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## Diurnal time budget of the Eurasian Wigeon (*Anas penelope*) at Lac des Oiseaux (northeast of Algeria)

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### Abstract

This study investigated the diurnal behavior pattern of the Eurasian wigeon *Anas penelope* in Lac des Oiseaux (oriental Numidia, northeast of Algeria) during two wintering season (2012/13 and 2013/14). The maximum number of this duck was recorded early January both in 2012/13 and 2013/14 respectively. The dominant activity in the diurnal time budget of this bird was the feeding noted 37% and 40% respectively. Overall, there was not marked seasonal change in the diurnal time budget of this species. The species used Lac des Oiseaux both as feeding and roosting area. Several factors could influence the geographical variation in the diurnal behavior of wigeon at Lac des Oiseaux.

**Keywords:** Eurasian wigeon, Lac des Oiseaux, diurnal behavior, Numidia, feeding and roosting area.

### 1. Introduction

Most of birds' species are migratory and their population dynamics are influenced by ecological process at their wintering area and along the migration routes [1]. Many studies on the migration of birds are made and have pointed the environmental conditions faces during wintering period and could affect their wintering performances. The productivity in wetlands extends several facilities to water birds and influencing their distribution in roosting area during wintering season and migratory halt [2]. The behavior of water birds gives a lot of information about birds' requirements and distribution. Several scientific studies on the behavior and ecology of birds in the occidental Palearctic were made [3, 4, 5, 6]. In Europe, the Eurasian wigeon *Anas penelope* has been studied intensively [8, 9, 10, 11, 12, 13, 16, 17]. In this topic we studied the ecology of the Eurasian wigeon *A. penelope* at Lac des Oiseaux, mainly the temporal distribution, abundance and diurnal time budget of this duck.

### 2. Study area

Lac des Oiseaux (36°47'N, 08°7'E), a shallow pond of 70 ha, is a part of a large and varied wetland complex located in Numidia (northeast Algeria). Listed as a Ramsar site since 1999, it is a sanctuary of wintering waterbirds which could number over 10,000 birds [6]. The vegetation is dominated by *Scirpus lacustris*, *Typha angustifolia*, *Scirpus maritimus* and to a lesser extent by *Nymphaea alba* and small stands of *Phragmites australis*. A total of 65 bird species are regularly seen on the site [5] which is used as a wintering and nesting habitat by a numbers of birds (personal observation).

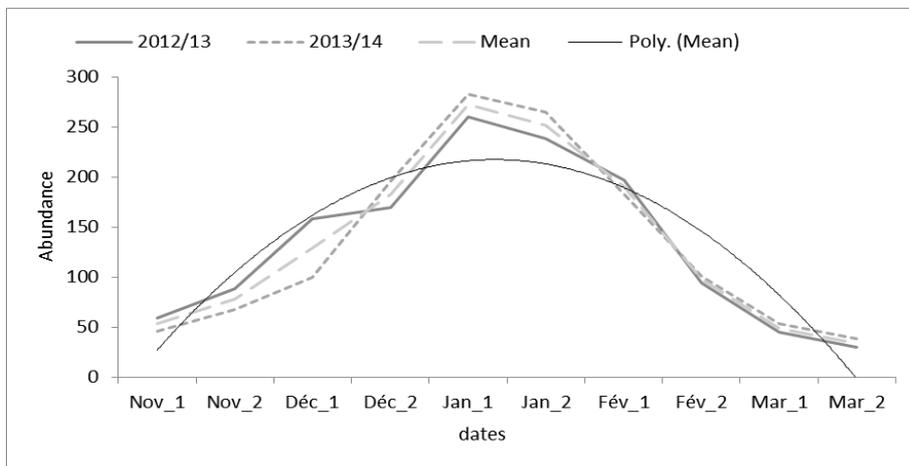
### 3. Material and methods

This study was done during the two consecutive wintering season 2012/2013 and 2013/2014 at Lac des Oiseaux, in order to evaluate the strategy of the wintering and the phenology of the Eurasian wigeon *A. penelope*. First we have counted the size of the population by the estimated method [7], then we have studied the diurnal time budget of this bird used the scan method [18]. Data were assembled then analyzed using XLSTAT (2009).

