



Reproduction of the Whiskered Tern *Chlidonias hybrida* near Tnine Al Gharbiya (Province of Sidi Bennour)

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Abstract

The nesting of the Whiskered Tern *Chlidonias hybrida* has been known in Morocco since the 1940s, but the number of nesting sites remains very limited, and the sites very remote and isolated. More recently, the nesting of this species was noted in the Marrakech-Safi region. In the Doukkala plain of Moroccan Atlantic flatlands, characterized by a very large number of dayas, the daya of Lgandaziya at Tnine Al Gharbiya is the only site where we recorded for the first time in 2016 a nesting case of a small population of this species with 12 nests.

Keywords: Whiskered Tern, *Chlidonias hybrida*, nesting, daya, Doukkala, Atlantic plain, Morocco.

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1. Introduction

The whiskered Tern *Chlidonias hybrida hybrida* (Pallas, 1811) (Fig. 1) is a species of Laridae Sterninae. According to Franchimont et al. [1] this species had a status of NO (Occasional Breeder), M (Migratory) and H (Wintering). This status was revised by Thévenot et al. [2] and Bergier et al. [3] and became PM (Passage migrant), WV (Wintering) and OB (Occasional Breeder). This species is considered to be of a "patrimonial interest" and "endangered in Morocco" [4].

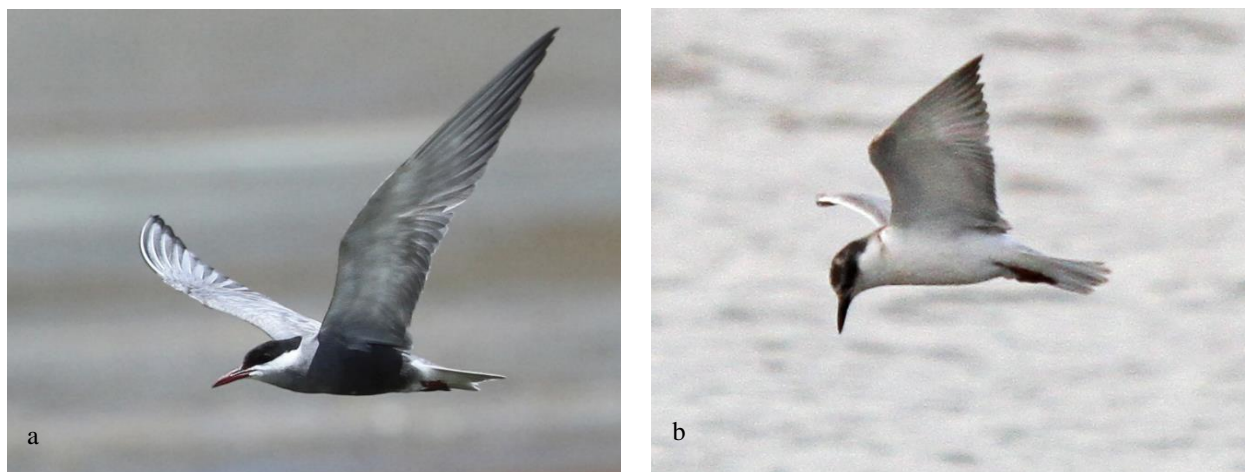


Figure 1. Photographs of Whiskered Tern *Chlidonias hybrida* observed in the study region: a- breeding adult (A. Rihane, 6/10/2017), b- Interbreeding adult (Photo A. Rihane, 10/15/2017).

In Europe, the Moustached Tern declined between 1970 and 1990 with an unfavourable conservation status in Europe [5] and was included in the European directive on the priority conservation of wild birds. However, the species breeds with very high populations in Russia, Ukraine and Turkey [6], also breeds in south-western Europe in Spain [7] and France [8] and in central Europe such as Poland [9], Romania [10] and Italy [11]. Other data are summarised in the Birdlife report [12].

For the period 1990 - 2000, numbers are estimated to be stable and estimated between 16,300 and 39,800 pairs in Europe and North Africa [6]. This population has been increasing and is estimated to be 66,300 and 108,000 pairs in Europe alone in 2015 [12][13]. The species is currently considered not threatened (Least Concern LC) [14].

In North Africa, the species has been known to breed in Morocco since the 1940s [15], especially in the Gharb region [16] and in the Draa region [17][18]. In Tunisia, the species is said to have nested in small colonies in the north and centre [16] and reported as breeding in Morocco, Algeria and Tunisia [19]. In Algeria, the species was only confirmed breeding from 1994 onwards in El Kala National Park [20][21][22][23][24][25] and therefore this is not the only known breeding site in North Africa as concluded in [25].

