

Population Abundance and Feeding Annotations for *Milvago chimachima* (Aves: Falconidae) in Santiago de Tolu, Sucre, Colombia

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Abstract

Objective: To document the presence of *Milvago chimachima* in the urban center of Santiago de Tolu, Sucre, Colombia, as a regular inhabitant, while determining its density and area of action, taking notes on its feeding habits and exploring reproductive and population aspects for the two seasons: rainy and dry. **Methods/Statistical Analysis:** This study was carried out in the urban area of Santiago de Tolu, Sucre Department, Colombia in the southern region of the Colombian Caribbean. The observations were made during six months of the year 2017, three months in the dry season and three months in the rainy season; two areas were selected, each with 24 ha and four sighting points were established using the synchronized total sampling method, with a total sampling effort of 384 hours. Variance analysis and Duncan's test was applied and the density was determined directly. **Findings:** The population density was between 0.333 and 0.416 Ind/ha for both adults and juveniles, with significant differences for the area and season. The area of action was between 2.4 and 3.0 ha/Ind and the *M. chimachima* feeding habits agreed with that recorded for the species, which is classified as an opportunistic, generalist scavenger hunter. Interspecific coprophagy has been reported. **Application:** The findings of this study expand the knowledge on the ecology and behavior of this falconiform species with urban occurrence and a wide presence in the Colombian Caribbean.

Keywords: Behavior, Caribbean, Colombia, Falconiform, Population, Urban Environment

1. Introduction

In urban areas, there is varied availability of environmental resources that are appropriate for feeding, nesting and shelters for many species of wild birds¹. However, for certain bird species with a lower tolerance to anthropic environments, negative environmental impacts, such as pollution, noise, traffic and even the presence of domestic animals, can affect population numbers². In general, raptors show relative adaptation to environmental transformations that occur with increased human activity, which can comparatively favor their presence in these environments³.

M. chimachima, locally known as "Pigua", is a species of the Falconidae family, subfamily Falconinae, Caracarina

tribe, with a wide geographic distribution. It is found from the south of Costa Rica through Colombia, Guyana and Trinidad, east of Bolivia and Brazil to Paraguay and north of Argentina and Uruguay, except Chile^{4,5}. In Colombia, it is found throughout the national territory, except in the Department of Narino, up to 1,800 meters above sea level⁶. It is cataloged by IUCN as LC (Least Concern).

It has common occurrence in open lands, frequently observed on trees, walking on roads and on the banks of bodies of water; it is an omnivorous and opportunistic species, which can include carrion, live prey, and some plants in its diet, including ticks that it extracts from cattle or wild mammals, as well as insects and small fish^{6,7}. It has also been reported as a consumer of corn seeds, tadpoles, frogs, crabs, nesting birds and even horse manure⁸.

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This study documented the presence of *M. chimachima* in the urban area of Santiago de Tolu, Sucre, Colombia, as a regular inhabitant and, at the same time, determined its density and home range, took notes on its feeding habits and explored reproductive and population aspects for the two seasons: Rainy and dry.

2. Materials and Methods

2.1 Study Area

This study was carried out in the urban area of Santiago de Tolu, Sucre Department, Colombia, located at 9°31'59"N and 75°34'59"W, in the southern region of the Colombian Caribbean, on the shores of the Gulf of Morrosquillo, at sea level; an area phytoclimatically classified as a tropical dry forest⁹. The sampling were carried out by dividing the urban area into two quadrants, each with an area of 24 ha (300 x 800 m), identified with N for the northern zone and S for the southern zone (Figure 1).



Figure 1. Study area. Google Earth (Free version).

2.2 Population Sampling

Within each of the two selected areas, four observation points were established, corresponding to the coordinates indicated in Table 1. The observations were made during six months of the year 2017, three months in the dry season: February to April and three months in the rainy

season: October to December; using the synchronized total sampling method¹⁰⁻¹⁴, with eight observers at each point at the same time. An observation session was carried out for each of the eight established points weekly: Between 06:00 and 08:00^{15,16}, with a total sampling effort of 384 hours.

Table 1. Sampling points for the two study areas

Zone	Point	North	West
North	1	9°31'08''	75°35'10''
	2	9°31'01''	75°34'40''
	3	9°31'22''	75°35'01''
	4	9°31'18''	75°34'50''
South	1	9°31'35''	75°34'39''
	2	9°31'29''	75°34'46''
	3	9°31'50''	75°34'55''
	4	9°31'47''	75°34'43''

2.3 Feeding

General observations was made with binoculars (10-30 x 50) during the sighting sessions, recording the detected feeding events and determining the frequency of consumption for each food item.

2.4 Class Determination

The differentiation of immature individuals from mature individuals were carried out by taking into account the fact that juvenile upper bodies are brown and that the lighter parts observed in adults are brownish with black-brown coloring^{17,18}.

2.5 Data Analysis

The data was organized in tables for a better understanding of the results. Variance analysis and Duncan test was applied to the population variables. The density and the area of action were determined directly¹⁹.

3. Results

Table 2 shows the number of individuals per study area and time of year, as well as the calculated density and home range.

In terms of density, both the adults and juveniles showed significant differences for area and time of year (Table 3). The Duncan test for the adults and juveniles by

zone are shown in Table 4. Juveniles was observed flying with parents in only the first part of the year (February-April).

