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Behavior and Phenology of Wigeon *Anas penelope* in the Garaet of Hadj-Tahar (Skikda, Northeast of Algeria)

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Abstract

Algerian Numidia (north-east of Algeria) is composed of about twenty fresh water bodies, the majority of which are marshy and landlocked in forest areas, some (Lake Tonga, Garaet Hadj-Tahar...) enjoying legal protection (Ramsar site). They present a luxuriant richness in aquatic grassland and attract a much diversified aquatic avifauna composed mainly of the *Anatidae* (dabbling ducks and diving ducks), the *Ardeidae*, the *Podicipedidae*, the *Scolopacidae* and the *Charadriidae*.

Wigeon *Anas penelope* is a dabbling duck very little studied in North Africa. Its ecology, its spatio-temporal distribution, and its dynamics are still poorly documented throughout this region of the Mediterranean basin.

In this work we studied the ecology of this species in hydrosystems of the North-East of Algeria, or we noted that Garaet Hadj-Tahar hosted during the wintering season (2011/2012) more than 550 individuals. This species occupies the deepest sites of the study site. We also noted that sleeping (35%) and swimming (38%) are the dominant activities, feeding (6%) and preening (20%) are also observed with low rates and flying is very low (1%).

Keywords: Wetlands, Garaet Hadj-Tahar, Wigeon, ecological study, daytime behavior, Algeria

1. Introduction

Wetlands are among the most productive and richest area in diversity in the world. They represent a place of life for many animal species such as fish, batrachians and some mammals. They also frequently host birds and are shelter to plants that are often unique, allowing these ecosystems to play an important role in maintaining the balance in biodiversity as well as water on the planet [14].

The Mediterranean is bordered by a string of wetlands, which constitute an exceptional floristic and faunistic richness. Nearby, Western Numidia (northeastern Algeria), represented by the Guerbes-Sanhadja Ramsar site since 2001^[1], contains 31 wet sites, represented here by Garaet Hadj Tahar (36 ° 51 ' , 50 N, 07 ° 15', 57 E) located about twenty kilometers from the Mediterranean and one of the largest water plans of this complex^[2]. This site plays an important role for the wintering of the aquatic avifauna and receives every year about fifty species of water birds ^[3], it is also a breeding ground for the migratory avifauna, including species classified as threatened with extinction, and/or almost threatened ^[4].

Wigeon *Anas penelope* is a dabbling duck that has been the subject of numerous studies on the northern shores of the Mediterranean, but still remains little studied in North Africa. Its ecology, its spatio-temporal distribution, and its dynamics are still little known throughout this region of the Mediterranean basin.

In order to study the ecology of this species of dabbling duck in these hydro-systems in the north-east of Algeria, the work that we propose is articulated on the following points:

- Monitoring of population dynamics of Wigeon *Anas penelope* in these water body.
- Studying their spatial-temporal distributions in these environments.
- Studying their diurnal behavior in these wetlands.

2. Materials and Methods

2.1 Study Area

The Guebes-Sanhadja wetland complex is located between latitude 36 ° 45 'and 37 ° 13' North and longitude 07 ° 13 'and 07 ° 30' East in the eastern part of Algeria (Fig.01).

It contains 31 wetlands ^[2]. Among these sites, Garaet Hadj-Tahar (36 ° 51'50 " N, 07 ° 15'57 'E) is a permanent freshwater marsh covering 112 ha. It is located about twenty kilometers from the Mediterranean and has a very elongated oval shape (Fig.03), surrounding to the northwest by a clay and sandstone hill, which gradually rise to 200 m, in the East, we find the dunes and in the Southeast an alluvial plain of Oued El-Kebir ^[5, 6]. The depression occupied by this marsh is oriented North-West-South-East. The most part of it is covered with water during the rainy season. It can thus remain throughout the year despite summer evaporation and intensive pumping of water. Colluvial collapses gradually fill this marsh, the depth of which does not exceed 2 m. Ninety-nine plant species are stratified in four belts around open water ^[2]. This site also plays an important role in the wintering of the aquatic avifauna. Fifty-four species belonging to sixteen families have been recorded during the last two winter seasons ^[3, 7]. It is also a breeding ground for rare species such as the *Athya nyroca*, the white-headed *Oxyura leucocephala* (Anatidae) and Purple Swamphen *Porphyrio porphyrio* (Rallidae) ^[8]. Recent studies have shown that Garaet Hadj-Tahar and Lake Tonga are singular in Numidia by their abundance of trophic resources and more particularly in gastropods (*Planorbis planorbis* and other species) ^[9]. The latter play a key role in the reproductive success of water birds ^[10].

