

## JAGUAR CONSERVATION IN THE REGION OF TAIAMÃ ECOLOGICAL STATION, NORTHERN PANTANAL, BRAZIL.

### CONSERVAÇÃO DA ONÇA-PINTADA NA REGIÃO DA ESTAÇÃO ECOLÓGICA DE TAIAMÃ, PANTANAL NORTE, BRASIL.

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#### ABSTRACT

The Taiamã Ecological Station is an area of 115,55km<sup>2</sup> in the Pantanal biome and is located in the municipality of Cáceres, Mato Grosso, Brazil. The station is also situated inside an area of great population density of jaguars. Georeferenced images of *Panthera onca* were taken in the rivers located around and at the borders of the station, with 27 distinct individuals recorded over several years. These photographic records, along with information obtained from the literature, make it plausible to assume that the station's current area is not sufficient to legally protect the feline population in the region. This study suggests an increase in the size of this conservation unit.

**Keywords:** Felidae, *Panthera onca*, Conservation Unit.

#### RESUMO

A Estação Ecológica de Taiamã, situada no Pantanal Matogrossense, município de Cáceres, com área total de 115,55km<sup>2</sup>, está localizada no centro de uma das áreas de grande concentração de onças-pintadas no Pantanal. Imagens georreferenciadas de *Panthera onca* foram obtidas nos rios que ficam no entorno e na borda da Estação, sendo que os registros fotográficos permitiram identificar 27 indivíduos distintos ao longo de vários anos. Através destas informações, e da comparação com informações obtidas na literatura, é possível supor que a área total protegida pela ESEC de Taiamã não é suficiente em tamanho para proteger legalmente a população deste felino na região, sugerindo a necessidade de ampliação da área desta Unidade de Conservação.

**Palavras-Chave:** Felidae, *Panthera onca*, Unidade de Conservação.

#### Introduction

The Taiamã Ecological Station (TES) in the Pantanal biome, a Federal conservation unit with full protection status, is located in the municipality of Cáceres, Mato Grosso, Brazil, and corresponds to the Taiamã Island, which covers an area of 115,55 km<sup>2</sup> (Fig. 01). Constituted primarily of flooded plains, the area has a great diversity of aquatic environments,

and is strongly influenced by the seasonality of the Paraguai River. Sararé Island, contiguous with Taiamã Island, is land owned by the Brazilian government (Fig. 5). Currently, Sararé Island is being considered to be included in an increase in the area of the TES. Around the station there is a private reserve, RPPN Jubran (Fig. 5), with an area of 355,31 km<sup>2</sup>.

The region where the Taiamã and Sararé islands are located is well known for frequent jaguar

(*Panthera onca*) sightings, mainly by tourists, professional fishermen, researchers and environmental agents. Jaguar sighting and sport fishing are the main tourist attractions of the region.

The jaguar, a species considered to be 'near threatened' (NT) by extinction (IUCN 2012), is the largest extant feline of the Americas. This species can be considered to be currently extinct in North America, the Mexican lowlands, El Salvador, Uruguay and developed regions in Brazil (MORATO et al., 1998; LEITE, 2000), mainly due to habitat loss and hunting. The Pantanal, the largest humid tropical area of the planet with 147,574 km<sup>2</sup>, is considered an important area for the conservation of jaguar (SANDERSON et al., 2002; SOISALO; CAVALCANTI, 2006; CAVALCANTI et al., 2012). In the Pantanal biome, larger populations of *P. onca* are found mainly in the central-northern area and in the southern limit of the region (Fig. 1). These areas are considered of the utmost importance for the long term preservation of this large feline (QUIGLEY; CRAWSHAW, 1992). Considering that the TES is located in the center of an area in the Pantanal with a great concentration of jaguars, and that there has been conflict between the felines and the cattle ranchers that have been hunting them (SOSLAIO; CAVALCANTI, 2006), this study aims to relate the observed jaguar population data to the legally protected area of the TES, so as to guarantee the preservation of this species in the region.