2. Worldwide distribution

The distribution of the Whiskered Tern (Fig. 2) includes Africa (except the Great Sahara and much of the equatorial region), much of Asia, especially southern and eastern Asia, Oceania, and the Australian region. In Europe, its distribution is discontinuous and represents only a few remote regions [26]. According to the Avibase site (2020)¹, the species includes 3 subspecies:

- *Chlidonias hybrida hybrida*: Breeds in northwest Africa and central and southern Europe to southeast Siberia, eastern China, southern Pakistan and northern India.
- *Chlidonias hybrida javanicus*: Breeds in Australia.
- *Chlidonias hybrida delalandii*: lives in Eastern and Southern Africa and Madagascar.

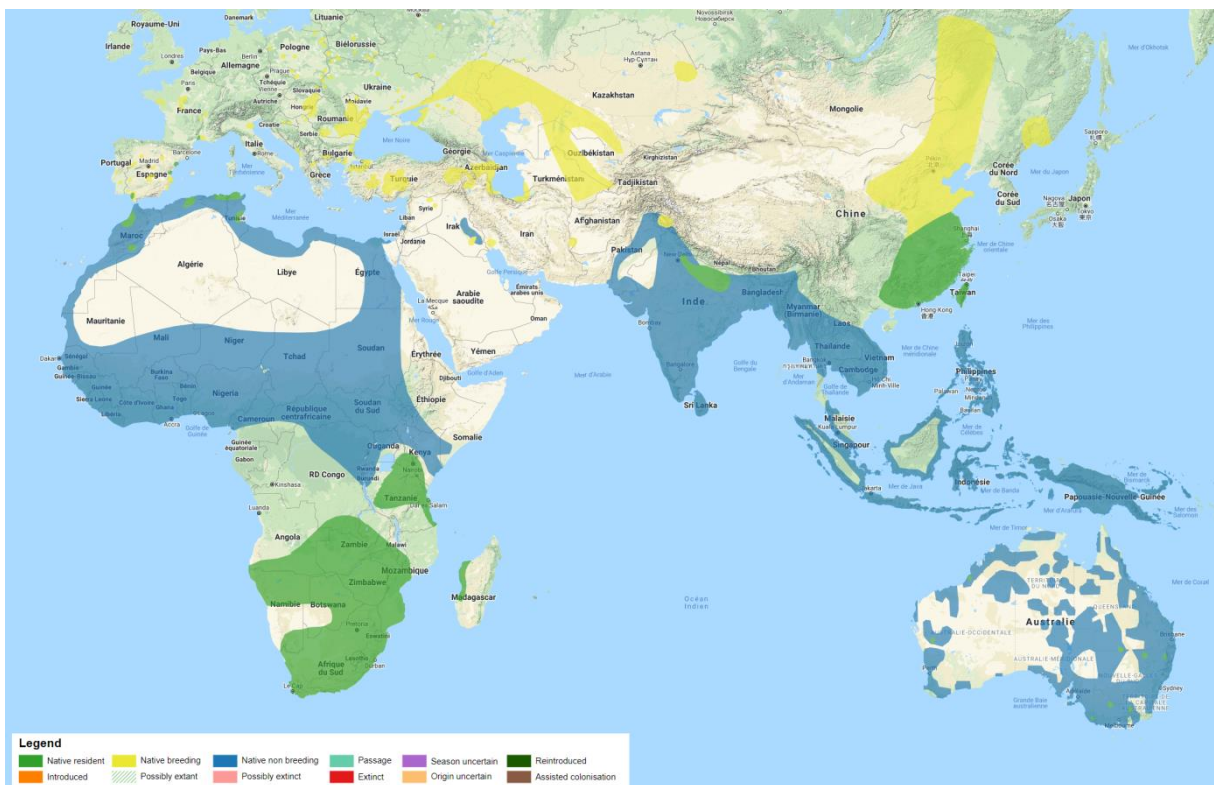


Figure 2: Distribution of the Whiskered Tern *Chlidonias hybrida* [25]

3. Distribution of the species in Morocco

In Morocco, the species is observed either in migratory passage along the Atlantic coasts in autumn and spring migration. We note from the map (Fig. 3) that the majority of observation sites are the same in both directions [2][3][26].