### 4. Results

#### 4.1 Phenology

The Eurasian wigeon *A. Penelope* was observed at Lac des Oiseaux during the wintering period (Figure 1). The peak of number was recorded early January reaching 260 individuals in 2012/13 and 283 individuals in 2013/14 (Figure 1), after that we observed a gradually decreasing in number until late march without significant difference in number of birds between wintering period 2012/13 and 2013/14 ( $U = 48$ ,  $p$ -value = 0.912).

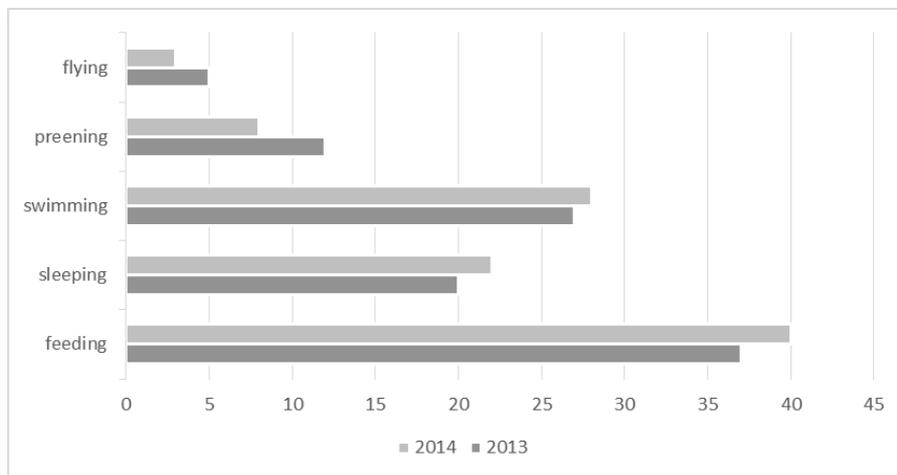


**Fig 1:** Abundance of the Eurasian wigeon at Lac des Oiseaux during the winter period 2012/13 and 2013/14.

**4.2 Time activity of the Eurasian wigeon**

The feeding was the dominant activity in the diurnal time budget of the Eurasian wigeon *A. penelope* at Lac des Oiseaux during 2012/2013 and 2013/2014. Then followed by the swimming, the sleeping and few proportion of the time budget accorded to the preening and flying. The feeding

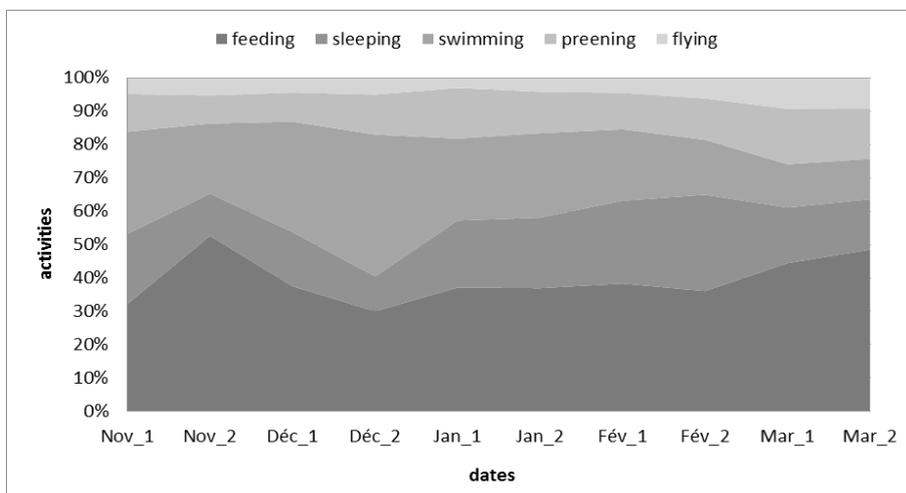
present 37% and 40% of the diurnal time budget during the first and the second wintering period, respectively (Figure 2). The mean proportion of sleeping and swimming in 2012/13 and 2013/14 was 20% and 27, 5% respectively (Figure 2). The comparison between two wintering season show a small variation in the diurnal time budget of this duck (Figure 2).