### Materials and Methods

The georeferenced images were taken between 2006 and 2011, usually between August and November, during fluvial excursions in the rivers around and bordering the station. The animals were observed on both margins of the rivers that feed the TES and Sararé Island. A few images were obtained with photographic traps. The traps with digital cameras and infrared sensors (*Tigrinus Equipamentos para Pesquisa Ltda, SC, Brazil*) were set in areas with frequent jaguar sightings, and monitoring occurred at intervals of 7 to 10 days.

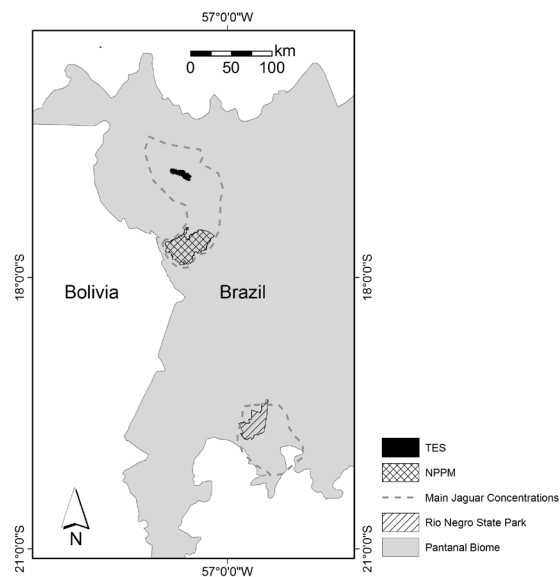
There is no quantification of the sampling effort in this study, since the images were obtained during routine activities of employees of the conservation unit. Furthermore, it is almost impossible to quantify the efforts of the collaborators. However, the authors

concede that the image sampling efforts were greater during 2010 and 2011.

The photographic records obtained were taken in a manner so as to enable the observation of the spot pattern on the animal's forehead, which allows the identification of each individual of *P. onca*, and, where possible, its gender. The need to adopt a standard of comparison between all individuals was justified by the great interindividual variation and the existence of previously catalogued jaguar images. Photographic records that did not allow for an individual's identification were discarded.

A significant portion of the information used in this study was kindly given by professional photographers, tour guides and researchers not directly involved in this project.

**Figure 1** - Partial map of the Pantanal biome, with the localization of the regions of higher jaguar concentration, according to Quigley & Crawshaw (1992), and conservation units in these areas



### Results

From a total of 50 photographic sightings, 43 occurring between August and November, it was possible to identify 27 individuals (13 males, 3 females and 11 undetermined) (Fig. 2). The jaguar recording events during this time period are presented in Figure 3.

The mean value of distinct individuals observed during 2010 and 2011 was of 10.5/year, and in each year there were 7 sightings of individuals not previously recorded (Fig. 3). Only 2 of the individuals recorded in 2010 were also recorded in 2011.