¹ <https://avibase.bsc-eoc.org/species.jsp?avibaseid=7AB4E42B260B5954>

During wintering, the species is noted in certain isolated regions such as the Moulouya estuary (on the Mediterranean coast), the Saiss, the Gharb, the Chaouia, the Doukkala, the Souss and Oued Eddahab. It is rarely observed in the Tingitane Peninsula (Fig. 3).

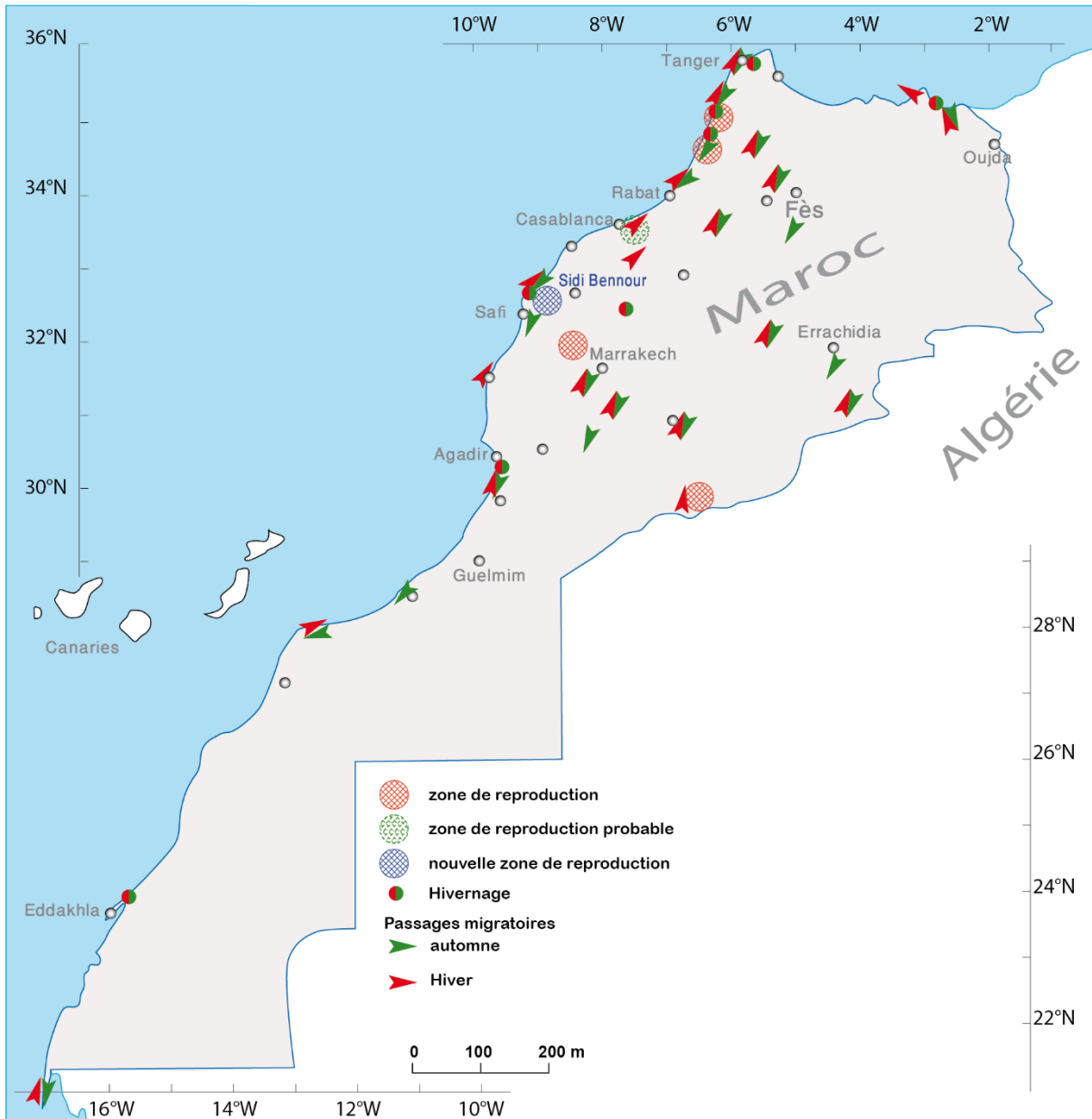


Figure 3: Distribution of the Whiskered Tern in Morocco (compiled from [2], [26] and the authors' work).