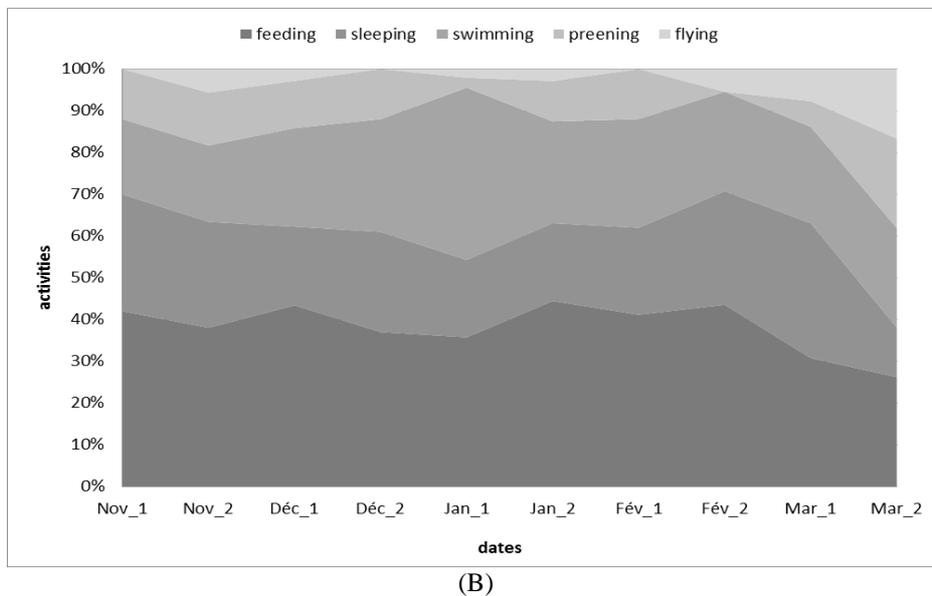
**Fig 2:** Time activities of the Eurasian wigeon at Lac des Oiseaux during 2012/13 and 2013/14.

The temporal evolution of diurnal time budget of the Eurasian wigeon *A. penelope* was similar in 2012/13 and 2013/14, the five activities were observed during all wintering period. The feeding activity and the sleeping activity increase at the start of winter then decrease at the end of December then almost increase at the end of wintering

period (Figure 3a). The swimming, preening and flying activities were constant during all the wintering period (Figure 3a). The time budget activities did not show an important variation in 2013/14, except for the flying which was instable (Figure 3b).



(A)

