

## **Description of the behavioural activities of the Caribbean flamingo in the Wildlife Refuge and Fishing Reserve Ciénaga Los Olivitos**

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### **Abstract**

In Venezuela, the Caribbean flamingo (*Phoenicopterus ruber*) is distributed along coastal wetlands. The largest resident population of this bird is found in the Wildlife Refuge and Fishing Reserve Ciénaga de Los Olivitos, where it feeds, rests and breeds. The objective of this work was to describe the behavioural activities of Caribbean flamingos in the refuge by making observations of their activities. Flamingo activity was categorised into five types of behaviour: Feeding, resting, preening, aggression and locomotion. The principal activity observed was feeding, where birds had their beak and/or head submerged in the water and used sweeping movements to collect food. Resting was described as an individual standing still with a relaxed posture; observations showed that flamingos preferred to put their necks in an “S” shape to the right. Those individuals who prefer to rest with their neck on the left side may be more involved in aggressive encounters than those who prefer to rest with the neck on the right side. Preening was observed less than feeding and resting. In Cuba, Caribbean flamingos invest less time in preening and, like the flamingos in Los Olivitos, time invested in foraging and resting is greater, probably because the salinities of both areas are similar. Aggressive behaviour was observed when the birds were performing courtship activities. Locomotion was observed when flamingos moved to areas for foraging, resting, to join in with courtship groups and when they were disturbed by anthropogenic factors.

### **Resumen**

En Venezuela, el flamenco del Caribe (*Phoenicopterus ruber*) se distribuye a lo largo de los humedales costeros. La mayor población residente de esta ave se encuentra en el Refugio de Fauna Silvestre y Reserva de Pesca Ciénaga de Los Olivitos, donde se alimenta, descansa y se reproduce. El objetivo de este trabajo fue describir las actividades de comportamiento de los flamencos del Caribe en el refugio haciendo observaciones de sus actividades. La actividad de los flamencos se clasificó en cinco tipos de comportamiento: alimentación, descanso, acicalamiento, agresión y locomoción. La principal actividad observada fue la alimentación, donde las aves tenían su pico y/o cabeza sumergidos en el agua y usaban movimientos de barrido para recolectar alimentos. Descanso se describió como un individuo inmóvil con una postura relajada; las observaciones mostraron que los flamencos preferían poner sus cuellos en forma de “S” a la derecha. Aquellos individuos que prefieren descansar con el cuello del lado izquierdo pueden estar más involucrados en encuentros agresivos que aquellos que prefieren descansar con el cuello del lado derecho. Se observó menos acicalamiento que alimentación y descanso. En Cuba, los flamencos del Caribe invierten menos tiempo en acicalarse y, al igual que los flamencos en Los Olivitos, el tiempo invertido en buscar alimento y descansar es mayor, probablemente porque las salinidades de ambas áreas son similares. Se observó un comportamiento agresivo cuando las aves realizaban actividades de cortejo. Se observó la locomoción cuando los flamencos se desplazaban a áreas para

buscar alimento, descansar, unirse a grupos de cortejo y cuando fueron perturbados por factores antropogénicos.

## Résumé

Au Venezuela, le flamant des Caraïbes (*Phoenicopterus ruber*) est réparti le long des zones humides côtières. La plus grande population résidente de cet oiseau se trouve dans la réserve faunique et réserve de pêche Ciénaga Los Olivitos, où il se nourrit, se repose et se reproduit. L'objectif de ce travail était de décrire les activités comportementales des flamants roses des Caraïbes dans le refuge en faisant des observations sur leurs activités. L'activité des flamants a été classée en cinq types de comportement: alimentation, repos, toilettage, agressions et déplacement. La principale activité observée était l'alimentation, les oiseaux présentant leur bec et / ou leur tête immergés dans l'eau et utilisaient des mouvements de balayage pour collecter de la nourriture. Le repos correspondait à un individu immobile, avec une posture détendue; les observations ont montré que les flamants préféraient placer leur cou en forme de «S» à droite. Les individus qui préféraient se reposer le cou du côté gauche étaient plus impliqués dans des rencontres agressives que ceux qui préféraient se reposer le cou du côté droit. L'activité de toilettage a été moins observée que l'alimentation et le repos. À Cuba, les flamants des Caraïbes investissent moins de temps dans le toilettage et, comme les flamants de Los Olivitos, le temps consacré à la recherche de nourriture et au repos est plus important, probablement parce que les salinités des deux régions sont similaires. Un comportement agressif a été observé lorsque les oiseaux effectuaient des activités de parade nuptiale. La locomotion a été observée lorsque les flamants roses se déplaçaient vers des zones de recherche de nourriture, de repos, de groupes de parade nuptiale et lorsqu'ils étaient perturbés par des facteurs anthropiques.

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## Introduction

In Venezuela, the biology of flamingos has been widely studied, but the detailed patterns of dispersal of this species along Venezuelan coasts, as well as more information about its behaviour and reproduction are still unknown. Conservation actions, typically aimed at preserving biodiversity, increasingly consider findings from behavioural studies on specific species. Knowledge of the behaviour of individuals allows prediction of the nature of interactions at other ecological levels, as well as monitoring of the consequence of human interventions on environments, which is especially relevant for conservation (López, 2004).