The reproduction of this species in Morocco is limited to a few regions. Data on this reproduction are represented in the map in Figure 3 compiled from the work of [2][26]. However, it should be noted that reproduction in the Hassar dam (Zenata Prefecture of Mohammedia) is possible, with several observations of pairs that exhibit reproductive behaviour between 2014 and 2017 during the May-early July period [27][26].

4. Materials and methods

4.1. Study area

The region of Tnine Al Gharbiya² (32° 34' N; 8° 51' W and an altitude of 139 m) is a rural commune in the great Doukkala plain. Administratively, it belongs to the region of Casablanca-Settat, province of Sidi Bennour.

The daya³ of Lgandaziya (32°37' N; 8°51' W) is located 5 km north of the village of Tnine Al Gharbiya and 22 km south-east of the lagoon of Oualidia. (Fig. 4). At full filling, the perimeter of the daya reaches about 5000 m and its surface area 64 ha.

This daya is one of the largest daysas in the region around Tnine El Gharbiya (Ann.Tab. I).



Figure 4. Location of the Tnine Al Gharbiya region and the Lgandaziya daya.

The Lgandaziya daya is a subcircular depression, about 40 cm deep on its large surface and more than 1 m to the south in the three small quarries (Fig. 5). If we consider its subcircular shape, with a surface area of 64,000 m² and an average depth estimated at 0.5 m, the retention volume is estimated at about 300,000 m³. The impoundment is done naturally by runoff water during the rainy period and artificially by drainage water from irrigated fields within the ORMVAD⁴ perimeter. Due to its location near the bour⁵ farmland, the daya water is used to irrigate the surrounding fields by at least ten butane pumps. It is also used as a drinking trough for cattle and as a place to wash wool and blankets. In shallow areas, belt vegetation based on the white water crowfoot (*Ranunculus aquatilis*), an aquatic annual plant, which grows as a submerged broad-leaved floating herb, occupying most freshwater or slightly brackish water bodies from 2 to 35 cm deep [28].

² The names of the localities are taken from Topographic Map No. NI-29-IV-3a, Scale 1:50 000, 1999 Edition.

³ Dayas are closed topographical depressions, which at the beginning of winter fill with rainwater, which then stagnates for many months. In regions with poor groundwater resources, they provide water sources for the herds.

⁴ ORMVAD : Office Régional de Mise en Valeur Agricole des Doukkala (Regional Office for the Agricultural Development of Doukkala)

⁵ bour: rainfall dependent fields.



Figure 5: Location of the Lgandaziya Daya between irrigated and bour fields. (Google Earth, 4/26/2016)

4.2. Methods

The avifauna of the days of Tnine Al Gharbiya and the reproduction of the Whiskered Tern are studied during an annual cycle with one outing for each season (April 2016, June 2016, October 2016 and January 2017). Other qualitative study trips have been conducted in the region.

For reasons of tranquillity and protection of breeding pairs, the reproductive success (hatching, fledging and breeding success) of the species was not studied.

For each trip, the following data are recorded:

- List of avifauna species frequenting the site ;
- Breeding species;
- Brood characteristics;
- Human activities, namely:
 - The number of working pumps;
 - The livestock frequency and size;
 - Washing activities;
 - Disturbances...

All activities in and around the daya are photographed.

5. Results

5.1. Daya's avifauna diversity

The aquatic avifauna of the Lgandaziya daya numbers is about 41 species, 6 of which are known to breed in this site ([Ann. Tab. II](#)).

On April, 24th 2016 we observed 3 species of Sterninae that are active in the site (Little Tern *Sternula albifrons*, Common Gull-billed Tern *Gelochelidon nilotica* and Whiskered Tern). The second visit was carried out on June, 4th 2016. The first remark was the large retreat of the water body more than 10 m from the northern edge. On this open part we noted the presence of Collared Pratincole *Glareola pratincola* and Kentish plover *Charadrius alexandrinus*, with breeding behaviour, Little Terns *Sternula albifrons* without chicks and Black-winged Stilt *Himantopus himantopus* with chicks.

5.2. Nesting of the Whiskered Tern in the Daya

The observations of the species and its first confirmed reproduction case in this region were made in the spring of 2016. On April, 24th 2016, the Whiskered Tern was most abundant with 12 pairs (Fig. 6a) at the nests and 4 displaying pairs on the banks of the daya (Fig. 6b and c). Individuals outside the nests were very active above the daya (characteristic flight in search of food) despite various disturbances.

