Short Note

Renilce Carvalho de Castro*, Paulo Guilherme de Souza-Cruz, Domingos de Jesus Rodrigues, Rogério José Custódio, Luiz Felipe Moreira Nascimento da Silva and Clarissa Rosa

Tapirus kabomani expanding its range in the Amazon: first record of the species in Cristalino State Park, Mato Grosso, Brazil

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Abstract: *Tapirus kabomani* is a little-studied species, making new records essential for understanding its geographic distribution, ecology and conservation. We document new records of *T. kabomani* in at Cristalino State Park, Mato Grosso, Brazil. These records significantly expand the known range of the species. Our findings highlight the importance of protected areas for the conservation of species such as *T. kabomani* and reinforce the need for continuous monitoring in the Amazon to ensure the preservation of these populations in the face of increasing deforestation and habitat fragmentation.

Keywords: species monitoring; tropical forests; biodiversity conservation

***Corresponding author: Renilce Carvalho de Castro**, Programa de Pós-graduação em Ecologia, Instituto Nacional de Pesquisas da Amazônia (INPA), Av. André Araújo, 69067-375, Manaus, Amazonas, Brazil; and Centro de Estudos Integrados da Biodiversidade Amazônica (INCT-CENBAM), Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, 69060-001, Brazil, E-mail: renilcecdc12@gmail.com. https://orcid.org/0009-0000-1245-5385

Paulo Guilherme de Souza-Cruz, Programa de Pós-Graduação em Ecologia Aplicada, Universidade Federal de Lavras, Lavras, 37200-900, Brazil. https://orcid.org/0000-0003-3154-9066

Domingos de Jesus Rodrigues, Centro de Estudos Integrados da Biodiversidade Amazônica (INCT-CENBAM), Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, 69060-001, Brazil; and Programa de Pós-Graduação em Ciências Ambientais, Universidade Federal de Mato Grosso, Sinop, 78550-970, Brazil. https://orcid.org/0000-0002-8360-2036

Rogério José Custódio, Programa de Pós-Graduação em Ciências Ambientais, Universidade Federal de Mato Grosso, Sinop, 78550-970, Brazil. https://orcid.org/0009-0005-9917-6042

Luiz Felipe Moreira Nascimento da Silva, MRS Ambiental, Cuiabá, 78050-790, Brazil. https://orcid.org/0009-0007-2874-3139

Clarissa Rosa, Programa de Pós-graduação em Ecologia, Instituto Nacional de Pesquisas da Amazônia (INPA), Av. André Araújo, 69067-375, Manaus, Amazonas, Brazil; and Centro de Estudos Integrados da Biodiversidade Amazônica (INCT-CENBAM), Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, 69060-001, Brazil. https://orcid.org/0000-0001-7462-1991

Tropical forests harbor approximately 60 % of the world's mammal species (Pillay et al. 2022). Although significant advances have been made in understanding species diversity and distribution in the tropics in recent years, many knowledge gaps remain regarding the distribution of various mammal species in these ecosystems (Feijó 2024; Querido et al. 2024). Even large-bodied species, such as tapirs, have been discovered and described only recently in tropical forests (Cozzuol et al. 2013). Others, such as Linnaeus's two-toed sloth, have had their known distribution significantly expanded to include much larger areas than previously recorded (Castro et al. 2024).

Tapirs (*Tapirus* spp.), as they are commonly known, belong to the order Perissodactyla and are large mammals native to tropical and subtropical forests in the Neotropics (*Tapirus terrestris* Linnaeus, 1758; *Tapirus pinchaque* Roulin, 1829; *Tapirus kabomani* Cozzuol et al., 2013; and *Tapirus bardii* Gill, 1865) and Southeast Asia (*Tapirus indicus* Desmarest, 1819) (Borges et al. 2020; Gonçalves et al. 2023; Medici and Fantacini 2022). Despite their broad distribution, these species remain understudied due to their solitary behavior, nocturnal habits, and elusive nature (Barcelos et al. 2023; Figueiredo et al. 2022; Medici and Fantacini 2022). Tapirs have specific adaptations to forested environments associated with watercourses, including an elongated skull and specialized dentition for consuming sprouts, grasses, and fruits (Barcelos et al. 2023; Medici and Fantacini 2022). As browsers, they consume only the aerial parts of plants, leaving the roots intact in the soil. Due to their fruit consumption, they are recognized as "nature's gardeners," playing a crucial role in seed dispersal and contributing to forest regeneration and structural maintenance (Barcelos et al. 2023; Galetti et al. 2001).

