












New records of jaguarundi (*Herpailurus yagouaroundi*) in the Maya Forest, Mexico

Nuevos registros de jaguarundi (*Herpailurus yagouaroundi*) en la Selva Maya, México

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ABSTRACT

Herpailurus yagouaroundi is considered a common felid in the Americas, however, its knowledge is limited. The objective of this note is to provide data on the presence, behavior and activity patterns of this species in the Maya Forest of Mexico. Between 2021 and 2023, 85 photo-trapping stations were installed in Calakmul, Campeche, Mexico, as part of the wildlife monitoring conducted in this municipality. Opportunistic collections of roadkill were made in the study area. With a cumulative sampling effort of 11,702 days/camera, 55 photographs of *H. yagouaroundi* were obtained, of which 33 correspond to independent events. Of the total number of records, 66.67% occurred in anthropogenic sites, and the remaining 33.33% in conserved areas. *H. yagouaroundi* presented a predominantly diurnal activity pattern. The records reported in this note show the presence of *H. yagouaroundi* at several sites in the Maya Forest, Campeche, Mexico.

Keywords: Carnivores; conservation; felines; monitoring; photo-trapping, southeast Mexico.

RESUMEN

Herpailurus yagouaroundi es considerado un felino común en América, sin embargo, su conocimiento es limitado. El objetivo de esta nota es proporcionar datos sobre la presencia, comportamiento y patrones de actividad de esta especie en la Selva Maya de México. Entre 2021 y 2023 se instalaron 85 estaciones de fototrampeo en Calakmul, Campeche, México, como parte de los estudios de fauna silvestre que se realizan en este municipio. De manera oportunista se colectaron individuos atropellados en el área de estudio. Con un esfuerzo de muestreo acumulado de 11,702 días/cámara, se obtuvieron 55 fotografías de *H. yagouaroundi*, de las cuales 33 corresponden a eventos independientes. Del total de registros, el 66,67% ocurrieron en sitios antropogénicos, y el 33,33% restante en áreas conservadas. *H. yagouaroundi* presentó un patrón de actividad predominantemente diurno. Los registros reportados en esta nota muestran la presencia de *H. yagouaroundi* en varios sitios de la Selva Maya, en Campeche, México.

Palabras clave: Carnívoros; conservación; felinos; monitoreo, fototrampeo, sureste de México.

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INTRODUCTION

The jaguarundi (*Herpailurus yagouaroundi*) is a small to medium-sized carnivorous mammal belonging to the Felidae family (1). It measures between 50 and 70 cm, and weighs between 3.5 and 7.6 kg, up to 11 kg in captivity (2). It has a flat, elongated, and shallow skull, the ears are small and rounded and the limbs are proportionally shorter in relation to their length (3). It has 2 shades of color, a reddish and dark gray, gray individuals are more common (4). It is a solitary animal, terrestrial in habits, and generally diurnal (1,4). It feeds mainly on small mammals, but its diet also includes birds (it has been identified as a predator of chickens; 4), reptiles, fish, insects and vegetables, and puma (*Puma concolor*) has been reported to prey on this species (2,5).

Herpailurus yagouaroundi is a species of great plasticity, with a continuous distribution in the Americas ranging from the southern United States to northern Argentina (4,6). In Mexico, it is distributed along the Pacific slope, from Sonora to Chiapas, and along the Atlantic slope, from Tamaulipas to the Yucatan Peninsula (1). It inhabits a wide variety of tropical and subtropical habitats (except arid and cold areas), from sea level to 3,200 m altitude. It prefers areas with dense shrub and tree cover, and they are rarely found deep in closed canopy sites. Its presence has also been recorded in open environments, even with some degree of disturbance (7).

Information on the ecology and natural history of *H. yagouaroundi* in Mexico is relatively scarce. Most studies conducted in the country focus on its distribution and records (8), abundance (9) home range, coexistence (10) genetics (11) and diet (5). Globally, the species is listed as “Least Concern (LC)” according to the International Union for Conservation of Nature (IUCN) (6), while, in Mexico, it is in the “Threatened (A)” category by the Mexican Official Standard NOM-059-SEMARNAT-2010, (12). This note provides information on the presence, behavior and activity patterns of *H. yagouaroundi* in the Selva Maya, Campeche, Mexico, using camera-traps.