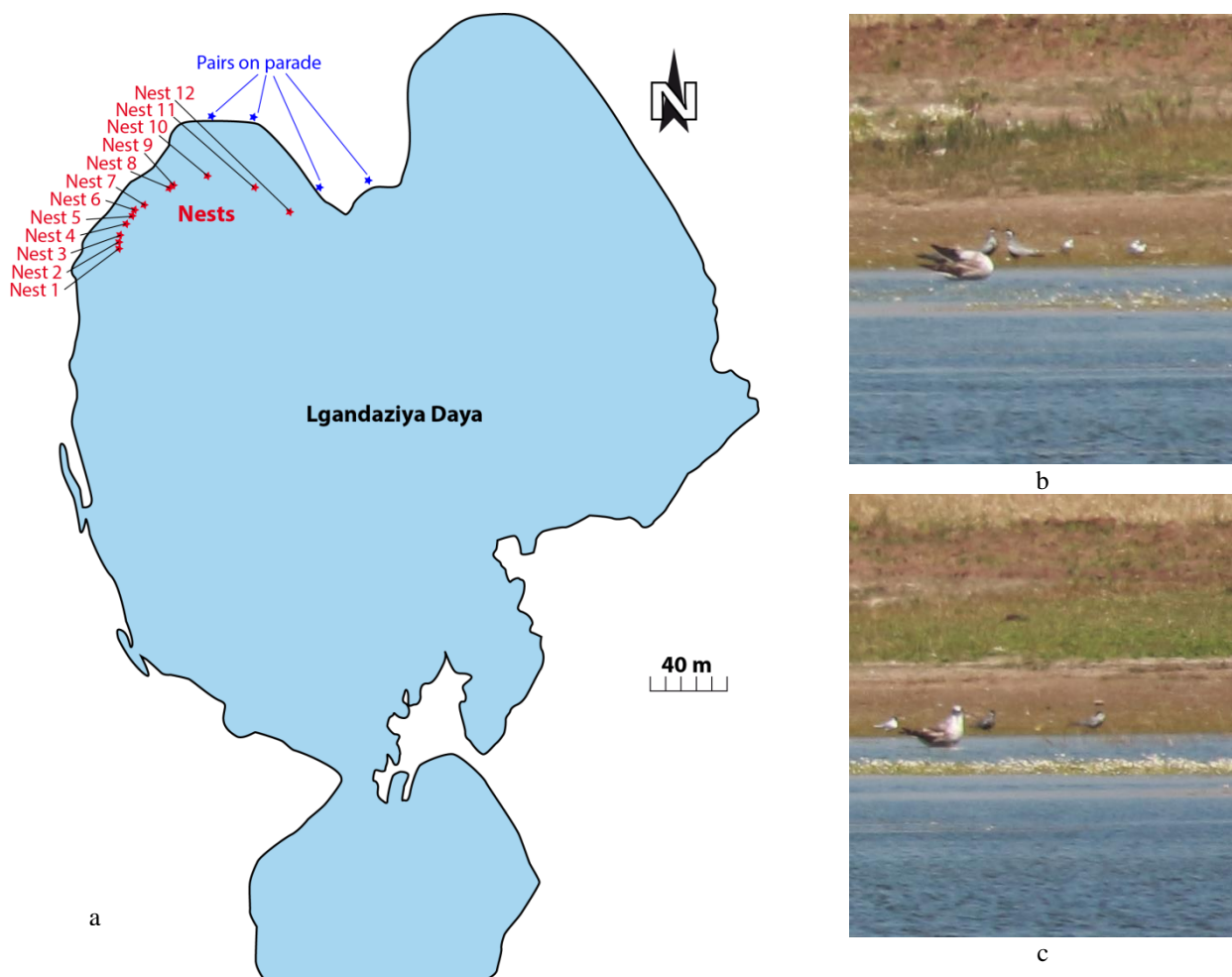


Figure 6: a- Distribution of nests near the western and northern banks of the Daya (in front of Douar Oulad Bouqnine), b- a pair on parade, c- isolated individuals.

The Whiskered Tern is dependent on freshwater marshes with floating vegetation used to build its floating nest [8][10][24][29][30][31].

