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The diurnal activity budget of the pintail *Anas acuta* wintering in the Lac des Oiseaux (North-East Algeria)

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Abstract

The wintering of the pintail duck *Anas acuta* at Lac des Oiseaux has been studied from September 2014 to March 2015. The size of the population was low and varied between months. They did not exceed 40 individuals counted during the month of December. The study of the rhythms of activities showed, that the dominant activity during the wintering was feeding with 59% of the time of activities, it was followed by rest and swimming with 16.66% and finally the preening with 4.83%. Thus, for the pintails the reserves necessary for migration and reproduction are probably gained at least on the wintering area.

Keywords: *Anas acuta*, wintering, time budget, diurnal activity, Lac des Oiseaux

1. Introduction

In winter, water birds migration is a process that involves a large number of species; it is done at regular intervals and allows species to divide their time between two geographically different regions. The birds migrate to more places ^[1] where climatic conditions are better and food more available. Wetlands in Algeria constitute a winter quarters for the migratory waterfowl. Their richness and diversity are remarkable and unique in North Africa. At "Lac des Oiseaux" Lake, located to the northeast of Algeria; several species of Anatidae were studied during the wintering season ^[2, 3, 4, 5] and also during nesting season ^[6, 4].

Time budget studies have been made for more duck ^[7] studied the activity rhythm of wintering European Green-winged Teal (*Anas crecca*) ^[8] described the activity rhythm of the European Pochard (*Aythya ferina*) and ^[9] added data on the Tufted Duck (*A. fuligula*). In Algeria the rhythms of activities have been studied for Northern Shoveller ^[10] hat duck ^[11] but ^[11] but few accounts of Northern Pintail *Anas acuta*, time budgets in it is wintering area have been published ^[12].

The objective of this study is to establish a count of the pintails *Anas acuta* in the 'Lac Des Oiseaux' lake and to monitoring the seasonal evolution of the effectives and their distribution on the study site. Analysis of activity budgets will firstly define the role the lake for the species and also giving the feeding strategy adopted by this species during the winter. The Pintail *Anas acuta* is a regular wintering bird, with small effectives on the 'Lac des Oiseaux'. Unfortunately there is no specific study on the pintail in this wetland. The most important numbers in Algeria, more than 24,000 individuals were counted in the high plateau region ^[12].

2. Material and methods

This study was conducted in the nature reserve of the "Lac des Oiseaux" (36 ° 42 'N and 8 ° 07 'E). which is a part of a large wetland complex located in Numidia (northeast Algeria) it is located at the municipality of Lake of Birds (wilaya of El Tarf) at equal distance (45 km) between El Kala city in the East and Annaba in the West. The "Lac des Oiseaux" is a freshwater lake with an area of about 40 hectares. During the rainy season, it can reach up to 70 ha. Only a road separates it from the easternmost part of the Mekhada marshes, with which it shares the same watershed ^[6]. The maximum depth does not exceed two meters ^[13]. The vegetation is dominated by *Scirpus lacustris*, *Typha angustifolia*, *Nymphaea alba* and *Phragmites australis*.

For estimating population size, we selected individual counting. This method is the most appropriate since the site area is quite small and the numbers of pintails are relatively low.

Counts are made in the early morning and one time per week from September 2015 to March 2015. To analyze the results we adopted the method of Fuller [14]. This method minimizes the under estimate of the ability of the site. For the analysis of the budgets of activities, Data are collected during the day of observation from 8:00 to 16:00 h, with 4 days per week, from September to February. Beyond that, the numbers of pintails are very low. Every hour we registered the activity behavior of each bird. The sampling of activities allows after conversion the percentage of time for each activity [15]. The observed behaviors without distinction of sex or age are classified into 4 types: Feeding, Swimming, Preening and Resting. Feeding is classified into four behaviors: beak under water (B), head and neck under water (TC), switching (BASC) and diving (P). A total of 24 observation day were spent in the field during the whole study equivalent to 192 man-hours were spent in carrying out this study.

3. Results

3.1 Monthly variation of the numbers of the Pintail

The monitoring of the wintering of the pintails in the Lake showed that the overwintering period is from September to April (Figure 1). According to periodic counts, the Pintail is wintering at small numbers. The population is more than 40 individuals counted in December.

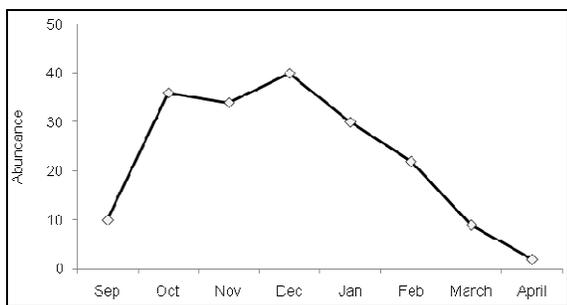


Fig 1: Abundance of the of the pintails at “Lac des Oiseaux” during the winter period

Changes in numbers of pintails are progressive from September to December when their number gradually increases to reach the peak in December (40 individuals). It decreases from January to March (9 individuals) where early departures are recorded. During the month of April, only 02 individuals were recorded (Figure 1).