2.2 Methods

The methods of observation and counting of birds are very numerous and depending on the bird species studied and the aim sought. Two specific methods fit with our objectives: the relative method and the absolute method. The method of absolute counting is the most used for the study of water birds ^[11].

We performed an individual count when the bird band is composed of fewer than 200 individuals and is at a distance of less than 200 m. For larger and more distant groups, numbers were estimated ^[12]. This method is the most widely used in the winter censuses of aquatic avifauna ^[11].

Our counts were carried twice a month, where the total number of birds was estimated at two observation posts (OP). The choice of observation posts was made according to the distribution of the birds and the vision of the site.

2.2.1 Sampling Frequency

The study was begun in September 2011 and was lasted until May 2012, where a field trip was carried out every fortnight. The enumerated birds are positioned on maps where they were observed on the ground to determine the different modes of the occupation of the Garaet.

2.2.2 Study of the activity rhythms of Anatidae

Two classic methods are usually used for the study of the rhythm of activity of the Anatidae, the focal sampling animal or FOCUS and the instantaneous scan sampling or SCAN ^[13]. In our case, we chose the last method, and the data are collected during a continuous day of observation, from 9 am to 4 pm every two weeks from September to May. We carried our observations on bands in which we carried out transect series every hour, reporting the activity of each observed bird. For this purpose five activities were noted; sleeping, swimming, preening, flying and feeding. For more information on the ecological requirements of Wigeon, the feeding activity has been dissociated into two modes: feed by the beak, feed by tilting (down).

3. Results and Discussion

3.1 Phenology of Wigeon

Wigeon is a species that began to colonize Garaet Hadj-Tahar with very few numbers, compared to other Anatidae. 150 individuals of this species were observed during our first outings. The total effective increases slowly to reach some hundred individuals during the month of December (Fig. 02). Afterward, massive arrivals of wintering populations brought the total abundance to 550 individuals recorded in late December and early January. At the end of the winter season in March-April, the number became very small, when 33 individuals were recorded.

These results correspond to the results of Metallaoui (2010) ^[14], which indicate that Wigeon occupied the Garaet over a period ranging from six to seven months with very great numbers.

3.2 Modality of spatial occupation

Wigeon is a dabbling duck, characterized by its very late colonization of Garaet Hadj-Tahar. The first arrivals settled in the northwest sector of the Garaet (Fig. 03). From the end of November until the end of the wintering season, while these numbers became large, the individuals concentrated mainly in the northern and northeastern sectors of the Garaet, which depended on essentially to the depth of the water of the Garaet. We note that this species is very sensitive to human disturbances.

These results are identical to those recorded by Tamisier (1999) ^[15], Metallaoui (2010) ^[14], Metallaoui and Houhamdi (2010) ^[5], and even that of Atoussi (2014) ^[16]. This result confirms that the whistling duck prefers the local more or less deep away from all disturbances.

3.3 Assessment of the activities rhythms

The diurnal activity rhythms of Wigeon wintering at Garaet Hadj-Tahar are characterized by the dominance of two activities: Swimming (38%) and Sleeping (35%) (Fig. 04).

Swimming took an important part of diurnal activity rhythms during the first months, when it was observed mainly in solitary individuals, the recorded value is of the order of 38%. Sleeping is represented an important activity of diurnal behavior of wigeon especially mid-day recording a percentage of 35%.

The preening activity also takes a more or less important part with a percentage of 20% of the total time.

Feeding was poorly recorded in the Wigeon during the day, with only 6% recorded.

Flying is rarely observed in individuals of this species where we have recorded a percentage of 1%.

3.3.1 Feeding behavior

Wigeon shows only two types of feeding behavior: feeding by beak and feeding by tilting. However, we did not observe it, either on the banks or diving (Fig. 05).

Feeding by beak is clearly dominant (86%) compared to that performed by tilting (14%).

3.3.2 Discussion

3.3.2.1 Study of the diurnal activity rhythms of Wigeon *Anas penelope*

In view of the analysis of the diurnal activity budgets of Wigeon at Garaet Hadj-Tahar, it appears that two activities predominate throughout the wintering period, swimming at 38% and sleeping at 35% (Fig. 04).

Since his arrival, October - November, Wigeon disposed of

abundant and easily accessible resources that allow it to develop important reserves. In December, these energy reserves would normally be constituted.