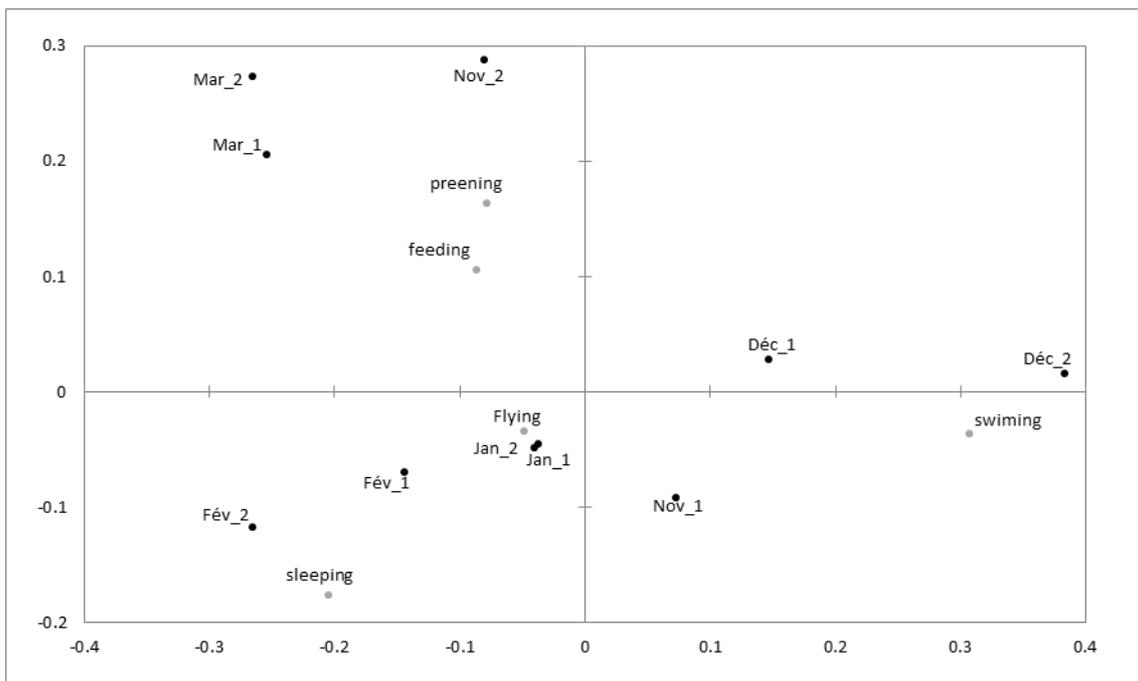


**Fig 3:** Monthly evolution of time budget activities of the Eurasian wigeon in Lac des Oiseaux. (A) during 2013 and (B) during 2014.

**1.1. Statistical analysis**

The statistical analysis using the factorial plane of AFC (86, 03% of inertia), separate the temporal evolution of the activities in two groups depending on two axes (Figure 4). The F1 axe separate the swimming observed in December and the rest of activities called comfort activities and

recorded during all the period. The axes F2 (called energy axes) separate the feeding and preening which were important to the birds after migration and during the cold period (to gaining energy) and the sleeping activity which keeping energy expenditure at minimum during the cold period (Figure 4).



**Fig 4:** plot of factorial plane 1 x 2 of correspondence analysis of the diurnal behavior of Eurasian wigeon *A. Penelope* at Lac des Oiseaux.

**5. Discussion**

The Eurasian wigeon *A. Penelope* have a wintering status in wetlands of Algeria, especially in the northeast wetlands of Algeria (such as Lac des Oiseaux). The species wintering regularly in Numidia early September and occupied sites until late April. The oriental Numidia was cited as an important and staging area for wigeon [4]. Furthermore, previous studies on ecology of this duck reported that the maximum number of this bird could reach 1000 individual in Lac des Oiseaux [5], in contrary to which was reported in our study, probably due to several forms of disturbance in this site causes by hunting and human predation. These numbers

of wigeon counted at Lac des Oiseaux are unavailable and formed many fractions of the total number of these birds distributed in three sites (lack Tonga, Mekhada march and Lack des Oiseaux) but Lack Fetzera is the only important site in Numidia for the population of *A. Penelope* [5]. The dominant activity in the diurnal time budget recorded during all study period (wintering 2012/13 and wintering 2013/14) was the feeding, this results was dissimilar to that observed in the Camargue (France population), where the feeding activity was devoted intensively only at the start of the wintering period (between October and November), then the birds allocated its time sleeping or swimming [11, 14]. The

feeding activity associated to sleeping contradicted the hypothesis reported by Tamisier (1985) in Camargue to the effect that the feeding and roosting area are distinct on two functional unit<sup>[14]</sup>. The change in the behavior pattern of the Eurasian wigeon *Anas penelope* at Lac des Oiseaux are explained by several factors such as hydrology, productivity and disturbance and interaction of these geographic differences, this disturbance could disperse the population of wigeon if the level of hunting and predation is low.

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