

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

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### **Abstract**

The abundance and distribution of flamingos in Venezuela have been the main parameters chosen to measure their populations throughout the country, however some aspects of their reproductive biology are still unknown. To cover these aspects, more information is required, which can be obtained by taking into account the most important nesting site of flamingos in the country. In this study the nests were counted directly. Then to an estimation of 100 nests, measurements of the internal diameter, external diameter and height were taken. As a result, 8335 active and 1724 inactive nests were recorded, distributed over an area of 29700 m<sup>2</sup>, with a density of 0.3 n/m<sup>2</sup>. In addition, it was calculated that the average internal diameter of the nests was 23.62 cm, the external diameter was 31.96 cm, with an average height of 39.5 cm. From these data it can be expressed that one of the possible causes of decrease in the number of nests compared to these data reported previously, is that the refuge has been affected in recent years by periods of drought.

### **Resumen**

La abundancia y distribución de flamencos en Venezuela han sido los principales parámetros elegidos para medir sus poblaciones en todo el país, sin embargo, todavía se desconocen algunos aspectos de su biología reproductiva. Para cubrir estos aspectos, se requiere más información, la cual puede obtenerse teniendo en cuenta el sitio de nidificación más importante de flamencos en el país. En este estudio los nidos fueron contados directamente. Luego, se tomaron medidas del diámetro interno, el diámetro externo y la altura a alrededor de 100 nidos. Como resultado, se registraron 8.335 nidos activos y 1.724 inactivos, distribuidos en un área de 29.700 m<sup>2</sup>, con una densidad de 0,3 nidos / m<sup>2</sup>. Además, se calculó que el diámetro interno promedio de los nidos era de 23,62 cm, el diámetro externo era de 31,96 cm, con una altura promedio de 39,5 cm. De estos datos se puede expresar que una de las posibles causas de la disminución en el número de nidos en comparación con datos informados anteriormente es que el refugio se ha visto afectado en los últimos años por períodos de sequía.

### **Résumé**

L'abondance et la répartition des flamants des Caraïbes au Venezuela ont été les principaux paramètres choisis pour évaluer le statut de leurs populations dans tout le pays. Cependant, certains aspects de leur biologie de la reproduction restent méconnus. Pour couvrir ces aspects, des informations supplémentaires sont nécessaires. Elles ont pu être obtenues en étudiant le site de nidification le plus important du flamant des Caraïbes dans le pays. Dans cette étude, les nids ont été comptés directement. Ensuite, pour un échantillon de 100 nids, des mesures du diamètre interne, du diamètre externe et de la hauteur ont été prises. En conséquence, 8335 nids actifs et 1724 nids inactifs ont été mesurés, répartis sur une superficie de 29 700 m<sup>2</sup>, avec une densité de 0,3 nid / m<sup>2</sup>. Le

diamètre interne moyen des nids était de 23,62 cm et le diamètre externe de 31,96 cm, avec une hauteur moyenne de 39,5 cm. À partir de ces données, on peut dire que l'une des causes possibles de la diminution du nombre de nids par rapport aux données précédemment rapportées est que le refuge a été affecté ces dernières années par des périodes de sécheresse.

## Introduction

In Venezuela, the Caribbean flamingo (*Phoenicopterus ruber*) reproduces annually in the Wildlife Refuge and Ciénaga de los Olivitos Fishing Reserve (R.F.S.R.P.C.L.O.), RAMSAR site of Venezuela. The first reproduction attempt of Caribbean flamenco was recorded between February and July 1987 (Casler et al., 1994) and for a decade (1987-1997) they did not successfully nest until 1998-1999. For this population, some aspects related to the reproductive event are unknown, such as the characteristics of the nest, the size of the nest, among others. The research conducted on the population of this flamingo species have been classified only in population censuses.

## Aims and objectives

The objective of this work was to describe the characteristics of Caribbean flamingo nests in R.F.S.R.P.C.L.O in the post-reproductive period 2012.

## Study area

R.F.S.R.P.C.L.O is located in the northeast of Zulia state, in the north-eastern end of Lake Maracaibo, Miranda municipality, 50 km from the city of Maracaibo (Pirela, 2000). The nesting area includes Los Corianos sector of the refuge, between the geographic coordinates of 10°52'12.6 "N and 71°23'48.5" W (Figure 1).