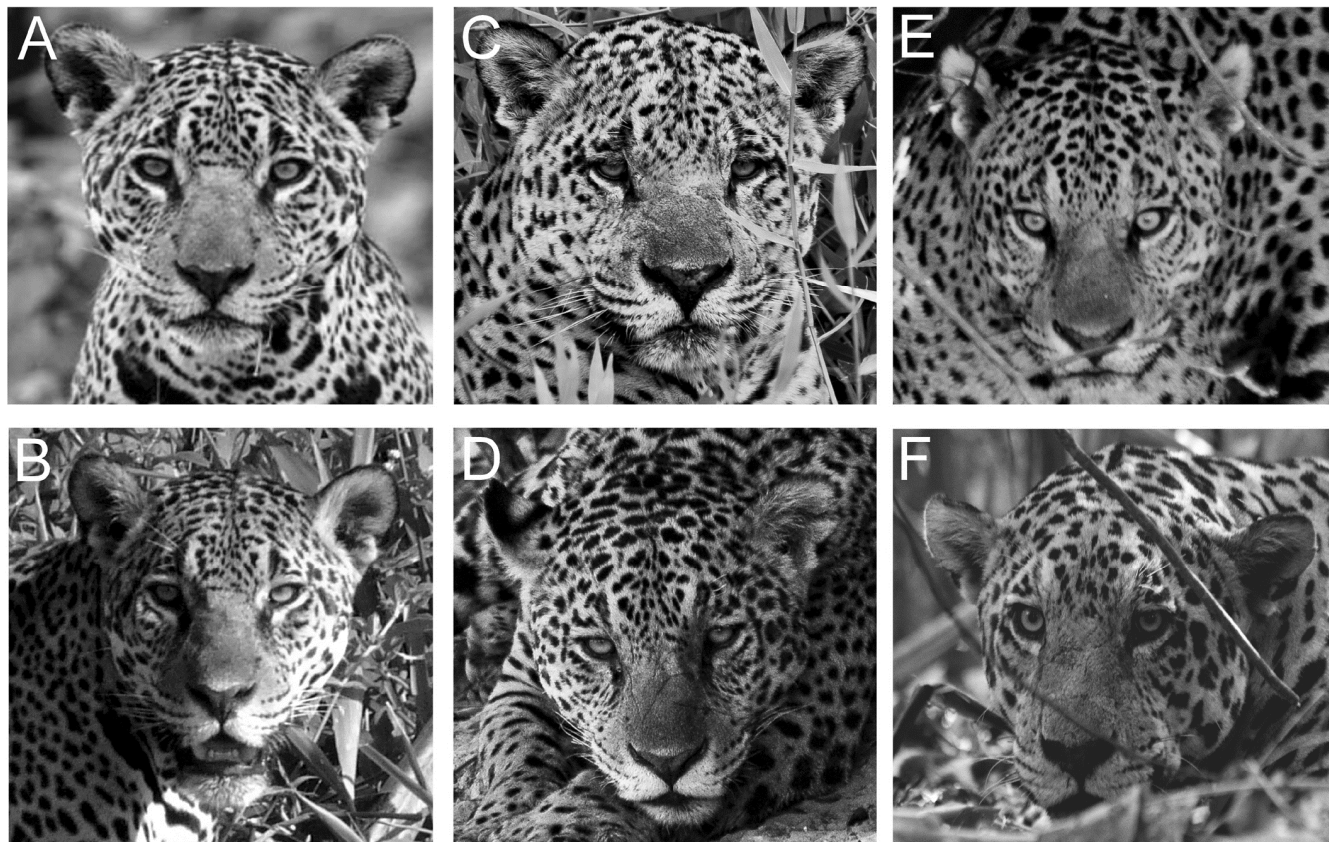
The sites where the *P. onca* individuals were recorded are represented in Figure 4.

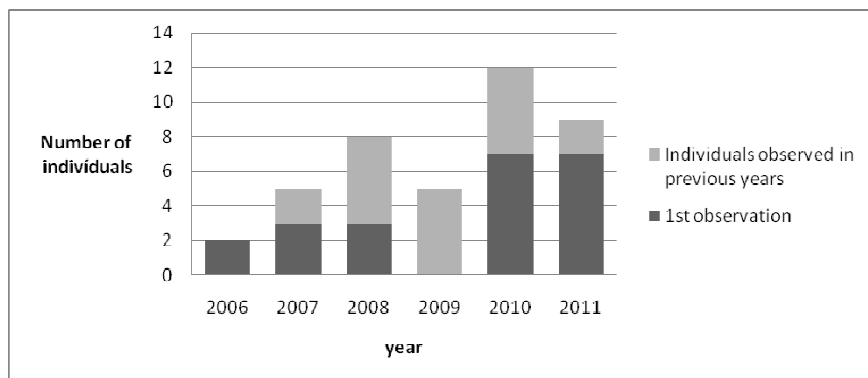
### Discussion

Of the 27 recorded jaguars in this study, it is likely that not all of them occupied the TES region

simultaneously, indicating that the local population is possibly smaller than the total number of individuals identified. However, it must be considered that not all the animals that were, or have been in the area, were sighted and recorded, making it difficult to estimate the population's size. Figure 3 shows that 12 and 9 individuals were