## Aims and objectives

The objective of this work was to describe the behavioural activities of Caribbean flamingo in the Wildlife Refuge and Fishing Reserve Ciénaga Los Olivitos, during the 2013-2014 breeding season.

## Study area

Los Olivitos Wildlife Refuge and Fishing Reserve, is located in the north eastern end of Lake Maracaibo, in the northeast of the Zulia state, Miranda municipality (Figure 1), between the parallels 10°50 '52' ' ; 10°58 '48' 'N and the meridians 71°19' 11 ' ; 71°33 '12' 'O, 50 km from the city of Maracaibo (MARNR, 2001).

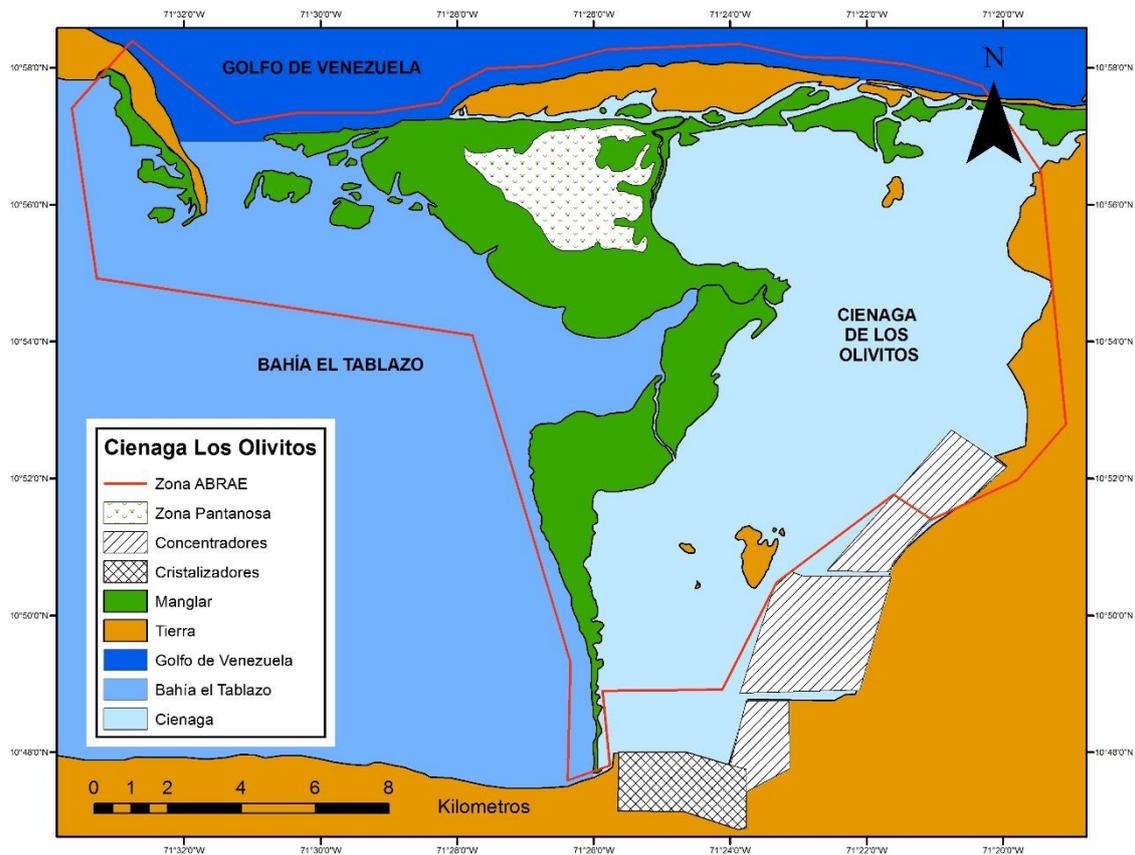


Figure 1. Map of Wildlife Refuge and Fishing Reserve Cienaga Los Olivitos.

## Methods

Ten samplings were carried out during the months of June, July, October and December of 2013 and January, February, March and May of 2014, for one to two days. The observations (Figure 2) were made with the help of a Celestron Ultima 80<sup>®</sup> telescope model 52250 and Bushnell 10 x 42mm binoculars, whilst photographs of the birds

were captured using a Samsung HZ50W camera. All data were recorded in a field notebook. The activities of the flamingos were categorized into five (5) types of behaviours: feeding, rest, grooming, aggression and locomotion; as described by Allen (1956), Rooth (1965) and Kahal (1975).



Figure 2. Observations in the study area and data collect.

