

Short Note

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Records of Crab-eating fox *Cerdocyon thous* (Linnaeus, 1766) (Carnivora, Canidae) in Rondônia, Brazil

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Abstract: We report the first records of *Cerdocyon thous* on the left bank of the Madeira river, extending its distribution to more than 10 km to the N–W. We carried out a survey of official information present in scientific articles, technical reports, and management plans for conservation units in the state of Rondônia, and accessions to the iNaturalist. Our records show *C. thous* occurs widely in state, even in busy urban areas such as the area surrounding the international airport of Porto Velho. This highlights the importance of monitoring the fauna present in the urban fragments of Amazonian cities.

Keywords: airport wildlife; Amazon rainforest; roadkill; urban ecology; wild canid

Cerdocyon thous (Linnaeus, 1766), commonly known as crab-eating dog, is the only living representative of the genus (Tchavica et al. 2007). It is a medium-sized wild canid, with a

body mass between 3.7 and 11.1 kg. Though it is predominantly nocturnal, the species can be crepuscular-nocturnal or cathemeral and has a preference for open areas (Monteiro-Alves et al. 2019). The species is omnivorous and generalist, with a diet that includes fruits, insects, crustaceans and small vertebrates (Beisiegel et al. 2013). *C. thous* is one of the vertebrate species with the highest records of roadkill in Brazil (Cunha et al. 2010).

The known distribution of *C. thous* covers a wide area within the Neotropical region and, in Brazil, it is recorded from all biomes. However, in the Amazon, its distribution remains poorly understood (Nagy-Reis et al. 2020). The species is also present in the region bordering the biome, in the Arc of Deforestation, the region with one of the highest rates of loss of natural vegetation cover in the biome. Of this generalist species in the Amazon may be expanding following the conversion of the forest into pastures (Beisiegel et al. 2013). However, compilations of records from mammalian groups (Nagy-Reis et al. 2020; Rosa et al. 2020; Santos et al. 2019) show large sampling gaps within the

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Amazon. Accordingly, the objective here was to present new records of the distribution of *C. thous* in the state of Rondônia, within the Brazilian Amazon.

The records provided here were made in the state of Rondônia located in southwestern Brazilian Amazonia, Brazil, having approximately 238,512 km². Forest cover is predominantly open rainforest, and the area has a humid equatorial climate, with an average temperature between 24 and 27 °C across the year. It has a short dry season (June to August) when mean rainfall is less than 100 mm and maximum temperatures reach 37 °C (Mendonça and Danni-Oliveira 2007). The rainy season occurs from September to May, with a precipitation peak in January with 300 mm, and a mean temperature of 25 °C (Franca 2015). The Rio Madeira is the main river in the region, with the basin covering some 1,370,000 km². One of its main tributaries, the Rio Ji-Paraná (or Machado), is exclusive to Rondônia, running some 1200 km through the state from its source in Chapada dos Parecis to its mouth in the Madeira (Casatti et al. 2013).

The state of Rondônia has an estimated population of 1,815,278 inhabitants in 2021, of which 74 % live in urban areas and 26 % in rural areas (IBGE 2017). Among the municipalities, Porto Velho stands out in deforested area, with 33.80 % of the area lost until 2021 (PRODES). This municipality has a total area of 34,090 km² and an estimated population of 548,952 inhabitants in 2021 (IBGE 2017) (Figure 1).

To explore the occurrence of *C. thous* in the State of Rondônia we used personal records of roadkill and individuals captured by camera traps, both obtained during mammal monitoring activities and via occasional observations. In addition, we searched for records present in the literature using the CAPES Journal Portal, Google Scholar and Web of Science databases using the keywords “*C. thous*”, “Crab-eating fox”, “Porto Velho”, “Rondônia” and “Amazon”. We also searched for species records from Rondônia in the iNaturalist on-line image database.

We also analyzed official documents on government websites, such as environmental impact reports and management plans for Rondônia conservation units present in the State. Management plans for the federal conservation units were obtained from the website of the Chico Mendes Biodiversity Conservation Institute – ICMBio, those for the state conservation units from the website of the Secretary of State for Environmental Development – SEDAM, and municipal sites from the website of the Municipal Under Secretariat for the Environment and Sustainable Development – SEMA.