3.2 Analysis of activity rhythms

Pintail mainly present in the North and Northwest parts of the lake, however, it moves a lot and can be found at any area of the site, where the depth is quite high (Figure 2).



Fig 2: Spatial distribution of the pintail at Lac des Oiseaux

The analysis of the budgets of daytime activities of the pintail shows that feeding is the dominant activity with 59% the allocated time, followed by swimming and the rest with 16.66% of the time budget, and finally the preening with 4.83% (Figure 3).

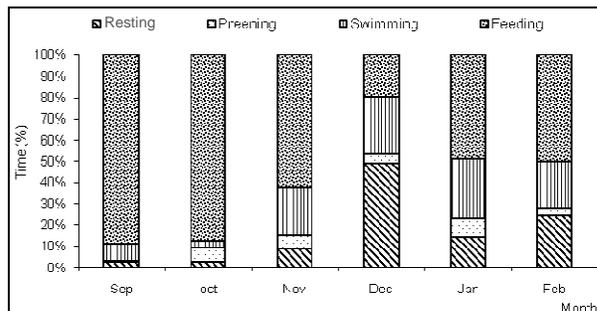


Fig 3: Monthly evolution the time of activities of the pintail at Lac des Oiseaux

With 3% of the time recorded in September and October, the rest is still low activity in the early season. During the month of December with 48% of the time recorded activities, resting is the most important activity. This percentage decreases late in the season with 23% of the time activities in February (Figure 4).

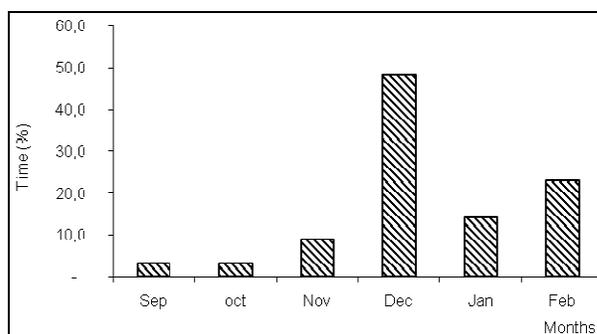


Fig 4: Monthly evolution the time of rest of the pintail at Lac des Oiseaux

The preening is a secondary activity. It is low throughout the winter. It peaked in January with 8% of the time. It varies from 1% to 6% in the early season, between September and November. In the end of the season, the pintails spend only 3% of their time on this activity (Figure 5).

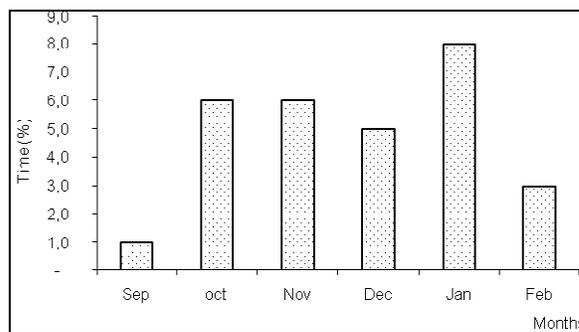


Fig 5: Monthly evolution the time of preening of the pintail at Lac des Oiseaux

As the preening, swimming is a variable activity. It accompanies feeding activity since pintails eat while swimming. Early in the season, it is relatively low and ranges

from 8% in September to 4% in October. It increases from November and it becomes stable with an average of 22% until the end of the season (Figure 6).

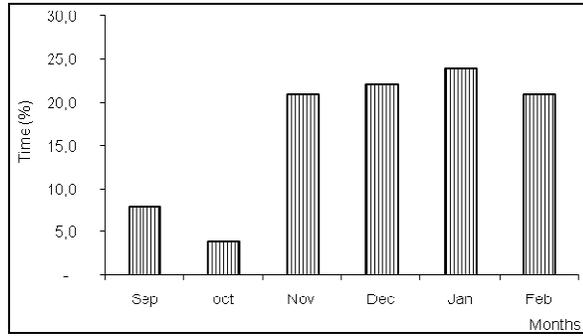


Fig 6: Monthly evolution the time of swimming of the pintail at Lac des Oiseaux

Feeding is the most important activity during the wintering season. Its value is important in the early season since the arrival of pintails on the lake in September with 89% of activity times. It decreases later and reached its minimum in December with 20% of the activity time. In January, it stabilizes around 50% until the end of the season (Figure 7).