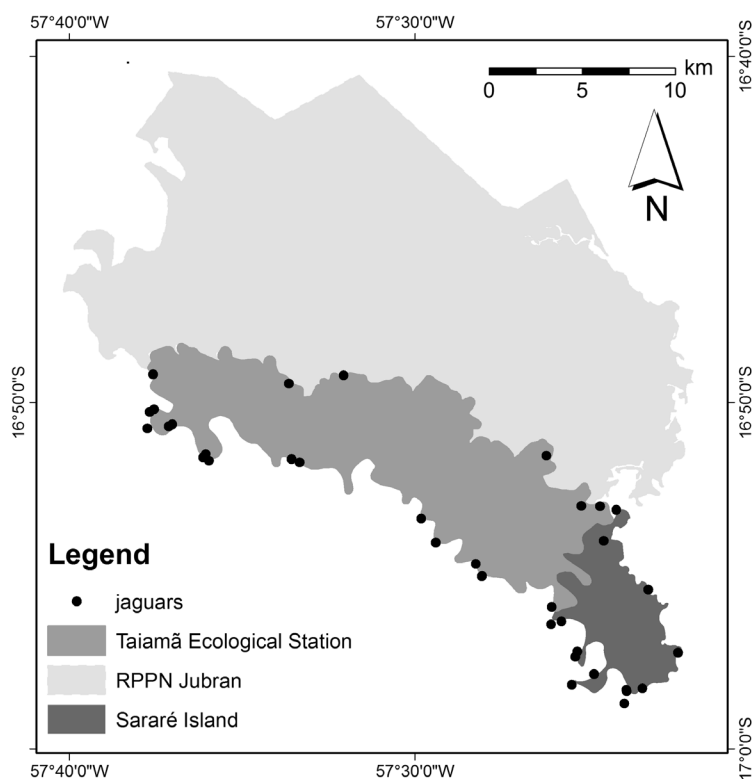
**Figure 2** - Photographic records of some jaguar specimens. A and B are records of the same individuals in distinct years (09/16/2009 and 08/29/2010, respectively). C, D, E and F are four distinct individuals. Photo credits: A – Adriano Gambarini; B, C, D, E and F – Kantek, D.L.Z.



**Figure 3** - Jaguar sightings through the years.

Identified in 2010 and 2011, respectively, with only 2 of them sighted in both years. The following factors should be considered: (1) the species is territorial (SCHALLER; CRAWSHAW, 1980) and thus does not show a tendency to undertake long migrations; (2) despite the difficulties of the sampling system, 6 of the recorded individuals were sighted in distinct years, with intervals of at most 4 years in nearby areas (less than 10km), confirming the territorial tendency suggested in the literature (SCHALLER; CRAWSHAW, 1980); (3) it is very unlikely that the majority of individuals that were recorded died from one year to the other

(SOSLAIO; CAVALCANTE, 2006), since the existing conflicts between felines and cattle ranchers occur outside the protected areas (AMANCIO et al., 2007); (5) although not objectively quantified, the study area has a high quantity of alligators and capybaras, which are considered as potential prey for jaguars in the Pantanal biome (CAVALCANTE; GESE, 2009); (6) the number of recorded individuals throughout the sampling period increased distinctively (Fig. 3) and it is likely that nowadays there are at least 10.5 specimens of *P. onca* in the study area, since that was the mean value for the number of recorded sightings during 2010-2011.