All tapir species are classified under some level of threat (ICMBio 2018; IUCN 2019), except *T. kabomani*, which was recently described (Cozzuol et al. 2013) and has not yet been

formally assessed by the IUCN. The main threats to tapirs include habitat loss and fragmentation (Barcelos et al. 2023; Mangini 2014), roadkill, and poaching (Barcelos et al. 2023; Pinto et al. 2022; Santos et al. 2022). These threats are exacerbated by the species' low reproductive potential, with long interbirth intervals of up to three years and a single offspring after a 13-month gestation period (Figueiredo et al. 2022; Pukazhenthi et al. 2013).

Tapirus kabomani, known as "little black tapir", is the smallest tapir species, weighing approximately 110 kg, with a body length of 130 cm and a height of 90 cm. Its records are limited to specific areas of the Amazon, including the states of Amazonas, Rondônia, and Amapá (Cozzuol et al. 2013; Medici and Fantacini 2022). In addition to its smaller size, *T. kabomani* differs from other tapirs in several morphological characteristics, including darker fur, a lower mane, a compact skull, and other internal anatomical differences (Cozzuol et al. 2013), which enable its adaptation to various forest habitats. However, due to its elusive behavior and recent recognition as a distinct species (Cozzuol et al. 2013; Quintela et al. 2020), there is still a significant knowledge gap regarding its distribution and ecology, making it challenging to develop effective conservation strategies. This situation is concerning, as the rapid expansion of deforestation in the Amazon (Laurance et al. 2002) increases pressure on *T. kabomani* populations, threatening their long-term survival. Identifying new occurrence areas is therefore crucial to understanding its ecological needs and ensuring its protection.

In this study, we document the first records of *T. kabomani* in Cristalino State Park (PEC), specifically in PEC II. PEC I and II, established in 2000 and 2011, respectively, are strictly protected areas where direct use of natural resources is prohibited. They are located in northern Mato Grosso, covering 66,900 and 118,000 ha, respectively, totaling a contiguous area of 184,900 ha that extends to the border with Pará (SEMA/MT 2024). PEC II connects PEC I to the Brigadeiro Velloso Testing Range of the Brazilian Air Force in the Serra do Cachimbo, a protected area of over 2 million hectares, serving as an ecological corridor between these regions. The climate is tropical continental, and the vegetation includes seasonal forests, savannas, ombrophilous forests ("Terra Firme"), and transition zones between savanna and forest (SEMA/MT 2024). The Park is home to 38 mammal species but faces challenges due to illegal logging and human settlements in the region (Rodrigues et al. 2015; SEMA/MT 2024).

We conducted periodic surveys along five trails in PEC (two in PEC I and three in PEC II) as part of a wildlife monitoring program associated with the "Monitora" Program of the Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) (see Roque et al. 2018) and the Biodiversity Research Program (PPBio) (see Rosa et al. 2021). Mammal monitoring was conducted using both camera traps and the linear transect method. Both methods were applied along 5-km-long trails (for the linear transect method) and at sampling stations placed every 1 km along the trails (for the camera trap method, see methodology in Brocardo et al. 2023). For the linear transect method, we used three 5-km transects, each surveyed twice a year (once in the dry season and once in the wet season), with five sampling days per transect in each season. Surveys were conducted by two observers walking the transects between 6:00 and 12:00. We recorded all mammal species through direct observation, vocalizations, and signs of presence (e.g., feces, tracks, etc.). Up to the tapir record, the total survey effort comprised approximately 125 km of walked transects and over 1,000 camera-trap days across all sampling points. Following this sighting, an additional 75 km were surveyed along the target monitoring trails, and more than 240 h of camera-trap footage were analyzed in an attempt to detect the species again. However, the tapir was not recorded by either method thereafter.

During one of these surveys, we recorded one individual adult of *T. kabomani* (Figure 1) on March 6, 2024, during the rainy season, in "Terra Firme" forest along Trail 2 (9°38′17.2″ S, 55°20′38.8″W) in PEC II. The animal was resting 10 m from the trail and it remained stationary without attempting to flee. Over the five days of surveys, we observed fresh tracks at the same location, indicating that the individual remained in the vicinity. The sex could not be determined, as the animal was partially concealed by foliage, and upon closer approach, it moved into denser vegetation, making verification difficult. Identification was confirmed based on its morphological characteristics, such as its small size and dark fur (Cozzuol et al. 2013). These diagnostic traits clearly distinguish *T. kabomani* from other tapir species, allowing a confident identification. However, uncertainties can still arise, and to minimize them and address broader taxonomic questions within the genus, future efforts should integrate molecular tools with morphological assessments, including a comprehensive phylogenetic revision, particularly in regions where cryptic diversity may occur.

This record is located approximately 899 km southeast of the type locality in Amazonas State, surpassing the previously accepted southeast limit of the species' range (Cozzuol et al. 2013) (Figure 2). This extension represents a 35 % increase in the known range, suggesting that *T. kabomani* may be more widely distributed in the southern Amazon than previously recognized.

