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**A new record of margay *Leopardus wiedii* (Schinz, 1821)
in the Brazilian Caatinga domain**

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ABSTRACT

The margay is a small neotropical wild felid, typical of forested environments, with high arboreal skills. Near threatened worldwide, this species is considered Vulnerable in Brazil. We report a new record of *Leopardus wiedii* in the semi-arid Brazilian Caatinga domain, outside its known distribution area and approximately 350 km from the nearest known record for the species. The animal arrived in the Araripe-Apodi National Forest in 2015, after being handed over to the environmental police by local residents. Future research should investigate the ecology and population status of *L. wiedii* in this region to support efficient conservation strategies.

Keywords: mammals, semi-arid, small neotropical felids, threatened species, tropical dry forest

RESUMO - Um novo registro de gato-maracajá *Leopardus wiedii* (Schinz, 1821) no domínio da Caatinga brasileira

Leopardus wiedii é um felídeo neotropical de pequeno porte, com excelentes habilidades arbóreas e típico de ambientes florestais. Quase ameaçada mundialmente, no Brasil a espécie está na categoria Vulnerável. Relatamos um novo registro de *L. wiedii* no domínio da semiárida Caatinga brasileira, fora da sua área de distribuição conhecida e distante aproximadamente 350 km do registro mais próximo conhecido para a espécie. O animal chegou na Floresta Nacional do Araripe-Apodi em 2015, após ser entregue por moradores à Polícia Ambiental. Futuras pesquisas devem investigar a ecologia e o status populacional de *L. wiedii* na região para subsidiar estratégias de conservação.

Palavras chave: espécies ameaçadas, floresta tropical seca, mamíferos, pequenos felinos neotropicais, semiárido

The margay *Leopardus wiedii* (Schinz, 1821), is a small, solitary Neotropical felid with predominantly nocturnal habits and great arboreal ability (Oliveira 1998; Tor-

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tato et al. 2013). This species is widely distributed in the Neotropical region, where it occurs in Mexico, Central America, northern to southern Brazil, northern Uruguay, and Argentina (Emmons & Feer 1997; Tortato et al. 2013). Despite the wide extent of occurrence, the species' area of occupancy is considerably smaller (Oliveira et al. 2015), with many populations considered to be threatened by habitat loss and fragmentation, roadkill, retaliatory killing for poultry predation, and disease transmission by domestic carnivores (Tortato et al. 2013; Oliveira et al. 2015). The conservation status of the margay on the IUCN Red List is Near Threatened (NT) (Oliveira et al. 2015), but in Brazil, the country that harbors a large part of its range, the species is considered threatened, listed as Vulnerable (MMA 2022).

With high arboreal skills, the margay is typical of forested environments (Oliveira 1998; Tortato et al. 2013). Thus, it tends to be absent or rare in more open phytophysognomies that do not have large forest patches (Oliveira et al. 2015). In Brazil, it mainly occupies the tropical rain forests of the Amazon and Atlantic Forest, as well as patches of deciduous or semi-deciduous forests within the Cerrado (savanna) and Pampa (grassland) domains (Tortato et al. 2013; Oliveira et al. 2015; Meira et al. 2018). In the Caatinga dry tropical forest, the northeast limits of its distribution are not well-defined (Oliveira 1998; Meira et al. 2018).

The Caatinga is a biome in northeast Brazil with a semi-arid climate. It has a wide heterogeneity of phytophysognomies, ranging from patches of thorny bushes to dry forests (Albuquerque et al. 2012). In this biome, *L. wiedii* was historically considered absent or restricted to forest enclaves, and the extent of its occurrence is still unknown in several distribution maps (Oliveira 1998; Tortato et al. 2013; Oliveira et al. 2015). More recently, points of occurrence of the species in the Caatinga phyto-geographic domain have been published (Fernandes-Ferreira et al. 2015; Meira et al. 2018). However, such records are mostly in humid remnants of the Atlantic Forest embedded in the semi-arid zone, known as northeastern highland swamps (Feijó & Langguth 2013; Fernandes-Ferreira et al. 2015), or in association with Cerrado ecotone environments. However, records in the Caatinga proper have also been published (Meira et al. 2018).