Additionally, we consulted the *speciesLink* database, SiBBR (Sistema de Informação sobre a Biodiversidade Brasileira), Smithsonian Institution, Field Museum of Natural History in Chicago, American Museum of Natural History in

New York, the collection of the Museum of the University of São Paulo, the collection of the Museu Paraense Emílio Goeldi, the collection of the Instituto de Pesquisas da Amazônia and the reference collection of the Universidade Federal de Rondônia.

We found six documents that cited the presence of *C. thous* in Rondônia, as well as management plans for four of the 23 protected areas analyzed. A further five records came from iNaturalist. The record most likely occurred on the interstate border where Amazonian savannas are present (Supplementary Table S1). We obtained only one record from the Mammal Collection of the Federal University of Rondônia, and the animal was recorded in the city of Porto Velho (Supplementary Table S1).

This data was complemented by 27 previously unpublished records for *C. thous* based on fieldwork by the authors in Rondônia (Supplementary Table S1). Of these, seven records occurred within Porto Velho municipality, including your urban area (Figure 1). Below we provide descriptions of the records from within the municipality, for eight sites.

Site 1: A young male was recorded as roadkill in June 2021 on a broad tarmacked road next to Porto Velho International Airport (Figure 2A), while on August 13, 2021, an adult individual was observed close to the airport runway area. According to airport employees, this individual was frequently observed looking for food in the solid waste dump.

Site 2: On March 6, 2021 at 17:46, on Ramal São Domingos, an unpaved road in a rural part of Porto Velho municipality, on the left bank of the Rio Madeira, two individuals of *C. thous* were observed walking in the middle of a road.

Site 3: In March 2018, interviews with hunters in the Assentamento Rural Joana D’Arc (Joana D’Arc Rural Settlement), recorded reports of retaliatory hunting of *C. thous*. According to the interviewees, in March 2018 between 18:00 and 19:00 h, a single *C. thous* was killed while stealing chickens from a backyard henhouse. Subsequently, the animal was cleaned and shared among four families for consumption. Information on interactions between humans and wild animals in Rondônia state show that conflicts in rural areas are often motivated by the depredation of domestic animals (Lima et al. 2020). However, the record of consumption of the species is unprecedented for the state (Oliveira et al. 2022; Ramos et al. 2020).

Site 4: Records of *C. thous* were obtained with camera traps (model HC-900) installed in a transect of primary forest in the rural area of Porto Velho, used by farmers and local residents (Figure 2C).

Site 5: Another individual was found as roadkill on December 16, 2020 at 13:04 on the rural road that gives access to the district of União Bandeirantes (Figure 2E) about