In our site, the nests are placed far from the banks and built on grasses growing in the water, Gramineae grasses and white water crowfoot *Ranunculus aquatilis* (Fig. 7). The second visit is made on June, 4th 2016. On the same premises, a group of about twenty Whiskered Terns stood on a cord of submerged grass. From time to time some individuals left the group to fly over the daya in search of food (Fig. 7). The nest of the Whiskered Tern has to be sufficiently stable to resist wavelets and changes in water level. The hydrodynamic properties of nests depend on composing materials and on size that may be modified in relation to the kind of support for the entire structure [23]. The adequate structure of the nest will depend on the plant materials used for building and will be directly reflected in nest size and shape. The nests are sometimes distant (a few meters), for example the distance between nest 4 and nests 5 and 6 is about 4 m. In the opposite case they can be quite close (a few centimeters), for example between nests 5 and 6 and between nests 8 and 9 (Fig. 7).

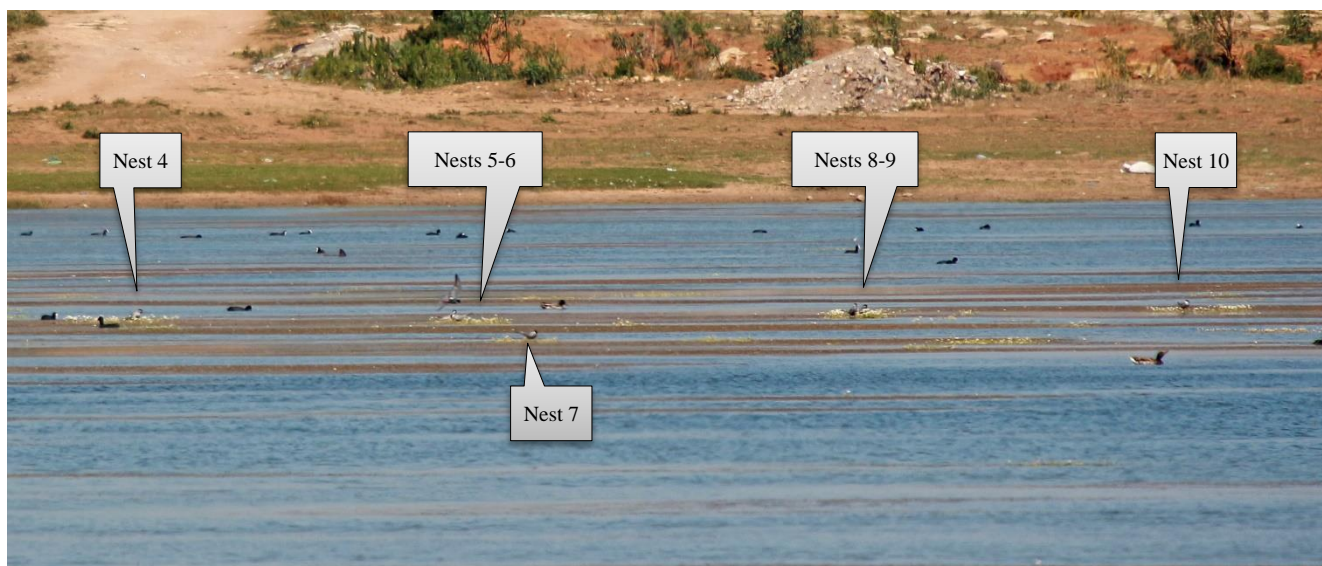


Figure 7. Distribution of some Whiskered Tern nests on the Lgandaziya Daya (4/24/2016)

The second visit is made on June, 4th 2016. On the same premises, a group of about twenty Whiskered Terns stood on a cord of submerged grass (Fig. 8). We could not see any chicks especially since the grass are high enough to hide them and the water and mud do not allow easy access. When we approached these places, all the other birds (ducks, spoonbills, gulls, little terns) flew away, but the Whiskered Terns stayed behind, which suggests that these terns might protect their chicks from predators, seagulls in particular.

In addition to this study, Benoit Maire noted the presence on the same site of a group of 85 individuals in 6/15/2017, with at least one nest defended by a pair (*Pers. Com.*).



Figure 8. Group of about ten Whiskered Terns in an inaccessible area (6/4/2020)

6. Potential predation by Yellow-legged Gulls *Larus michahellis*

The abundance of seagulls, especially Yellow-legged Gulls *Larus michahellis*, can be fatal to Whiskered Tern chicks in the case of a lack of adult attentiveness. We encountered gull pellets with undetermined chick bones (Fig. 9).



Figure 9. a- Group of more than 100 gulls (Lesser Black-backed Gulls and Yellow-legged Gulls) at the Lgandaziya daya, b- Gull pellet containing bones and feathers of young chicks.