The new record of *T. kabomani* in PEC II represents a significant discovery, as it expands the species' distribution

Figure 1: Records of the *Tapirus kabomani* individual found in Cristalino State Park, Mato Grosso.

beyond previously known geographical limits (Cozzuol et al. 2013). Previous studies indicated that the species was restricted to primary forest areas in the southwestern Amazon (Cozzuol et al. 2013), but our data suggest that *T. kabomani* may have a broader distribution than initially thought, also occupying protected forests in southern Amazonian regions. These new records expand the known distribution of *T. kabomani* and carry important implications for conservation and monitoring. The presence of the species in PEC II highlights the need to strengthen protection measures and integrate elusive species into ongoing monitoring programs. Such data can inform habitat connectivity, anti-poaching actions, and land-use planning, supporting efforts to preserve critical habitats and ensure the species' long-term survival.

Apparently, *T. kabomani* prefers "Terra Firme" forests, as it has only been recorded in this environment so far (Cozzuol et al. 2013). "Terra firme" forests consist of large trees and are not flooded by lakes or river waters, covering more than 82 % of the Amazon Basin (Melack and Hess 2010). These non-flooded areas are crucial for understanding the distribution of species such as the *T. kabomani*. However, there is a significant "record gap" between known occurrence points, raising questions about its distribution. It remains unclear whether this gap represents isolated populations or a continuous distribution. Previous studies, such as Castro et al. (2024) on Linnaeus's two-toed sloth, also discuss these record gaps in relation to population connectivity. Notably, this gap includes extensive areas of "Terra Firme" forests, reinforcing the possibility that undetected populations may be associated with this habitat type.

Over the past 15 years, mammal studies in the Amazon have expanded, mainly driven by the widespread use of camera traps (Antunes et al. 2022). This technology enables remote monitoring of hard-to-reach areas, reducing the need for extensive field expeditions that require infrastructure and significantly increase research costs (Rosa et al. 2021; Wagner et al. 2019). However, complementary sampling methods remain essential for broadening species records. While camera traps allow passive and continuous fauna detection, line transects enable active searches for direct observations or signs of species presence. Combining these methods has been recommended to enhance study accuracy and coverage, maximizing species detection diversity (Silveira et al. 2010).