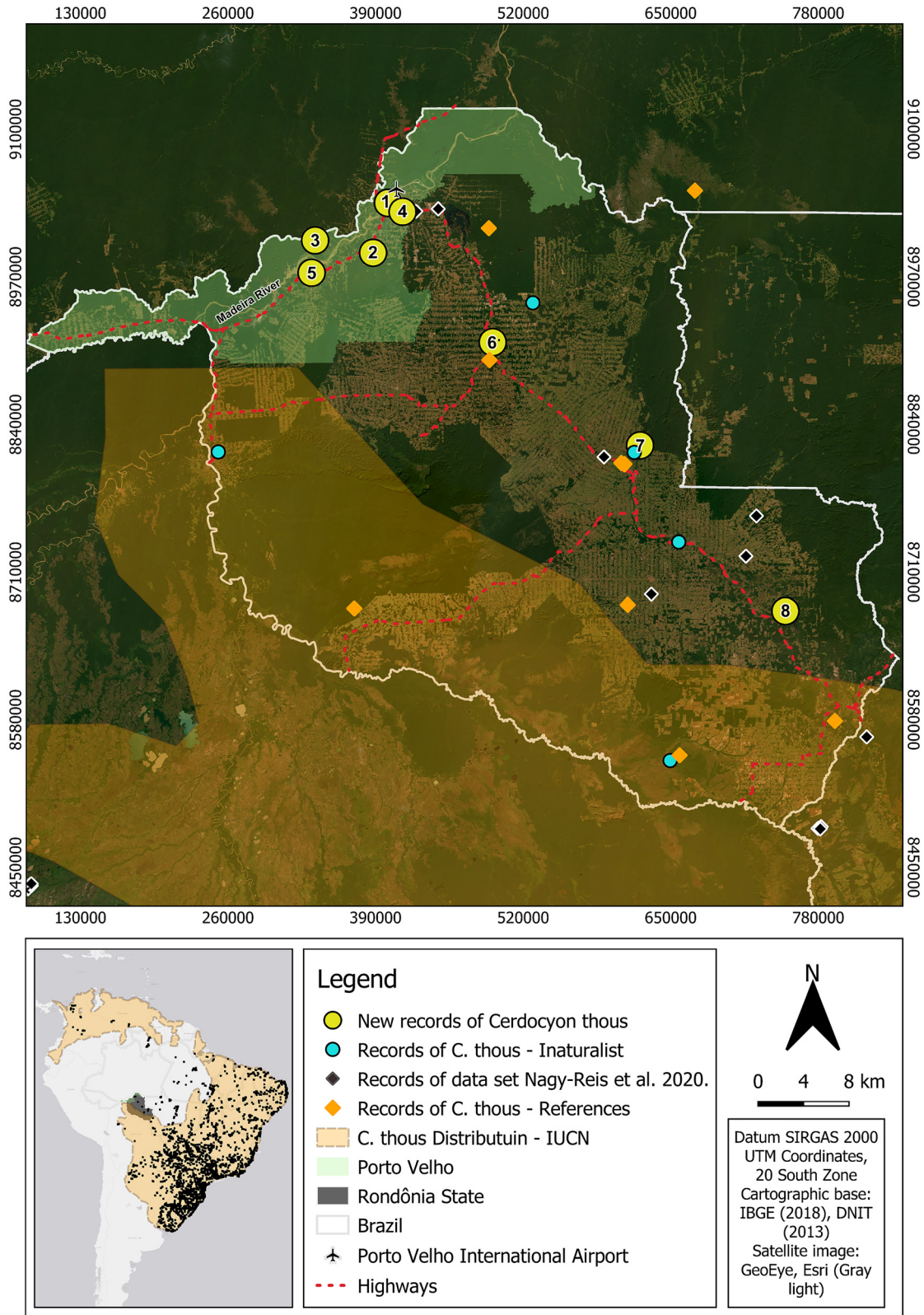


Figure 1: Distribution of Crab-eating fox (*Cerdocyon thous*, Carnivora, Canidae) in the Rondônia State and new records in Porto Velho city.