MATERIALS AND METHODS

The study was conducted in the portion of the Maya Forest, is located within the Yucatan Peninsula, to the southeast of the state of Campeche. It is part of the Greater Calakmul Region, which includes the Maya Biosphere Reserve in Guatemala and the Río Bravo Dos Milpas conservation area in Belize. It has an area of 723,185.12 ha. The CBR has a warm and subhumid climate (Aw), with an average annual temperature of 24.6 °C. The maximum height is found on the Champerico hill (390 m.a.s.l.), while the minimum height varies from 100 to 150 m. The dominant vegetation types are medium sub-evergreen forests, medium subdeciduous forests, and low sub-deciduous forests.

The data were obtained between April 2021 and August 2023, using 85 photo-trapping stations. A Bushnell (TropyCam; Outdoor Operations LLC.), Browning (Strike force; Browning Trail Cameras.), or Cuddeback (Cuddeback IR; Non-Typical Inc.) digital camera-trap was installed at each station. The study was part of a jaguar monitoring program carried out by WWF (World Wildlife Fund) in the Maya Forest, so the spacing between cameras was kept to a minimum of 2 km. The cameras were tied to a tree trunk at a height of 40-50 cm from ground level and were programmed to take three photographs per detection with five-second intervals between series, 24 hours a day (13). All stations were georeferenced using a GPS model 64sx (©Garmin Ltd.). Subsequently, they were checked monthly to corroborate the correct functioning of the devices, replace batteries and extract the information stored in the memory card.

For the analysis, the following cases were considered as independent records: a) consecutive photographs of different individuals of the same species, and b) consecutive photographs of the same species separated by 24 hours (14). Species activity patterns were analyzed and plotted using the “overlap” package in R Studio software version 4.1.1 and categorized using the methodology described by Monroy-Vilchis et al (14).

RESULTS

With a cumulative sampling effort of 11,702 days/camera, 55 photographs of *H. yagouaroundi* were obtained, of which 33 correspond to independent records (Figure 1; Table 1). The data indicate that, of the total number of independent records, 66.67% ($n = 22$) were obtained in anthropogenized sites, while the remaining 33.33% ($n=1$) corresponded to conserved forest. On the other hand, we found that *H. yagouaroundi* showed a diurnal activity pattern, with 72.72% ($n =24$) of the capture events between 13:00-14:00 hr and 16:00-17:00 hr (Figure 2). Additionally, 4 records of roadkill were collected opportunistically on the road network of the Maya Forest (Figure 3).

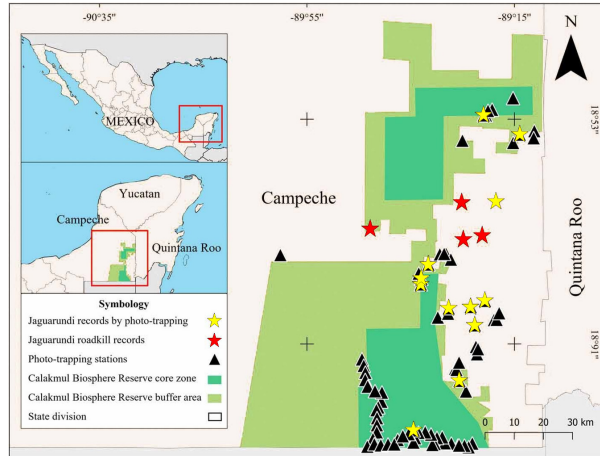


Figure 1. Location of independent records of jaguarundi (*Herpailurus yagouarundi*) in the Maya Forest, in Campeche, Mexico.