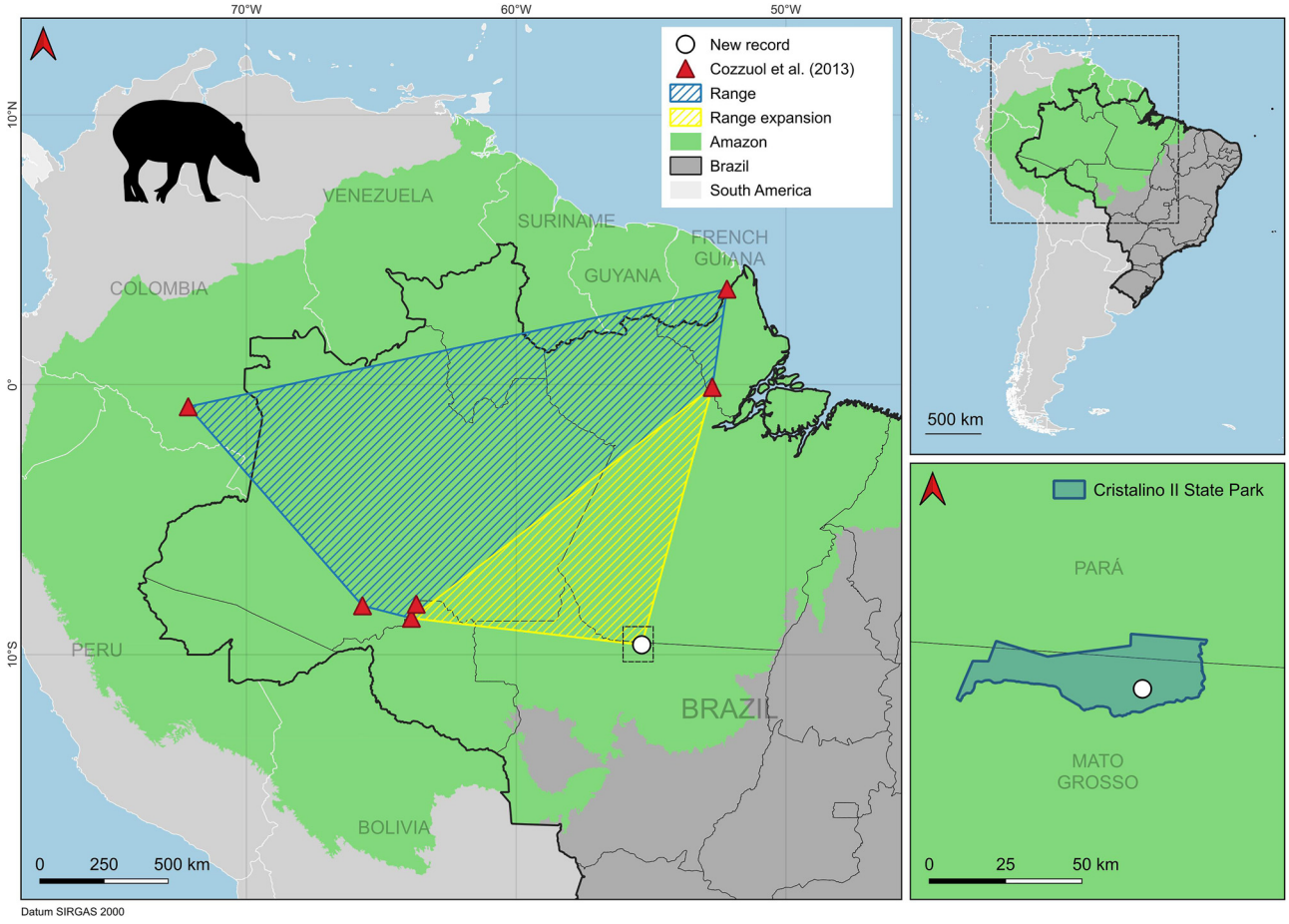

Figure 2: Occurrence areas and distribution range expansion of *Tapirus kabomani*.

Beyond methodological choices, continuous monitoring in protected areas is crucial. In Brazil, this role has been carried out by ICMBio through the Monitora Program in federal protected areas (Roque et al. 2018) and adopted by some states, such as in PEC. Additionally, the PPBio, also a federal initiative, operates in several protected areas across the country (Rosa et al. 2021), often integrating with the Monitora Program. Both programs have significantly contributed to advancing knowledge about biodiversity and ecosystem processes in tropical and subtropical ecosystems through standardized protocols that allow for the study of temporal and spatial biodiversity patterns and integration between initiatives (Bergallo et al. 2023; Rosa et al. 2021; Roque et al. 2018).

It is important to highlight that PEC (I and II) is located within the "Arc of Deforestation," one of the regions most affected by forest conversion into agricultural lands in the Amazon. This region is under pressure as it represents one of Brazil's most important agricultural frontiers, with constant expansion of soybean fields, cattle ranching, and infrastructure, leading to high deforestation rates (Leite-Filho et al. 2021). Recently, PEC II, where the tapir was recorded, was abolished by a ruling from the Mato Grosso State Court due to a land tenure lawsuit filed by alleged landowners. However, Brazil's Attorney General's Office appealed, and the case is awaiting an environmental agency decision (Rodrigues et al. 2025), exposing the vulnerability of protected areas within the Arc of Deforestation.

In this context, PEC is part of a mosaic of protected areas, including other protected areas, Indigenous Lands, and military areas, forming a continuous forest massif of over 2 million hectares, contributing to the ecological integrity of the southern Amazon. Large forested landscapes like this play a crucial role in biodiversity conservation and the provision of essential ecosystem services, such as climate regulation and water resource maintenance (Nunes et al. 2022).

The preservation of these continuous forest areas is essential for mitigating the effects of deforestation and fragmentation, as well as ensuring the survival of key species that perform critical ecological roles, such as seed dispersal and herbivore population control (Abreu et al. 2022; Reis et al. 2015).

Additionally, these intact forest areas contribute to achieving national and international commitments, such as the goals of the Paris Agreement and the Convention on Biological Diversity (ICMBio 2018; MMA 2022). Therefore, conserving PEC and its connection with other intact forest blocks are essential strategies for curbing deforestation and ensuring the region's environmental resilience, particularly in the face of climate change and anthropogenic pressures (Gatti et al. 2021; Leite-Filho et al. 2021).

Regarding *T. kabomani*, further studies are still needed to understand the species' ecological requirements. However, the records obtained so far provide a foundation for future studies on its ecology. The new record of *T. kabomani* in PEC II highlights the critical importance of employing integrated monitoring methods – such as camera trapping and line transects – to effectively detect elusive and cryptic species. Additionally, genetic analysis (e.g., environmental DNA or eDNA) stands out as a promising complementary methodology, particularly valuable for mammals in remote tropical regions where access is difficult and species are hard to detect (e.g. Mena et al. 2021). Furthermore, predictive distribution modeling serves as a valuable tool to estimate potential habitats, especially in regions lacking records, guiding the efficient allocation of survey efforts. Together, these strategies will be crucial to refine knowledge of the species' ecology and guide effective conservation planning across the Amazon basin. Future research should focus on investigating the movement patterns of *T. kabomani* and the connectivity between populations in different forested areas, especially in edge regions where anthropogenic pressure is more intense. Understanding these patterns can help identify priority areas for conservation and promote strategies to ensure the species' long-term preservation.

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