Cleaning of the plumage constitutes a more or less important part of the diurnal behavior of Wigeon (20%) (Fig.04). It is observed during the first half of the wintering period and especially as soon as it arrives, which can be explained by a regular preening and rearrangement of the plumage following the problems caused by the migratory flight.

The flight which holds a very small part of this species (1%) is only observed after regroupings and rearrangements of places of two or three individuals who have taken flight from one group to join another group.

These results opposed those expected by Houhamdi (2002)^[17] at Lac des oiseaux where he recorded that swimming is

usually accompanied by feeding and took dominance over other activities (55%) while sleeping and flying are registered with very small percentage (3%)^[18].

3.3.2.2 Diurnal Food Behavior

The feeding behavior of Wigeon observed at Garaet Hadj-Tahar, was split only in two activities: feeding by beak and feeding by tilting.

Feeding by beak has taken a significant proportion of the time allowed to feeding, 86% in opposition to tilting feed with 14% (Fig.05).

Wigeon which is a dabbling duck is likely to be unable to access aquatic grass. It can then only feed on the surface (beak in water) from floating filamentous algae.

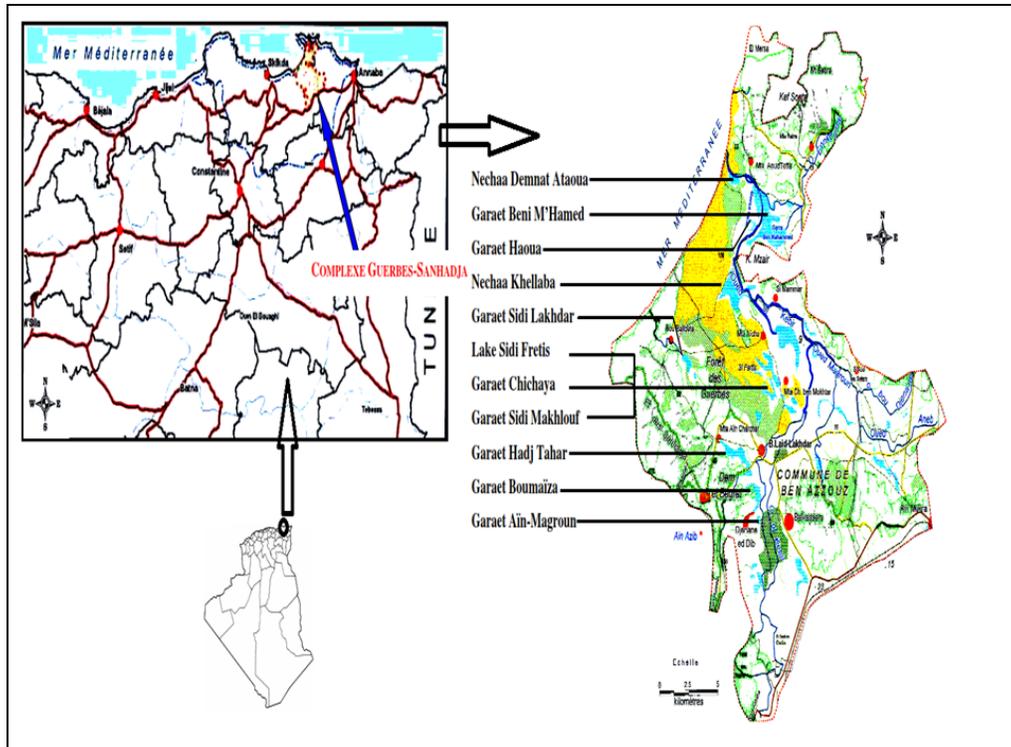


Fig 1: Localization of the wetlands complex of Western Numidia ^[1]