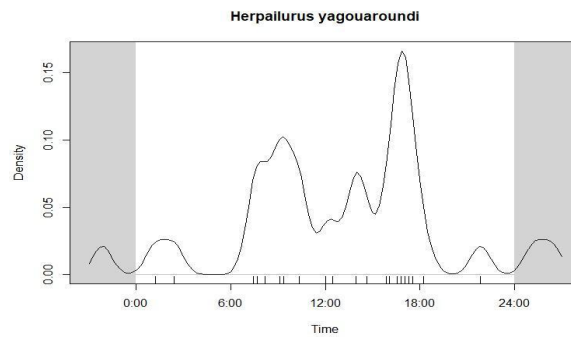


Figure 2. Graphical representation of estimated activity patterns for *Herpailurus yagouarundi* in the Maya Forest, in Campeche, Mexico.

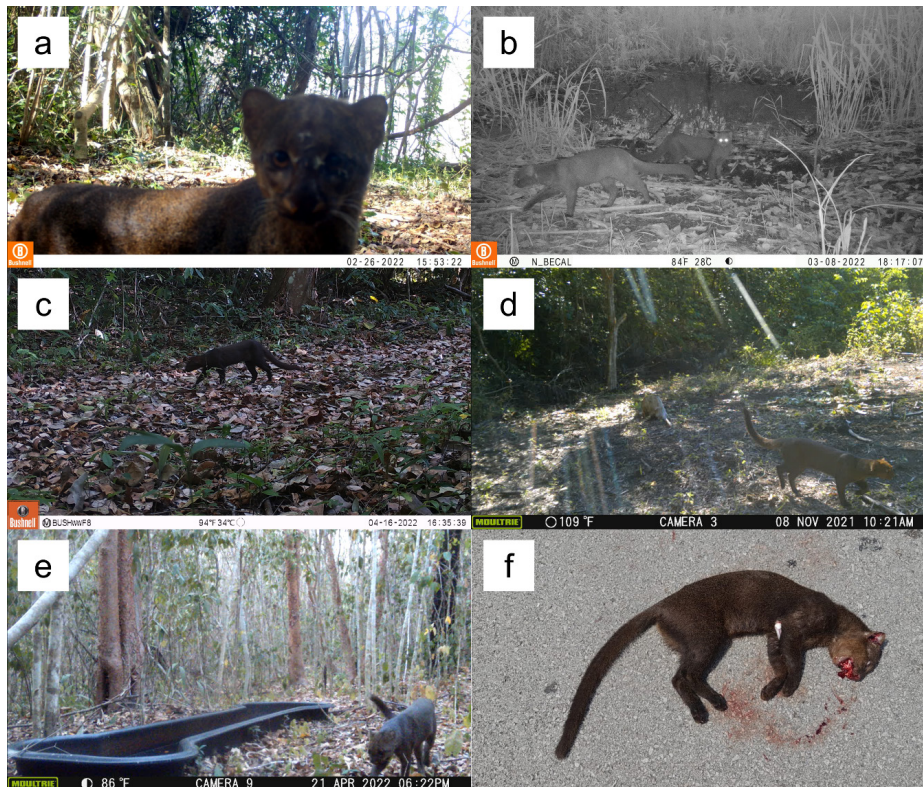


Figure 3 a) *Herpailurus yagouarundi* in Narcizo Mendoza; b) female with calf in Nuevo Becal; c) individual walking in the Mexico-Guatemala border area; d) *Herpailurus yagouarundi* in Valentín Gómez Farías in a logged jungle area; e) *Herpailurus yagouarundi* using artificial drinking troughs; f) jaguarundi run over on federal highway 186 (Xpujil).

Table 1. Independent records of jaguarundi (*Herpailurus yagouarundi*) in the Maya Forest, Campeche, Mexico.

