the common coot *Fulica atra* and the common moorhen *Gallinula chloropus*. Both are resident breeders in the area and seen during the breeding period in the boundary waters next to the site containing the *Phragmites*. Egg fragments and nests with eggs found in the vegetation confirmed the breeding success of this species.

#### Recurvirostridae

Two resident breeder species were found from this family, the tow black–winged stilt *Himantopus himantopus* and avocet *Recurvirostra avosetta*. They were observed almost throughout the year in fluctuating numbers; breeding pairs were observed during June and July. Eggs and chicks found on 15 May 2016 confirmed the breeding success of this species.

### Threskiornithidae

The Eurasian spoonbill *Platalea leucorodia* and the glossy ibis *Plegadis falcinellus* have wintering status in the region. These species are generally present in the site in very small numbers, not exceeding 20 individuals for either species (table 1).

### Charadriidae

For this family, two species were found; the ringed plover *Charadrius hiaticula* (migrant species) and the kentish plover *Charadrius alexandrinus* (resident breeder species). Both have a sedentary status. Their presence was confirmed after breeding pairs were observed in April and May 2016 when nests with two and three eggs were found in the northern border of the site.

### Phalacrocoraciidae

Most of the population of the great cormorant *Phalacrocorax carbo* (wintering species) winters on the coasts of the Mediterranean and the fresh waters of the interior. Some individuals can reach the northern Sahara (Isenman and Moali, 2000). Fifty to 70 individuals were observed in November 2015 and January 2016 (table 1).

### Ciconiidae

The white stork *Ciconia ciconia* (migratory breeder) is an anthropophilic species. It nests voluntarily in the cities and the villages where it chooses high points to build its nest. They were regularly observed feeding in the wetland, from January till August. A maximum of 87 individuals was recorded at the site on 4 October 2013 (table 1).

### Phoenicopteridae

The greater flamingo *Phoenicopterus roseus* (wintering species) is a characteristic species of salt wetlands. It was regularly observed in high numbers from September until the end of May. The highest number of birds, 280, was recorded in January 2014 (table 1).

### Accipitridae

The Western marsh-harrier *Circus aeruginosus* (wintering species) was the only species observed from this family. It was seen throughout winter, from November to April. Low numbers were recorded in the southern part of the Wadi.

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## **Discussion**

Anatidae was the most abundant family in terms of richness and number, with 11 species and a maximum abundance exceeding 2,000 individuals from the total species combined in December and January 2013. Except for Scolopacidae, with nine species detected, all other families were poorly represented.

Breeding was confirmed for some species, such as the ruddy shelduck *Tadorna ferruginea*, which had not been reported previously in the Wadi Djedi. Reproduction of this species had been reported previously in the valley of Oued Righ in the south of Ziban by Nouidjem et al. (2016). Species of greatest conservation concern, listed as Endangered Species in the category (VU) of the IUCN Red List (Birdlife International, 2004), were the marbled teal *Marmaronetta angustirostris* and the ferruginous duck *Aythya nyroca*.



Taken together, our results show that Wadi Djedi plays an important role in the wintering and breeding of waterbirds and also serves as a stopover site for migrant species during their trans-Saharan migration journeys. This work underscores the general ecological significance of the Ziban Oasis in southeast Algeria, and the checklist of waterbirds at Wadi Djedi emphasizes the ecological and ornithological value of this wetland.

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