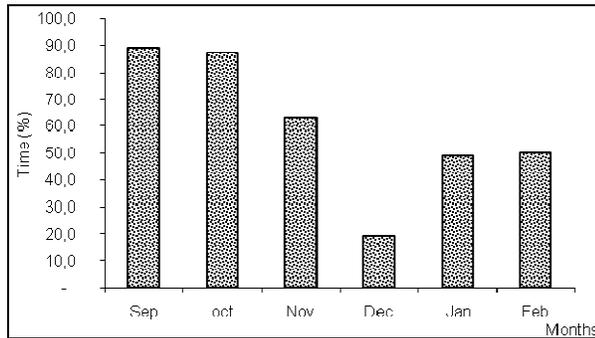


Fig 7: Monthly evolution the time of feeding of the pintail at Lac des Oiseaux

The pintail duck feeding is characterized by two eating behaviors (Figure 8): switching (BASC) and head and neck in water (TC). The latter is the most dominant behavior early in the season, it is recorded in September with 72.45% of the time and then gradually decreases until December with 7.5% and remains low until the end of season. The switching is a variable behavior during the season; the minimum value is recorded in the early season with less than 20% of time and then increases gradually until November and reaches 40% of the time. It decreases in December and increases again later until end of the season (50% of activity times) (Figure 8).

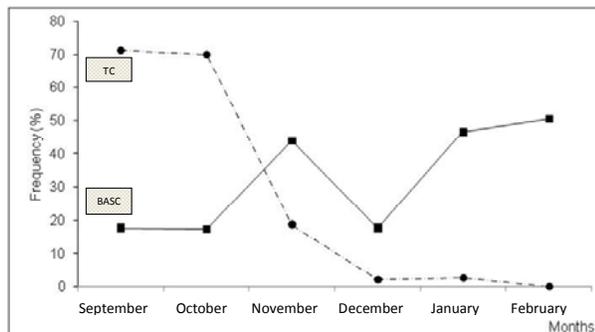


Fig 8: Feeding behavior of the pintail at 'Lac des Oiseaux'

In absolute time, Feeding represents a period of more than 5 hours. This means that much of this activity is carried out on the day. Swimming and the rest represent a period of more than an hour and the least important activity is the preening (Table 1).

Table 1: Duration of activities of the pintail at "Lac des Oiseaux"

| Activities | Absolute time (number of hours) |
|------------|---------------------------------|
| Feeding | 5H 31mn |
| Resting | 1H49mn |
| Preening | 43mn |
| Swimming | 1H49mn |

4. Discussion

4.1 Phenology of wintering

The Pintail is one of 12 species of Anatidae who regularly frequent the "Lac des Oiseaux". Its numbers are low and reach 40 individuals maximum. This lake is not the favorable site for this species; in the study area, about 400 individuals were identified at Lake Tonga in 1997 [3]. At beginning of the wintering, food resources are available and accessible at the lake, this is mainly due to the low water level at this time of the year. From December, it increases considerably, pintails and other species, leaving the lake to feed nearby, in the marshes of the Mekhada where food resources are still accessible. All these movements indisputably reveal a close functional relationship between different wetlands of the region.

4.2 Daily activities Budgets

The study of the rhythms of activity tells us about the function of the wetland for waterbirds and the behavior of the species studied. Regarding the activities of the Pintail (*Anas acuta*) during its wintering, feeding is an important activity from September to November. Early in the season, the pintails are weakened by a long migration and need an important feeding time to reach their average weight that corresponds to a certain physiological balance [16]. In addition, during this period, food resources are available and easily accessible (low water levels) at the lake. From December, individuals adopt an energy conservation strategy: increase in time spent at rest and decreased activity in costly energy that is diet. Indeed, from this month, the water level increases, the resources (phytoplankton and zooplankton) become inaccessible and their densities are low. According [17], the density of Copepods and water fleas typically reach a peak in the first month of autumn and are minimal in the last month of winter. During the winter feeding and rest are the main activities. From January, the need to stock reserves for the spring migration results in an increase of the feeding time. Late in the season the water level increase and food resources become inaccessible and rare, the pintails are then forced to switch to feed despite their long neck. This activity is dominant during the wintering. In absolute time, food represents a period of more than 5 hours; this means that much of this activity is carried out the day. This activity becomes totally night in case of large diurnal disturbances [18, 19]. Swimming takes one hour in the activity. The least represented activities are the preening and rest.

Our results confirm those obtained in California [20, 21] and Louisiana [22], in which the authors report that time spent on food by pintails increase in February and March, which corresponds to an increase in body mass just before migration. However, they differ from those of [23] and [24] reporting that ducks wintering respectively in Mexico and Texas, showed no

increase in body mass before starting migration and thus accumulate the reserves necessary for the continuation of migration [25] and reproduction [26, 27] during their migratory movement. In the low valley of Senegal (big lake Djoudj), [28] reported that during the month of January the pintails spend 60% of time for resting, 20% for feeding, 15% for swimming and 5% for preening. On the lake Timerganine [12] obtained different results from ours where rest is the dominant diurnal activity in winter with 41.45%, followed by swimming (25.80%) and feeding (11%).

The "Lac des Oiseaux" seems to satisfy the requirements of the pintail (*Anas acuta*). It can be considered a place of foraging for this species particularly early in the season. However, it appears that the reserves acquired by pintails early season probably be determinants not only for their physiological condition throughout the wintering but also during their migration to nesting areas.

5. Acknowledgement

This work is dedicated in the memory of the late person who introduced us to the study of waterbirds, M. CHALABI Bouzid, pioneer on ornithology and waterfowl. He was one of the first Algerian researchers engaged to the protection and conservation of wetlands in the country.

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