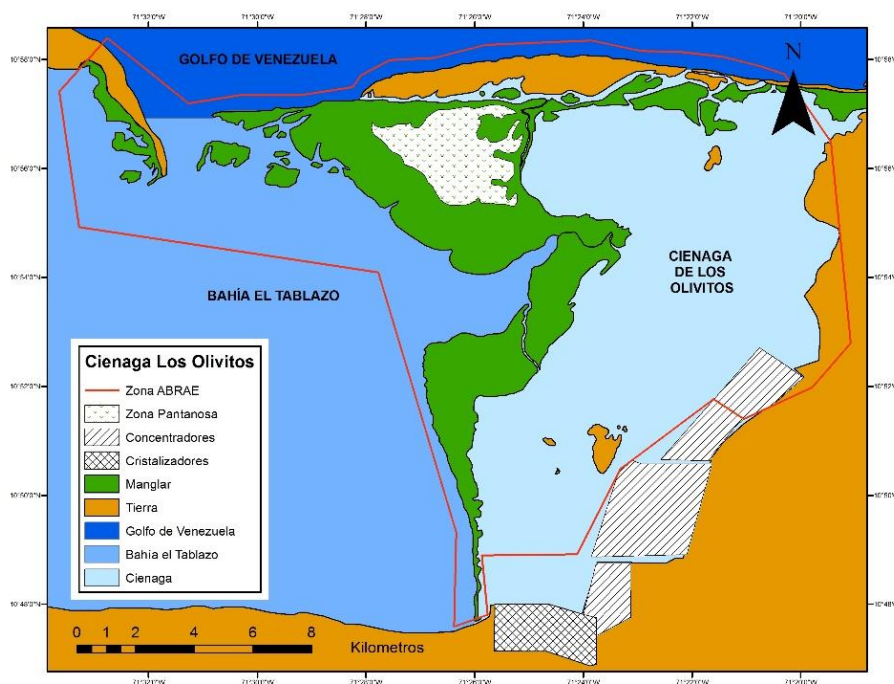


Figure 1: Map of Wildlife Refuge and Fishing Reserve Ciénaga Los Olivitos.

## Methodology

During the months of reproductive inactivity (June, July and October 2013) direct counting of nests was carried out with the help of a

manual counter, following the methodology proposed by Sosa (1999), which consisted in the demarcation of the area in sections cordoned with nylon in order to subdivide it, without specific measurements between the

divisions, and each nest were punctured superficially with a wooden stake to prevent them from being counted more than once. Likewise, a sample of 100 nests was randomly selected to which the following morphological variables were measured with the help of a flexible tape measure (Figure 2):

Di: Internal diameter of the nest: from the opposite inner edges of the upper part of the nest.

De: External diameter of the nest: from the periphery of the upper part of the nest.

H: Nest height: includes the measurement of the existing depression between the nests, by the extraction of the material for its construction, up to the top of the nest.