Location	Coordinates	Records	Year	Type of record	Type of site
Xpujil	18.487429 -89.408408	1	2021	Roadkill	-
Centauro del Norte	18.377923 -89.552424	2	2022	Phototrapping	Conserved
Centauro del Norte	18.407209 -89.520997	1	2022	Phototrapping	Anthropogenized
Centauro del Norte	18.342973 -89.545713	1	2022	Phototrapping	Anthropogenized
Kilómetro 120	18.517271 -89.774944	2	2022	Phototrapping	Conserved
La Victoria	18.210786 -89.371013	1	2022	Phototrapping	Anthropogenized
Ley de Fomento	18.031627 -89.420737	1	2022	Phototrapping	Anthropogenized
Manantial	18.289873 -89.338286	1	2022	Phototrapping	Anthropogenized
Manantial	18.270175 -89.384287	1	2022	Phototrapping	Anthropogenized
Mancolona	18.826745 -89.225684	1	2022	Phototrapping	Anthropogenized
Nuevo Bécál	18.609717 -89.302477	1	2022	Phototrapping	Anthropogenized
Nuevo Bécál	18.609443 -89.285944	1	2022	Phototrapping	Conserved
Valentín Gómez Farias	18.517178 -89.285944	6	2022	Phototrapping	Conserved
Centauro del Norte	18.361112 -89.545024	7	2023	Phototrapping	Anthropogenized
Carretera Xpujil-Belha	18.606347 -89.413013	1	2023	Roadkill	-
Carretera Xpujil-Conhuas	18.521503 -89.709485	1	2023	Roadkill	-
Carretera Xpujil-Quintana Roo	18.499938 -89.347532	1	2023	Roadkill	-
Centauro del Norte	18.361056 -89.543609	3	2023	Phototrapping	Anthropogenized
Dos Lagunas Norte	18.888811 -89.342267	1	2023	Phototrapping	Anthropogenized
Narciso Mendoza	18.265725 -89.455350	2	2023	Phototrapping	Anthropogenized
Reserva de la Biosfera Calakmul	17.871392 -89.568400	1	2023	Phototrapping	Conserved

DISCUSSION

Most of the records of *H. yagouarundi* reported in this note were obtained in anthropogenized sites (66.67%; n=22). The above can be attributed to the fact that these felids have a high capacity to adapt to different types of habitats, which include sites altered by humans, such as agricultural plantations, pastures and suburban areas (7). Similarly, these disturbed environments often provide them with more accessible food resources such as small rodents, lizards and poultry (15), as well as less competition with other predators such as jaguars and pumas (2,4,5).

Considering that 10.81% (n=4) of the records correspond to individuals that have been run over, it suggests that roads in the Maya Forest could impact the survival of the species when moving from one fragment to another. These mammals can walk a long way in search of food, mates, or shelter, which increases the probability of roadkill when they attempt to travel along roads in their dispersal process (16). Likewise, because they are small, they can go unnoticed by drivers, which increases the risk of fatal accidents (17).

With respect to activity patterns, we observed that *H. yagouarundi* presented a diurnal behavior, with two marked activity peaks, the first at 10:00 hr and the second at approximately 17:00 hr. The above coincides with what has been reported in previous studies on the species in the states of Oaxaca (18) and Tamaulipas (6) in Mexico, as well as for the department of Santa Cruz in Bolivia (19). *Herpailurus yagouarundi* shows increased activity during the day, which is unusual compared to other wild felids that tend to be more crepuscular or nocturnal (20). This adaptation is closely related to the availability of prey and the need to avoid competition with other predators (9).

Despite its wide distribution in the continent (6), *H. yagouarundi* is the least studied felid in the Americas, and the least known by society in general (17). For this reason, it is important to continue conducting studies that help to understand more about their ecology, behavior and distribution to develop effective conservation strategies to protect these cats and their habitats.

Conflict of interest

We declare that we have no conflicts of interest with respect to the work presented in this note.

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Contribution authors

FMC-M, LC-R and SP conceived the research. FMC-M, DJ-E, JMM-T, PB-R, KS-P, OH-Z, JG-M, GM-P, GM-SM gathered the data. JM-T, FMC-M and KS-P analyzed the data and drafted the manuscript. LCR, KS-P and FMC-M edited and gave input to the final version of the manuscript. All authors reviewed the manuscript. All authors have read and agreed to the published version of the manuscript.

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