For food, domestic food waste was mostly observed, which was obtained from open-air containers located in the urban area, left by residents for eventual trash collection. In the first quarter, which coincides with the mango harvest, they were observed consuming ripe fruits. Another important food item included dead fish left by the tide, primarily consumed in the morning hours. Consumed palm fruits included *Elaeis oleifera* and *Bactris guineensis*. The carrion included a dead domestic dog; and the other hand *Campylorhynchus griseus* chicks and eggs were consumed (Table 5).

4. Discussion

M. chimachima, as do other species of birds of prey, persists in urban areas despite environmental changes to the original landscape²⁰. In Porto Alegre, Brazil, this species is constantly observed and its presence is associated with the surrounding agricultural matrix¹⁵, with the greatest presence of the Falconiformes and urban bird class¹⁶. The same association has been made for this species in the city of Sincelejo, Colombia²¹.

The average density reported for the urban area of Sincelejo, Colombia was 4.9 ind/ha²¹, which, when compared to the range obtained in this study of between 0.333 and 0.416 ind/ha, is much higher, as is the existing estimate for Parque Nacional Tayrona, Colombian Caribbean with an average density of 1 ind/ha¹². It is clear that high densities may be related to habitat quality factors, specifically they can be associated with factors that include surrounding wooded areas that constitute a predominant refuge in highly degraded landscapes¹³, as well as surrounding productive agricultural landscapes that offer benefits to birds, especially raptors¹⁵.

The area of action found in this study was between 2.4 and 3.0 ha/ind, which is within the normal range for this species, whose value ranges from 0.012 to 5.34 ha/ind^{2,13,21}. It should be noted that the area of action of raptors is influenced by the abundance of prey, the access to prey and the state of conservation of the local vegetation^{10,11}.

The observation of juveniles flying with parents from February-April led to the conclusion that the breeding season begins in the intermediate period between the rainy and dry seasons since there is a courtship and nesting time of at least 30 days (personal observation); there is also an incubation period of 26-27 days and an incipient period of 32-34 days⁴, with effective exit from the nest in approximately 30 days²². In Brazil, in the Cerrado region, the nest appears in the month of August²²; similarly, in Sincelejo, Sucre, Colombia, located 40 km away from the study area, two nests was found on July 23, 2009. However, for this species, the reproductive season is prolonged⁴, which could explain the differences in dates between the two Caribbean zones that are 40 km apart.

On the other hand, it was striking that there were no significant differences between the two seasons of the analyzed year, which makes it possible to identify this *M. chimachima* population as a resident and in equilibrium²³. However, it is necessary to clarify the relationships between habitat quality and the population state of some species of raptors, such as *M. chimachima*, which are sometimes not clear enough to affirm whether the populations are at any risk⁸.

In general, the feeding habits of *M. chimachima* were in accordance with what has been recorded for this species, which is classified as an opportunistic, generalist scavenger hunter. On the other hand, it is known that, among raptors, neotropical caracara hawks are recognized for their foraging versatility²⁴ and their variable diet, which includes fish and mainly consists of carrion^{7,25}. The consumption of fruits and grains has been reported⁸.

Table 2. Number of individuals by area according to time of year and calculation of density and home range

Zone	Season	Area (ha)	Adults	Density (ind/ha)	Juveniles	Density (ind/ha)	Total density (ind/ha)	Total home range (ha/ind)
North	Rainy	24	7	0.291	2	0.083	0.375	2.66
South	Dry	24	7	0.291	3	0.125	0.416	2.40
North	Rainy	24	9	0.375	0	0	0.375	2.66
South	Dry	24	8	0.333	0	0	0.333	3.00

Ripe mango fruit, a fruit tree with common occurrence in the study area, consumption was observed.

Table 3. Analysis of comparative variance by age group for area and time of year

Adults				
Source	DF	SCT	F-Valor	Pr > F
Zone	1	0.287	0.89	0.03
Season	1	0.105	0.33	0.04
Juveniles				
Source	DF	SCT	F-Valor	Pr > F
Zone	1	0.538	6.36	0.01
Season	1	2.44	28.89	<.0001

Table 4. Duncan's test for the adults and juveniles by zone

Adult grouping	Mean	N	Zone
A	0.18829	94	Norte
B	1.80208	96	Sur
Juveniles grouping	Mean	N	Zone
A	0.17021	94	Norte
B	0.06250	96	Sur

Table 5. Food consumed by the *M. chimachima* adults and juveniles

Item	N	F (%)	Adults	Juveniles
Domestic food waste	25	33.3	X	X
Mango fruits	16	21.3	X	X
Dead fish	15	20.8	X	X
Palm fruits	14	18.6	X	
Carrion	2	2.6	X	X
Chicks	1	1.4	X	
Eggs	1	1.4	X	
Dry cow manure	1	1.4	X	X
Total	75	100		

For the observed coprophagy of cow feces, there is no particular record; however, the consumption of horse feces has been reported⁸. Interspecific coprophagy or ingestion of the feces of other species, has occurred in several species of vertebrates²⁶. Interspecific coprophagy contributes to diet because it can provide, in addition to minerals, other important nutritional compounds^{4,27}.

5. Conclusions

The evaluated population parameters are adjusted to those determined for this falconiform species, reaffirming its adaptability in general.

The presence of juveniles, especially as observed in the dry season and flying with parents, led to the conclusion that, in this study area, the reproductive stage occurs at the beginning of the year, which differs with results from bordering areas and reaffirms the idea that the reproductive period of this species is prolonged.

Finally, adaptation of the feeding behavior to urban environments was observed, as evidenced by the consumption of domestic organic waste; it is also evident that he possesses interspecific coprophagy.

6. References

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