## Results

### Feeding

It was observed that the main activity carried out by adult flamingos during the day was feeding. Allen (1956) and López (2004) define this activity as the behaviour used by flamingos to obtain food by presenting their beak or head submerged in the water, using sweeping movements on both sides to collect food. It has been described that this activity can be done in two ways: whilst walking or "kicking" the substrate. Based on the observations made in this work, feeding was defined as the position in which flamingo places its peak partially or totally in the water and filters its food. It was observed that these flamingos adopted several methods to obtain food. Moving the beak inside the water from one side to another (this method can be done walking or standing) or by walking to search for food (head and bill out of the water in a "search position"), submerging the beak to engulf prey when located (Figure 3). Usually small holes, made by the flamingos in search of their food, were observed in the sediment. The flamingo places its beak on or near to the Lake's substrate and begins to kick around the beak, thus making a hole in the substrate.

### Resting

Another activity that was observed in the flamingos was resting. This is described by

López (2004) as the activity in which the individual was standing still with a relaxed posture. Directing head backwards or "under one wing", as well as standing on one leg also constituted evidence of resting behaviour. In this context, our study defines resting based on observations of the animal's posture (resting on one leg, positioning the neck in an "S" shape against one of the sides of its body, supporting its head leaving the beak inside the wing on the same side); see Figure 4.

### Preening

Arenas (2014) describes this behaviour as activity that includes plumage cleaning and bathing. In our work this activity is described as the behaviour in which birds clean their plumage and rub their body with their head, as well as scratching the lower part of the jaw with a foot (Figure 5).

### Aggression

López (2004) describes this activity as that used for the defence of a territory or for mate guarding. The individuals who adopt this behaviour perform striking displays such as vocalisations, opening of the wings, approaches with "intimidation" postures and pecking at opponents. For the purposes of this work, aggression was defined as the behaviour adopted by the flamingos with a defensive position, with the wings extended

and the beak open ready for pecking (Figure 6).

Locomotion

According to López 2004, locomotion is defined as the action used by flamingos to move from one point to another, either by

walking or flying. In this context, our work defines locomotion as the activity in which individuals move from one place to another, including both walks or flights, whether or not caused by some anthropogenic factor, and not including any locomotion used whilst foraging (Figure 7).



*Figure 3. Adult flamingos feeding in "Los Corianos" sector of Los Olivitos.*



*Figure 4. Adult flamingos resting in "Los Corianos" sector.*



Figure 5. Adult flamingos showing preening /maintenance activity in "Los Corianos" sector.



Figure 6. Flamencos showing aggressive behaviour in "Los Corianos" sector.



Figure 7. Flamingos performing locomotion activities in "Los Corianos" sector.

## **Discussion**

### Feeding

It is evident that these birds need to invest much time in feeding, considering that each individual needs to consume 270 grams of food a day (Rooth, 1976) and whose diet is based mainly on benthic macroinvertebrates (MIB) that do not exceed 1 cm in length. In general, the flamingos in this refuge are feeding in an area that is approximately 1 km from the nesting grounds, where hundreds of flamingos gather for foraging. They will also feed in small groups near their nesting area.

### Resting

Anderson (2009) studied the preference of neck position during resting in lesser flamingos (*Phoeniconaias minor*) in South Africa, finding that these flamingos had a preference to place the neck on the right side. One of the main reasons may be that early sensory and motor experiences play an important role in neural and behavioural asymmetry. Another possible reason is that the right cerebral hemisphere is typically related to the control of emotions and aggressions, such that those individuals who prefer to rest with the neck on the left side are more involved in aggressive encounters than those who prefer to rest with the neck on the right. This behaviour was observed most frequently between the hours of the morning until midday, probably because the flamingos prefer to forage at night. López (2004) states that Caribbean flamingos use nocturnal foraging to compensate for their energetic expenses during the reproductive stage, which is why increases in the rest period are seen during the day.

### Preening

This behaviour was less observed than foraging and resting; however, according to López (2004), in extremely saline environments it is necessary to spend more time cleaning and caring for feathers than in low-saline environments. In Cuba this species

of flamingo invests 9% of its time on preening and, like the flamingo in Los Olivitos, the time invested in the activities of foraging and resting is greater (between 50 to 88% of the bird's time), probably because the salinities of both reserves are similar.

### Aggression

In a few occasions in Los Olivitos, aggressive behaviour was observed among individuals; however, this behaviour was notable mainly during courtship activities. López (2004) states that courtship displays, pair formation and selection of nesting sites represent the main activities that promote confrontations between individual flamingos.

### Locomotion

The locomotary activities of the flamingos in the study area were mainly observed when they moved in to new foraging patches, or their resting places, or to join the courtship groups. It was also observed that these flamingos were disturbed by anthropogenic factors, such as the movement of boats. When a boat approached, most of the flamingos in the flock did not show any modification to their activity, only some adopted an alert position (which may include vocalization). If the boat continued approaching, the flock began to walk in the opposite direction until they started to fly.

## **Conclusions**

Feeding was the main activity carried out by these flamingos in this study area; since they need certain food requirements that are easily obtained in this ecosystem, the flamingos are not forced to fly to other locations in search of food. Resting was observed most frequently during the day, probably because the flamingos prefer the hours of the night to feed. Finally, aggressive behaviour was observed during courtship activities.

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