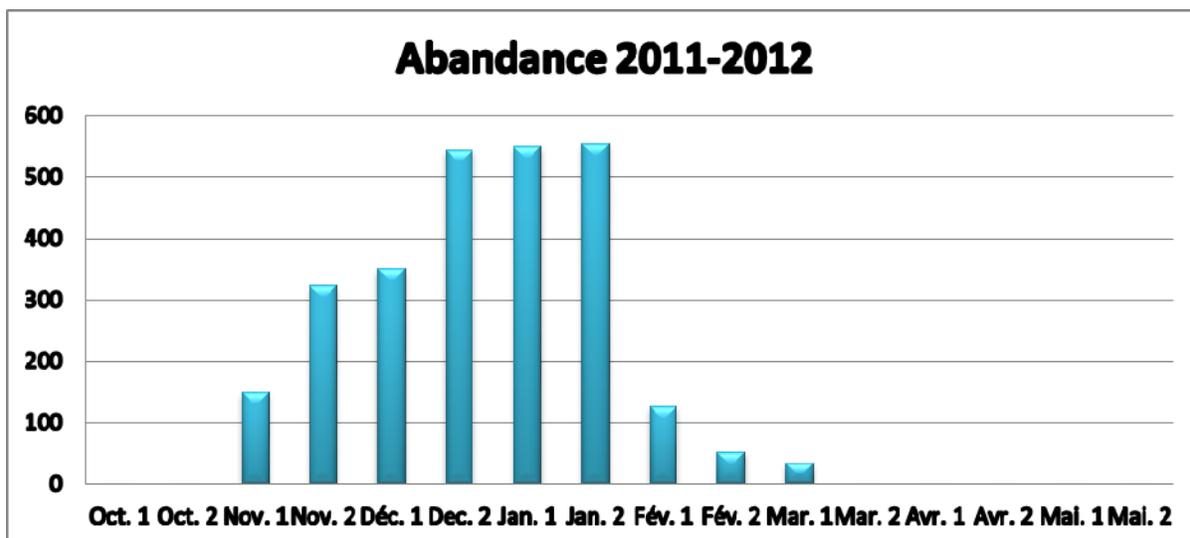


Fig 2: Monthly effective evolution of Wigeon in Garaet Hadj Tahar (wintering season 2011-2012).

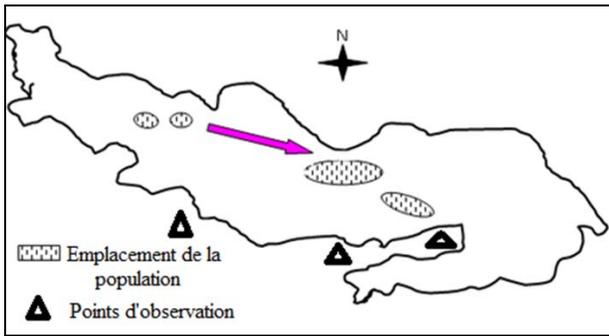


Fig 3: Spatial occupation of Garaet Hadj-Tahar by Wigeon *Anas penelope*

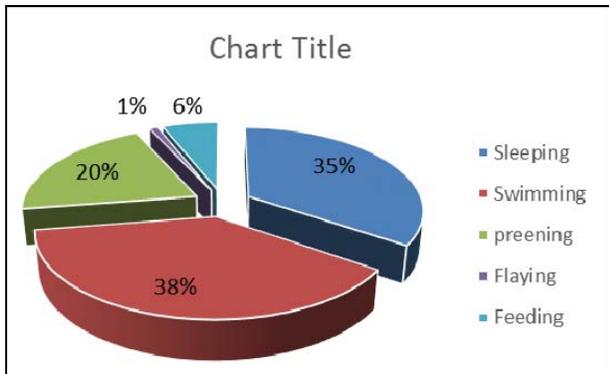


Fig 4: Assessment of the rhythms of the diurnal activities of Wigeon *Anas penelope* Figure 05: Feeding behavior of Wigeon *Anas penelope*

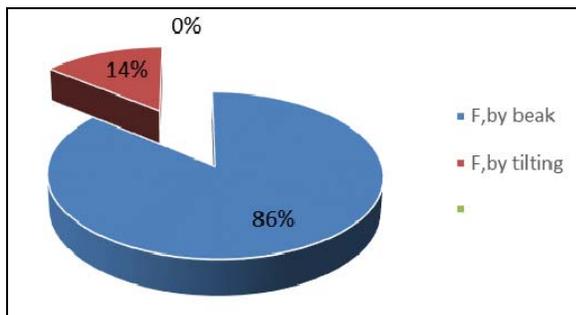


Fig 5: Feeding behavior of Wigeon *Anas penelope*

4. Conclusion

The Garaet Hadj-Tahar plays an important role for the wintering of Wigeon *Anas penelope*.

During the wintering season (2011/2012), this water body has resaved more than 550 individuals of this species who frequented the deepest places of the water and far from any disturbance. Sleeping and swimming are the activities that dominate the diurnal activity rhythms of this species. Feeding and preening are noted with low rates and flying was only very little observed.

Concerning feeding behavior, Wigeon prefers to feed on the surface by its beak compared to the tilting of the body where 86% of the feeding time was observed against only 14% of the time allocated to the tilting of the body.

Finally, the populations of Wigeon devoted the majority of their time to swimming, sleeping, and preening, indicating that Garaet Hadj-Tahar is a daytime resting medium for this species.

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