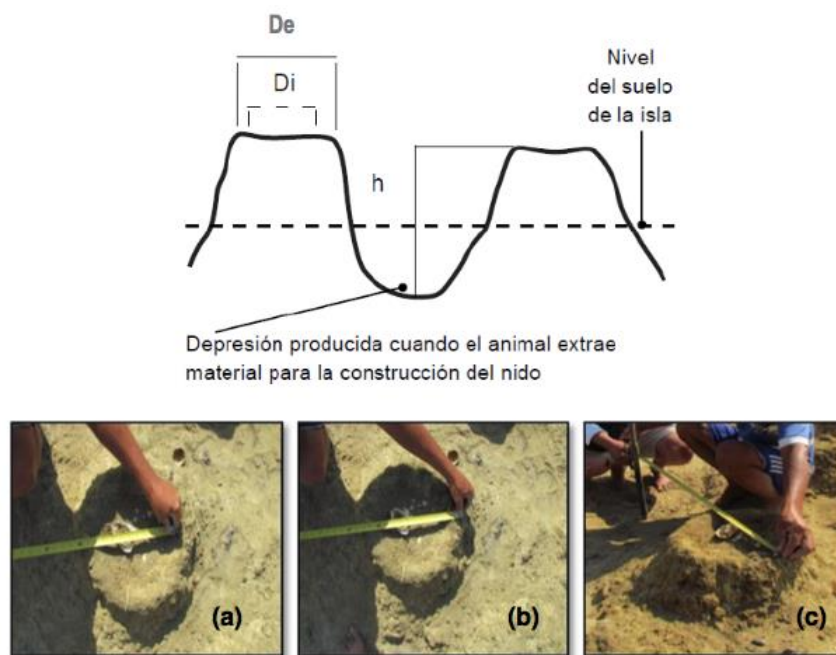


Figure 2: Measurements of the diameters: internal (a), external (b) and height (c) of the nests in the colony of Caribbean flamingos in Los Olivitos.

The density of the nests was calculated considering the area occupied by them, using the formula used by Sosa 2011:  $D = \text{Number of nests} / \text{Area of nesting area}$

## Results

The nesting area of the Caribbean flamingo in the refuge represents a well-defined area of 29,700 m<sup>2</sup> (2.9 ha). Usually the water partially floods the nesting area, having a height that

slightly exceeds the water level; however, in dry season this area remains completely dry. A total of 8335 active nests and a total of 1724 inactive nests were recorded (Figure 3), with a density of 0.3 n/m<sup>2</sup>, (in an area of 29,700 m<sup>2</sup>). Remains of shells, feathers and eggs were observed without hatching in the upper part of some nests and in others as inclusions within the clay material, which probably would indicate that they were reconstructed (Figure 4).

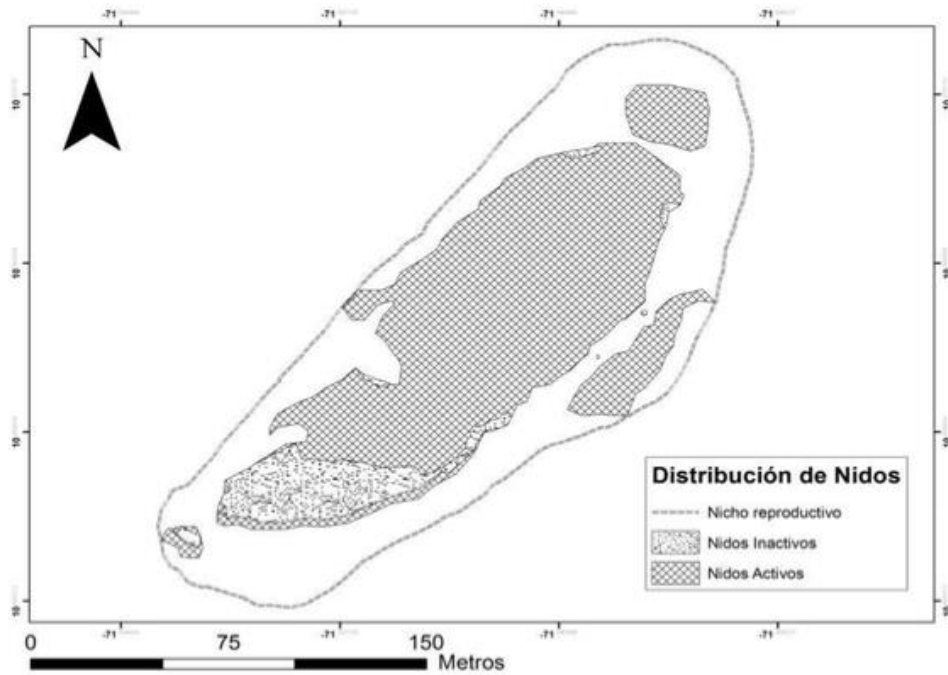


Figure 3: Nests and nesting area of the Caribbean flamingo colony in the Wildlife Refuge and Fishing Reserve Ciénaga Los Olivitos.



Figure 4: Principal component materials of nests and reconstructed nests of Caribbean flamingos in Los Olivitos.