6. Discussion

The Whiskered Tern is reported as an occasional breeder in Morocco with a very few breeding case across the country [2][26]. The species has not been reported from the region except for a mention of K. Glen on 8/31/2013 in the Khemis Zemamra region without mentioning the exact location especially that the large dayas of Al Gharbiya are well known. Even though we could not get statistical data concerning the clutch size and success rates (hatching and fledging data), a new breeding site was added to

the entire breeding map of the Whiskered Tern in Morocco which is improving our knowledge on the species distribution regionally.

The Lgandaziya daya brings together a number of factors that allow for the establishment of a breeding population of the Whiskered Tern:

- The presence of submerged or floating vegetation;
- Relatively favourable climatic conditions (in this year 2016) with a good watering;
- The water level and its stability during the breeding period was still high even in June (high pumping);
- The abundance of food [5]. The daya attracts a large number of birds that find peace and food.
- Colony breeding.

When all conditions (choice of location, colony breeding, favourable climatic conditions, stable water level, abundant food, type, shape and size of nests, low presence of parasites and predators, type of vegetation supporting the nests and parental care of the chicks) are right, reproductive success is generally high [7][21][22][24][30].

The construction of floating nests of the Whiskered Tern is well known by several authors [13][21][23][24][30][32]. It uses floating vegetation as a support for its nest, which is itself formed with aquatic vegetation. We noticed that the nests are lined with freshwater filamentous algae and are dependent to submergent vegetation such as Graminae grass and water crowfoot.

The Whiskered Tern is eclectic in terms of diet. It is opportunistic and feeds on small fish, insects, amphibians, worms and even gammarids [33][34].

The eggs and chicks of the Whiskered Tern may be subject to predation especially by the Yellow-legged Gulls (a species abundant in the site) which is known as a predator on various species (eggs, chicks and adults) [35][36][37]. Several species of raptors are observed in the vicinity of the site such as Black-winged *Elanus caeruleus*, Western Marsh-harrier *Circus aeruginosus*, Montagu's Harrier *Circus pygargus*, Eurasian Sparrowhawk *Accipiter nisus*, Black Kite *Milvus migrans*, Long-legged Buzzard *Buteo rufinus*, Common Kestrel *Falco tinnunculus*, Lanner Falcon *Falco biarmicus*, Peregrine Falcon *Falco peregrinus*, ... [38]

Conclusion

The Lgandaziya daya is a new breeding site for the Whiskered Tern in Morocco reported for the first time. It should be noted, however, that birds breeding in the Lgandaziya daya are subject to very strong anthropogenic and natural, mainly climatic, impacts:

- The rapid withdrawal of water in the spring and early summer is due to several factors in combination:

- Over-pumping: During our visits, we counted at least 10 pumps running on butane. If we consider a 2-inch pump that can pump 36 m³/h, the amount of water withdrawn from the daya is estimated at 864 m³/day and all the pumps withdraw 8640 m³/day, all the water from the daya will be pumped in 35 days (Figs. 10, 11).



Figure 10. Example of anthropogenic activities in the site: Pumping water and washing clothes, carpets, mats and wool.



Figure 11. Withdrawal of water from the shallow northern part of the daya. (6/4/2016)

- Stopping the inflow of drainage water in connection with the end of irrigation during the sugar beet grubbing period (May and June).
- The scarcity of rain during this period.
- Increase of evaporation during the rise in temperatures at the end of spring and in summer.
- Pollution: various types of pollutants are noted in the daya such as pesticides (very diverse and some are not approved by the competent services), foliar fertilisers, fertilisers sometimes in excess, detergents used in clothes washing and wool washing (Fig. 10), motor oils, various

solid wastes, animal corpses, various domestic waste, etc...

- Livestock that use the daya as a watering place may enter inside in search of tender plants such as white water crowfoot and grasses and sometimes damage floating nests made from these edible plants [39]. Previous observations in the wetland complex of Oued EL Maleh [40] have shown that these animals are responsible for the destruction of a number of nests of gravel plovers, whiptails and dwarf terns.
- Shepherds, especially those who are still young, remove the eggs or hunt the chicks by simple game or sell them to poachers [39]. Sometimes they keep the adults away by their long presence near the nesting areas.

Finally, this new breeding area for whiskered Tern is not permanent because the presence of water is dependent on suitable irrigation periods and abundant and regular rainfall in addition to the quantity of water used in the irrigation of Bour fields (rainfall dependent fields). In addition, previous observations allow us to conclude that the Whiskered Tern can breed in several regions of Morocco if the favourable conditions of wetland impoundment, the presence of submerged or floating vegetation and quietness are met.