The state of Ceará is fully encompassed in the Caatinga biome; therefore, it was not included in the range of the species for the latest national and international red list assessments (Tortato et al. 2013; Oliveira et al. 2015). Margay was confirmed in Ceará, but was restricted to only one region. Previously, the only record points are based on voucher specimens and interviews from the Environmental Protection Area (APA) of Serra de Baturité (Feijó & Langguth 2013; Fernandes-Ferreira et al. 2015), a relict of the Atlantic Forest influenced by the Caatinga and Amazon domains, located in the northern portion of the state (Moro et al. 2015). Due to its geographic restriction and evidence of historical population decline, *L. wiedii* has been categorized as Endangered (EN) by the Ceará Red List of Threatened Animals (SEMA 2022).

In this work, we report the record of a juvenile individual of *L. wiedii* in the Chapada do Araripe region, Ceará state, around 350 km south of the only known record of the species in Ceará, from the Serra de Baturité, and approximately 390 km east from the



species range considered by the IUCN (Oliveira et al. 2015). In 2015, the animal was delivered by residents to the Ceará Environmental Police Battalion and taken to the headquarters of the Araripe-Apodi National Forest (Fig. 1; central coordinates of the reserve: latitude -7.3625; longitude -39.440278). More detailed information about the specimen is absent (F. Domingos personal communication), including the exact location where it was found and the reason for its capture. However, the removal of kittens from nature is an important threat to the species, as predicted by the National Action Plan for the Conservation of Small Felids (ICMBio 2022). According to officials at the Chico Mendes Institute for Biodiversity Conservation (ICMBio), the animal was struck by a car on a road near the National Forest a few months after its arrival, becoming the victim of another important threat to the species. Unfortunately, the animal died and its biological material was not deposited in any scientific collection or museum.

Although the exact origin of the *L. wiedii* specimen cannot be confirmed, it is very unlikely that a juvenile animal was taken from an area more than 300 km from Chapada do Araripe, the closest area with confirmed presence of the species. In addition to ethnozoological studies that indicate the presence of the species in the area (Silva Neto et al. 2017), according to reports from ICMBio analysts, another road-killed animal also identified as *L. wiedii* through photos has already been found in the region by residents, reinforcing its presence in Chapada do Araripe.

The specimen had typical characteristics of *L. wiedii* (Fig. 2), which allowed its identification from other neotropical wild cats, initially by PFRR in loco and later by all authors through photographs. *Leopardus wiedii* has large, bulging eyes and a proportionately long tail, accounting for approximately 70% of the body, and the usual coat pattern consists of large solid spots in the middle of the back and large full rosettes on the sides with brown edges and centers darker than the background color, with the hair facing forward in the nape of the neck (Oliveira 1998).

Created in 1946, the Araripe-Apodi National Forest is located in Chapada do Araripe, a geological formation approximately 180 km in length that covers the states of Ceará, Pernambuco, and Piauí. Chapada do Araripe has a mesic climate and vegetation that is relatively different from the typical semi-arid environment surrounding it (Fig. 3). Formed by a vegetation mosaic influenced by the altitude, relief, and humidity that comes from the north, in areas that exceed 900 m of altitude it is possible to find humid forests closely associated with Atlantic Forest. As the altitude and relief change, it is possible to find arboreal Cerrado (Cerrado woodland), dry forests and xerophytic vegetation closely associated with typical Caatinga formations (Novaes & Laurindo 2014).