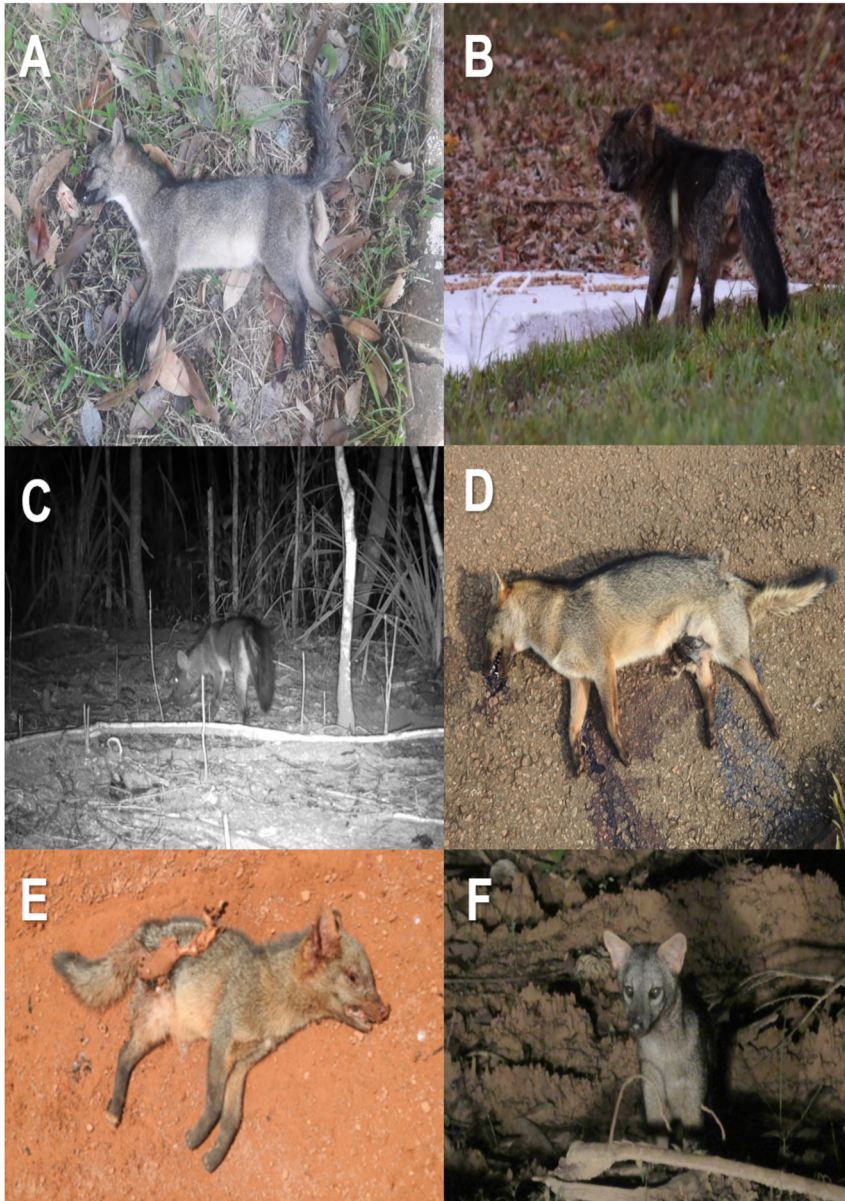


Figure 2: Records of Crab-eating fox (*Cerdocyon thous*, Carnivora, Canidae) in the Rondônia State. The photos show (A) an individual killed by a running over in Porto Velho International Airport; (B) an individual registered in Porto Velho International Airport; (C) trap in primary forest in rural Porto Velho camera record; (D) specimen run over in in the municipality of Ariquemes on the BR-364 and (E) in district of União Bandeirantes, (F) registration of an individual in Ji-Paraná, Rondônia.

160 km from Porto Velho. The site had monocultures of soy and corn adjacent to it.

Site 6: One *C. thous* individual was recorded during a survey of road-killed fauna in the municipality of Ariquemes on the BR-364. The site was a federal highway, with rural properties on the margins and some scattered forest areas.

Site 7: On 02 March 2022 at 05:40, an individual was seen by LGAG in a forest fragment of an open ombrophilous forest in the municipality of Ji-Paraná (Figure 2F).

Site 8: The two records came from rural roads in forests surrounding the 103 Hydroelectric Power Plant (HPP) Rondon II, located in the municipality of Pimenta Bueno, Rondônia.

Whilst it is unlikely that the expansion of this species will negatively impact potential prey species, as there is

already a broad complement of felid, canid and mustelid predators in the region (Lopes et al. 2022), ecological interactions are possible with the short-eared dog (*Atelocynus microtis*). However, while the two are of similar size, they appear to differ in both dietary and habitat preferences, with *C. thous* preferring more open habitats and having a more generalist diet, while *A. microtis* prefers forest habitats and has fish as the most predominant item in its diet (Jaramillo Castrillón 2021; Sillero et al. 2004). Despite this, a research project to study such interactions would be extremely useful, not in the least since *A. microtis* is considered Near-Threatened by the IUCN and Vulnerable by the Brazilian Red List and range expansions by more generalist species have been linked to the introduction of diseases and disease vectors (Hulme 2014; Labruna et al. 2005; Stanley et al. 2020).

C. thous is not the first canid to extend its range in Rondônia State via occupation of anthropically-modified habitats, as this has also been recorded for the maned wolf (*Chrysocyon brachyurus*) (Goebel et al. 2019; Queirolo et al. 2011; Silva-Diogo et al. 2020). The species is known to coexist through niche separation with many other native canids (Almeida Jácomo et al. 2004; Aragona and Setz 2001). Although both *C. thous* and *C. brachyurus* favor more open areas and thus benefit from the loss of dense vegetation that generally accompanies anthropic action in the region (Piontekowski et al. 2019), there are substantial differences in the components and breadths of the dietary niches and the types of grass-based habitats preferred by the two species (Almeida Jácomo et al. 2004). This, in itself, shows the variety and extent of the ecological changes wrought by human-mediated vegetation change on the prevailing mammalian assemblages in the resultant landscapes (Lyra-Jorge et al. 2010; Vynne et al. 2011).

Our records of *C. thous* in the state of Rondônia are the first official records of the species for this region of the Amazon, and one that is not yet on the IUCN distribution map. Additionally, there were records of the species to the left bank of the Rio Madeira. A lack of knowledge of the current and historical distribution of the species in more heavily forested areas complicates both assessment of the species range and the impacts of its colonization of anthropized areas.

Research ethics: Our research was approved by the Research Ethics Committee (CEP) of the Centro Universitário Aparício Carvalho under protocol number 2,661,332. The road-killed animals were photographed but not collected. Accordingly, a collection license was not required.

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