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Annexes

Annex Table I. Large dayas of Tnine Al Gharbiya classified by surface area

N°	Name of the daya	Latitude		Longitude		Total area (ha)	Water filling*	Remarks
		North	West	West	West			
1	Slalaf (Ouled sbaita)	32°38'	8°50'	8°50'	8°50'	119 Ha	RW	Dried up
2	Taraslghoul	32°37'	8°47'	8°47'	8°47'	94 Ha	RW, DIA, WTP	
3	Lgandaziya	32°37'	8°51'	8°51'	8°51'	64 Ha	RW, DIA	
4	Lqaq	32°34'	8°52'	8°52'	8°52'	41 Ha	RW, DIA, Sbih's daya flood	
5	Sbih (Çbih)	32°31'	8°50'	8°50'	8°50'	32 Ha	DIA	

*Filling: RW: Rainwater; DZH: Drainage of irrigated areas; WTP: Water treatment plant

Annex Table II. List of the aquatic avifauna of the Lgandaziya daya

	Scientific name	English name	Certain reproduction in the site
I	Anatidae		
1	<i>Marmaronetta angustirostris</i>	Marbled Teal	
2	<i>Netta rufina</i>	Red-crested Pochard	
3	<i>Spatula clypeata</i>	Northern Shoveler	
4	<i>Anas platyrhynchos</i>	Mallard	Yes
II	Podicipedidae		
5	<i>Tachybaptus ruficollis</i>	Little Grebe	Yes
III	Rallidae		
6	<i>Gallinula chloropus</i>	Common Moorhen	
7	<i>Fulica cristata</i>	Red-Knobbed Coot	
8	<i>Fulica atra</i>	Common Coot	yes
IV	Ciconiidae		
9	<i>Ciconia ciconia</i>	White Stork	
V	Threskiornithidae		
10	<i>Platalea leucorodia</i>	Eurasian Spoonbill	
VI	Ardeidae		
11	<i>Ardea cinerea</i>	Grey Heron	
12	<i>Ardea purpurea</i>	Purple Heron	
13	<i>Egretta garzetta</i>	Little Egret	
VII	Burhinidae		
14	<i>Burhinus oedicephalus</i>	Eurasian Thick-knee	
VIII	Recurvirostridae		
15	<i>Himantopus himantopus</i>	Black-winged Stilt	Yes
IX	Charadriidae		
16	<i>Charadrius hiaticula</i>	Common Ringed Plover	
17	<i>Charadrius dubius</i>	Little Ringed Plover	
18	<i>Charadrius alexandrinus</i>	Kentish Plover	
X	Scolopacidae		
19	<i>Limosa limosa</i>	Black-tailed Godwit	
20	<i>Calidris canutus</i>	Red Knot	
21	<i>Calidris pugnax</i>	Ruff	
22	<i>Calidris ferruginea</i>	Curlew Sandpiper	
23	<i>Calidris alpina</i>	Dunlin	
24	<i>Calidris minuta</i>	Little Stint	
25	<i>Gallinago gallinago</i>	Common Snipe	
26	<i>Actitis hypoleucos</i>	Common Sandpiper	
27	<i>Tringa ochropus</i>	Green Sandpiper	
28	<i>Tringa erythropus</i>	Spotted Redshank	
29	<i>Tringa nebularia</i>	Common Greenshank	
30	<i>Tringa totanus</i>	Common Redshank	
31	<i>Tringa glareola</i>	Wood Sandpiper	
XI	Glareolidae		
32	<i>Glareola pratincola</i>	Collared Pratincole	Yes
XII	Laridae		
33	<i>Larus ridibundus</i>	Black-headed Gull	
34	<i>Larus melanocephalus</i>	Mediterranean Gull	
35	<i>Larus audouinii</i>	Audouin's Gull	
36	<i>Larus fuscus</i>	Lesser Black-backed Gull	
37	<i>Larus michahellis</i>	Yellow-legged Gull	
38	<i>Sterna albifrons</i>	Little Tern	
39	<i>Gelochelidon nilotica</i>	Common Gull-billed Tern	
40	<i>Chlidonias hybrida</i>	Whiskered Tern	Yes
XIII	Accipitridae		
41	<i>Circus aeruginosus</i>	Western Marsh-harrier	