The presence of margay in Chapada do Araripe has already been considered in ethnozoological studies involving the hunting of mammals in the region (Silva Neto et al. 2017) and moderately predicted by habitat suitability analyzes (Espinosa et al. 2018); however, there are still no records of specimens or photographs, a necessary condition for the confirmation of the occurrence of the species, given the common difficulty of identifying wild cats painted by non-specialists, especially in areas outside



the known distribution and where similar species are sympatric, such as *Leopardus tigrinus* (Schreber, 1775), proposed as *Leopardus emiliae* (Thomas, 1914) by Nascimento and Feijó (2017), and *Leopardus pardalis* (Linnaeus, 1758). Other felid species that co-occur in the region are *Herpailurus yagouaroundi* (É. Geoffroy Saint-Hilaire, 1803) and *Puma concolor* (Linnaeus, 1771) (Silva Neto et al. 2017), while *Panthera onca* (Linnaeus, 1758) was recently considered extinct in Ceará (SEMA 2022).

Occurrence records of *L. wiedii* in typical environments of the semi-arid Caatinga region have only appeared in recent years, suggesting that the species is capable of using hitherto unexpected habitats. In south-central Bahia, the species was recorded in a typical semi-arid environment relatively close to the transition with the Cerrado biome (Meira et al. 2018). Surveys in other mountain and ecotone areas of the Caatinga should investigate the presence of the species and possible connections between subpopulations.

The present work confirms the presence of margay in a mesic environment in the center of the semi-arid Brazilian Caatinga and outside the known distribution area of the species, helping to shed some light on the occurrence of margay in the Caatinga domain. Both areas with margay presence in Ceará are isolated and likely relictual. Similarly, the hoary fox *Lycalopex vetulus* (Lund, 1842), a canid typical of the Cerrado domain, also showed a disjunct population in Chapada do Araripe (Oliifiers & Delciellos 2013).

Our results should update the information needed to assess the conservation status of *L. wiedii* in Ceará, with the first record of a living animal, which should be considered in future assessments of its extinction risk as well as the necessary directions for state conservation plans. In addition, the National Action Plan for the Conservation of Small Felids (ICMBio 2022) should serve as a guideline for the implementation of important conservation actions in the region, such as curbing the removal of kittens from nature and measures to reduce the impact of roads on small wild cats. Our work reinforces the biological importance of Chapada do Araripe as an important refuge for Caatinga biodiversity, which must be conserved in the face of the various threats that exist in the region. Finally, new studies should attempt to establish the population status of the species in the area and investigate the relationship between *L. wiedii* and the different phytophysiognomies of the Chapada do Araripe region.

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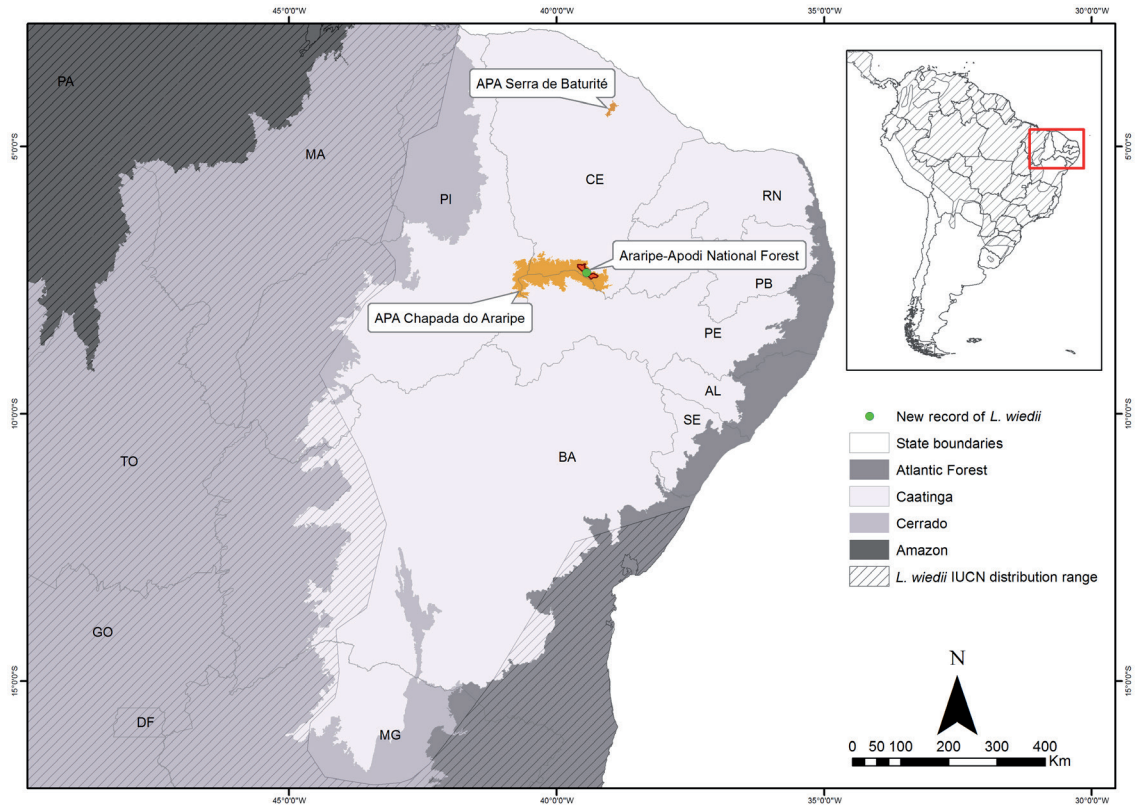