The average height of the nests was  $39.5 \pm 7.52$  cm with maximum values of 54 cm and with minimum values of 25.5 cm, the sample was classified into 5 intervals with length of 5 cm each, nests with height intervals between 37 and 42 cm accounted for 28% (28 nests), followed by intervals between 25.5 and 30.5 cm, as well as 31-36 cm with a percentage of

20% for each, for nests with a height interval between 43 and 48 cm they represented 19% and for nests between 49 and 54 cm the percentage was 11% (Figure 5). The category of height that concentrated the greatest number of nests was that of the intervals of 37 to 42 cm in height and that of least quantity was that of the intervals of 49 to 54 cm.

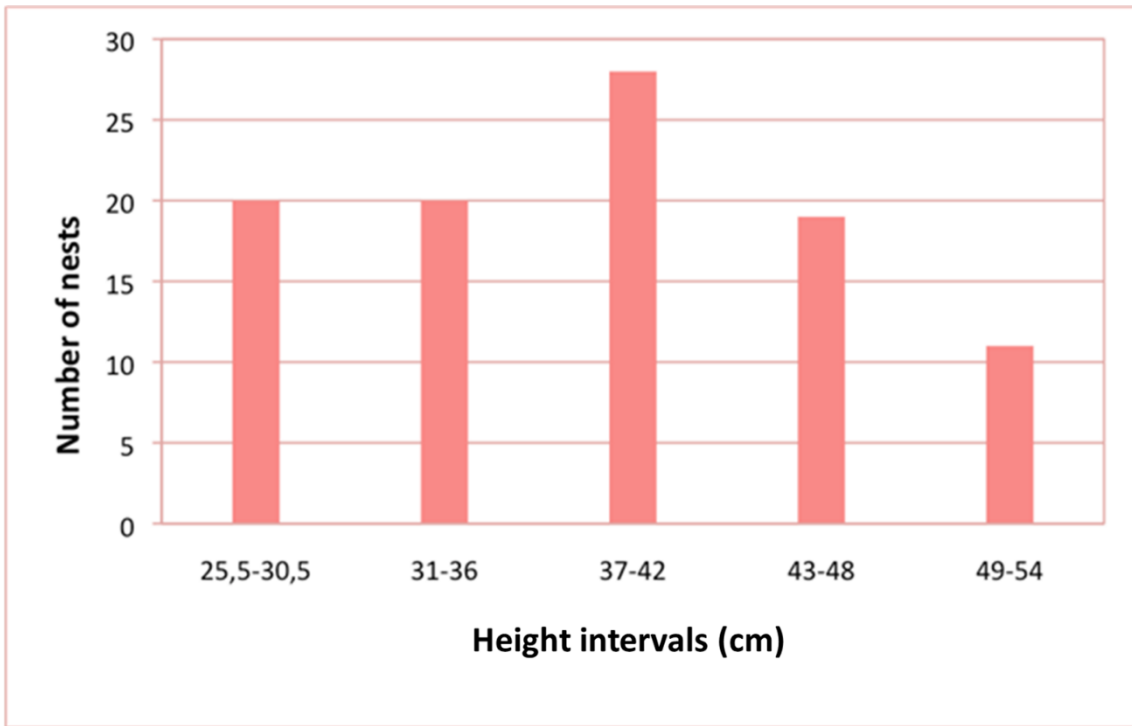


Figure 5: Intervals of height of the Caribbean flamingo nests in Los Olivitos.

The average diameter (cm) internal of the nests was  $23.63 \pm 2.47$ , with maximum values of 34 cm and minimum values of 17 cm, of which 68% of the nests had an internal diameter between 23 and 28, followed by 29% nests with an interval between 17 and 22.5 and finally with only 3% nests with intervals

between 29 and 34 (Figure 6). The category of internal diameter that concentrated the greatest number of nests was that of the intervals of 23 to 28 cm, and the smallest quantity was that of the intervals of 29 to 34 cm.