**Figure 4** - Map with the sighting localities of the recorded *Panthera onca* individuals.



The TES is located in the middle of one of the two great areas of jaguar population density (Fig. 1), and south of the TES is the National Park of the Pantanal Matogrossense (NPPM), with an area of 1,350km<sup>2</sup>, making a total of 1,465,55km<sup>2</sup> of federal protected area. There are some private reserves in the region, but they are conservation units for sustainable use and are characterized by a low degree of protection (CARVALHO JR; MORATO, 2013). No state or municipal conservation unit was created in this area so far. Of the Brazilian biomes that include jaguars, the Pantanal is the one with the least number of protected areas (SOLLMANN et al., 2008).

Quigley & Crashaw (1992) recommend that each of the two areas with the greatest population density of jaguars in the Pantanal (Fig. 1) (a central area with approximately 10,000km<sup>2</sup> and the other with approximately 5,000km<sup>2</sup>), have around 2,000 to 3,000km<sup>2</sup> of its area protected by law. By comparing these numbers, there are still 500km<sup>2</sup> missing to attain the minimum required for jaguar conservation in the central area. The increase in the TES area would be an opportunity to approach the recommended minimum, since it is located next to the central area of jaguar concentration (Fig. 1) and the current results suggest that there is a great population density in the rivers that delimit the TES. Apparently, the extraordinary abundance of the Pantanal's fauna (SWARTZ, 2000) is the probable food source for jaguar in the region where the station is located, since the only other food source in the Pantanal, cattle farming (SOSLAIO; CAVALCANTE, 2006), does not exist around the TES.

A literature review on the population density of jaguars in the Pantanal biome (ASTETE et al., 2008), indicated a mean density of 4.53 individuals per 100km<sup>2</sup>. Extrapolating this information for the TES area (115.55km<sup>2</sup>), the station is currently protecting 5.05 jaguars. The RPPN Jubran was not taken into account for this analysis since it has a low degree of protection and only 5 of the records (10% of the total) occurred at the border of this private reserve. Even if the areas being compared are different, although in the same biome and with several natural prey in common, the TES legally protected area is apparently not capable of guaranteeing the survival of the minimum population of 10.5 jaguars observed in the current study.

The habitat use by the jaguar reflects the movement and population density of its main prey (SCHALLER; CRAWSHAW, 1980; RABINOWITZ; NOTTINGHAM, 1986; CRAWSHAW; QUIGLEY, 1991), and not habitat availability. In the floodplains the jaguar moves between the habitats according to the water level, always following the transition zone between aquatic and land environments, where prey availability is greater (JUNK et al., 1989). The photographic records from this study were always at the river margins and, independently of the year when they were taken, were usually between August and November, months of the annual dry season of the watershed of the Paraguai River in the TES region. This indicates that the felines identified in this study followed the transition zone mentioned by Junk et al. (1989).

The interconnectivity between populations is of the utmost importance for the long term survival of a species (GILPIN, 1987). Much land was recently acquired for conservation in the northern Pantanal, which has created a mosaic of legally protected areas and private farms (CAVALCANTE et al., 2012). Between the TES and the NPPM there are no protected areas, neither private nor state owned. Thus, the expansion of the TES area would be the first step toward the creation of a legally protected ecological corridor between two fully protected conservation units that occur in a region of high jaguar concentration (Fig. 1). The Paraguai River, the main river of the Pantanal biome, connects these two protected areas and part of its limits is inside the central area of high jaguar concentration. Future efforts should concentrate on establishing more protected areas to form part of a mosaic of conservation units aiming to increase the effectiveness of this corridor, which is still well preserved. Initiatives such as this will contribute to avoiding the decline of the distribution and population density of jaguars within the Pantanal biome.

## Conclusion

The analysis described in this study indicates the need to expand the area of the Taiamã Ecological Station in order to better protect jaguars in this region.

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