Figure 1. Location of the Araripe-Apodi National Forest and Environmental Protection Area (APA), in southern Ceará, northeastern Brazil, where the specimen of *Leopardus wiedii* was recorded after being rescued by the Environmental Police in the Chapada do Araripe region.

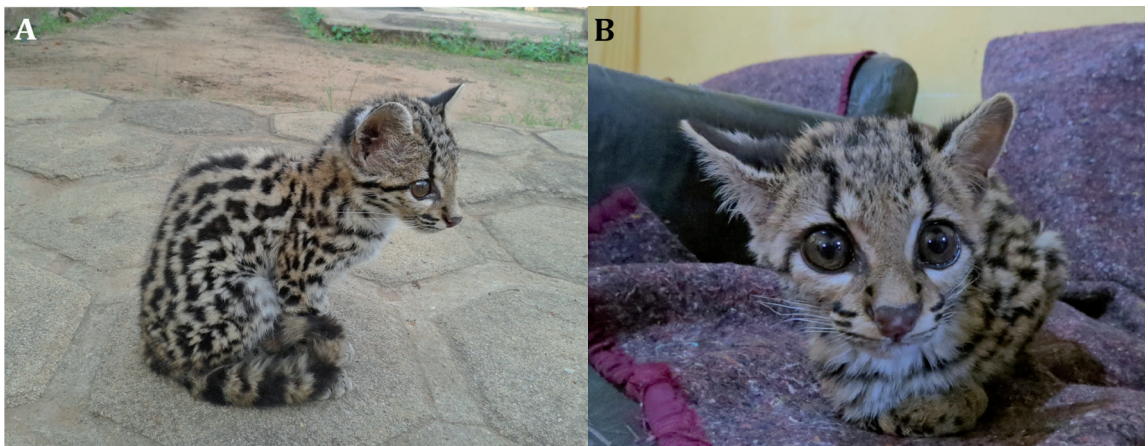


Figure 2. Juvenile margay *Leopardus wiedii* rescued in Chapada do Araripe region, southern Ceará state, northeastern Brazil. A) It is possible to observe the spots pattern, the long tail, and the hairs on the nape facing forward; B) as well as the large, bulging eyes, typical features of *L. wiedii*. Photos: PFRR.



Figure 3. Vegetation of the Chapada do Araripe region, Ceará, Northeast Brazil, with emphasis on the humid forest formation during the rainy season. Photo: Bárbara Praxedes.

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