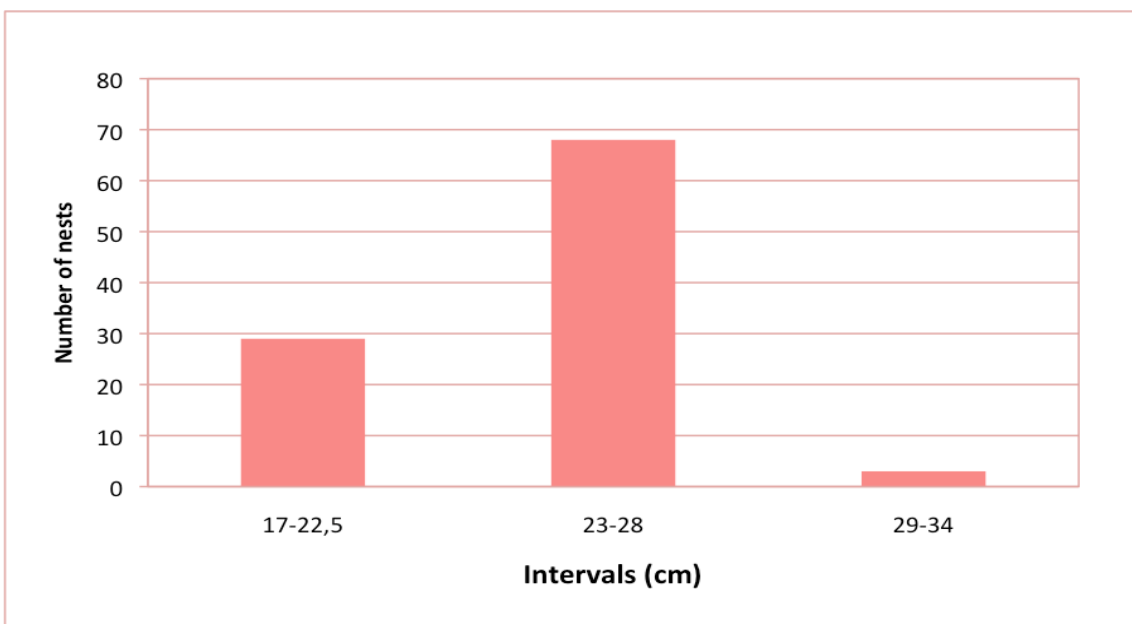


Figure 6: Intervals of internal diameter of the Caribbean flamingo nests in Los Olivitos.

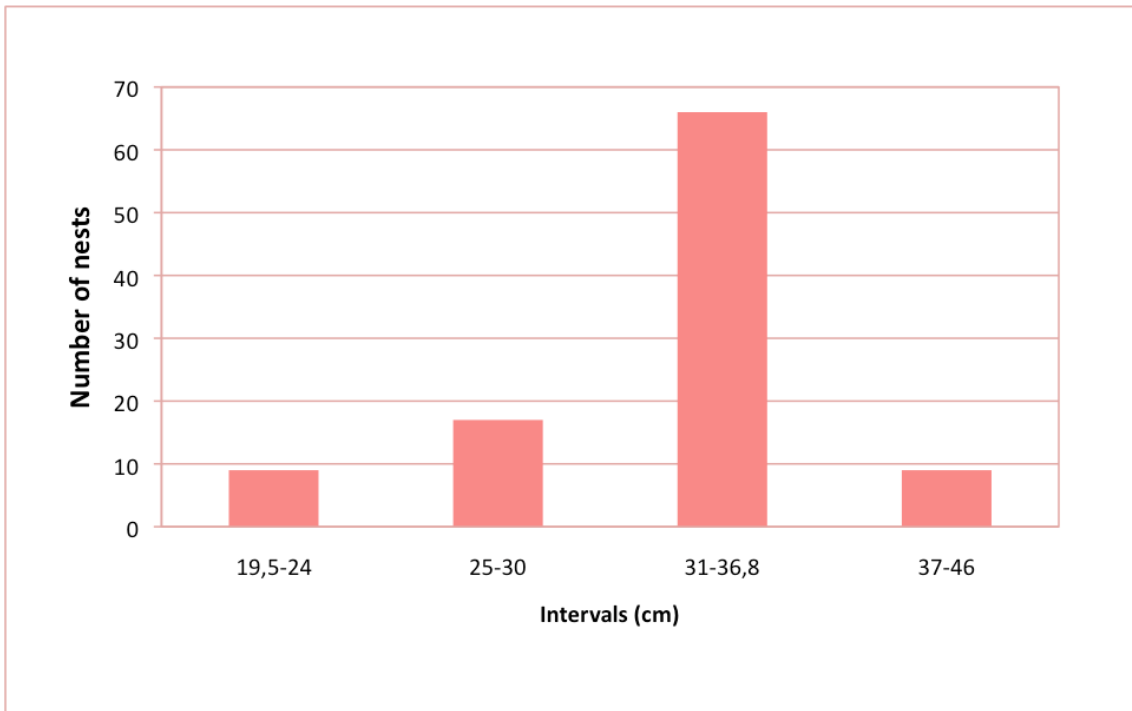


Figure 7: Intervals of external diameter of the Caribbean flamingo nests in Los Olivitos.

The external diameter of the nests had an average of  $31.96 \pm 4.18$ , with maximum values of 46 cm and minimum values of 19.5 cm, of which 66% of the nests had diameters between 31 and 36, 8 cm, followed by a 17% interval between 25 and 30 cm; the intervals of 37 to 46 cm with 9% and finally the interval of 19.5 to 24 cm with 8% (Figure 7). The category of external diameter that

concentrated the greatest number of nests was that of the intervals of 31 to 36.8 cm, and the smallest quantity was that of the intervals of 19.5 to 24 cm and 37 to 46 cm. The average structure of Caribbean flamingo nests in Wildlife Refuge and Fishing Reserve Ciénaga Los Olivitos is 39.5 cm high, with an internal diameter of 23.63 cm and an external diameter of 31.96 cm (Figure 8).





Figure 8: Average measurements of Caribbean flamingo nests in the Wildlife Refuge and Fishing Reserve Ciénaga Los Olivitos.

## Discussion

Sosa and Martín (2011), refer to the Laguna Llanquanelo Provincial Reserve in Argentina, which for the Chilean flamingo (*P. chilensis*), the number of nests found in this reserve exceeds those found in the refuge, with a total of 13,866 nests (all with signs of occupation), on an area of 10,800 m<sup>2</sup>, smaller than that occupied by flamingos in Los Olivitos and an approximate density of nests of 1.3 n / m<sup>2</sup>, the average of the external diameter of the nests (referred to these authors as internal diameter) was smaller with a value of 29.72 cm, while the average height of the nests was greater with 33.7 cm.

Porter and Forest (1974) refer to St. Lucia Lake in South Africa that for the greater flamingo (*P. roseus*), the approximate number of nests was 6000, the internal diameter of the nests was from 14.3 cm to 21 cm; the external diameter was 25.8 cm to 38.2 cm; the nest depression was 2 cm to 3.5 cm with a height of 1 cm to 8.7 cm. The variations between the dimensions of the nests between Chilean, greater and Caribbean flamingos is related to the size of the clutches, since usually the females of Caribbean flamingos only lay one egg, but in some nests of greater flamingos in South Africa, two eggs were found in the same nest (Porter and Forest, 1974). In turn, the size of the eggs varies according to the species; for Caribbean flamingos the average size of the eggs is 7.78 cm long and 4.41 cm wide and for greater flamingos was 8.9 cm long and 5.4 cm wide (Porter and Forest, 1974). The size of the nests is influenced by the size of the individuals of the species (it is positively correlated with the size of the species), since the individuals of the austral flamingo tend to be of smaller size than the individuals of the Caribbean flamingo and these in turn smaller than the individuals of the pink flamingo, which is the largest subspecies of flamingos of all (Bradford, 2014).

## Conclusions

The nesting site of this flamingo species for the reproductive period 2013-2014, occupied an area of 2.9 ha, with a nest density of 0.3 n/m<sup>2</sup>, the nesting population of Caribbean flamingos in Los Olivitos has 83% of active nests and 17% of inactive nests. The type of substrate that composes the nests is clay-loam, characteristic of flood-prone environments and the other elements consist of feathers, shells and inclusions of eggs without hatching, which indicate their reconstruction. The variation of the dimensions of the nests between Caribbean and Chilean flamingos is related to the size of the nest and that of the eggs, as well as the size between the species.

## Acknowledgements

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