



Predation of *Boa constrictor* (Squamata: Boidae) by *Cerdocyon thous* (Carnivora: Canidae) in a Caatinga biome region in the state of Piauí, northeastern Brazil

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Resumen

Este estudio informa sobre la depredación de un espécimen adulto de boa común *Boa constrictor* por parte del zorro cangrejero *Cerdocyon thous* en el bioma Caatinga, una región semiárida de Brasil. Tales interacciones representan casos de depredación sensible al riesgo, dada la posibilidad real de que los zorros cangrejeros resulten heridos o muertos al atacar a especímenes adultos de boa común. Se discute el probable papel de eventos climáticos extremos, como la severa y prolongada sequía que ocurrió en la región al momento de este registro, en la ocurrencia de estas interacciones tróficas entre especies.

Palabras clave: Bioma Caatinga, Brasil, depredación sensible al riesgo, eventos climáticos extremos, zorro cangrejero.

Abstract

This study reports the predation on an adult common boa *Boa constrictor* specimen by the crab-eating fox *Cerdocyon thous* in the Caatinga Biome, a semi-arid Brazilian region. Such interactions represent cases of risk-sensitive predation, given the real possibility of crab-eating foxes being injured or killed when attacking adult common boa specimens. The likely role of extreme climatic events, such as the severe and prolonged drought that occurred in the region at the time of this record, in the occurrence of these trophic interactions between species is discussed.

Key words: Brazil, Caatinga Biome, Crab-eating fox, extreme climatic events, risk-sensitive predation.

The crab-eating fox *Cerdocyon thous* (Carnivora: Canidae) is a medium-sized canid endemic to South America that usually inhabits coastal and mountainous regions at

altitudes up to 3,000 masl (Lucherini 2015). It is classified as of Least Concern by the International Union for the Conservation of Nature (IUCN) due to its adaptive flexibility concerning geographic distribution, habits, and behaviors, as well as population stability (Lucherini 2015). It is a generalist species, with crepuscular and nocturnal habits (Courtenay & Maffei 2004; Monteiro-Alves *et al.* 2019), exhibiting high ecological relevance, due to its important role as a seed disperser (Raíces & Bergallo 2010).

Crab-eating foxes are omnivorous and play an important role in controlling prey populations (Terborgh *et al.* 2001). Its diet, as well as the relative frequency of ingestion of its prey items, varies throughout its geographic distribution area, according to availability, climatic drivers and, probably, the social status of individuals (Courtenay & Maffei 2004).

Frequent herpetofauna consumption by crab-eating foxes is well known, although amphibians and reptiles are not always the most abundant prey items for these canids (Graciano *et al.* 2022; Araújo Goebel *et al.* 2023). Both venomous and non-venomous species of snakes have been detected in the stomach contents of crab-eating foxes (Graciano *et al.* 2022).

The common boa *Boa constrictor* (Squamata: Boidae) is a non-venomous snake, reaching up to 4.2 m (Henderson & Powell 2007) comprising an opportunistic and generalist top predator that usually kills its prey through constriction (Pizzatto *et al.* 2009). Common boa predation events by crab-eating foxes are, however, scarce in the literature. In this sense, Silva *et al.* (2018) described the cooperative predation of two crab-eating foxes towards a common boa in a Cerrado region in the state of Mato Grosso do Sul, Brazil, while Lima *et al.* (2022) recorded a crab-eating fox individual subduing and consuming a common boa in a Caatinga region in the state of Rio Grande do Norte, also in Brazil. Nevertheless, crab-eating foxes also represent a potential common boa prey. For example, Almiron *et al.* (2011) recorded an attempted *Boa constrictor* *occidentalis* predation of a crab-eating fox in Rivadavia, northern Argentina. The crab-eating fox died due to constriction, despite the fact that the snake was unsuccessful in its attempt to consume it (Almiron *et al.* 2011). Furthermore, the scientific literature describes predation events by the common boa in on other canid species Latin America (Leite *et al.* 2023).

Given the above, this study aimed to record a probable adult common boa predation event by a crab-eating fox in the Caatinga biome, located in the Brazilian semi-arid region.

On September 29, 2022, at 7:36 am, a technical team of biologists involved in rescuing wild fauna in the works of a wind energy farm project observed a crab-eating fox carrying part of a common boa carcass in its mouth. This was noted while the team was traveling with a vehicle on a dirt road that separates two Caatinga fragments in the rural area (8.8804, 41.5762; WGS 84; 251 masl) of the municipality of Dom Inocêncio, in the state of Piauí, Brazil.

We observed an adult crab-eating fox coming out of the forest and crossing in front of the moving vehicle carrying the lower half of a common boa carcass (Figure 1). We stopped the vehicle and the animal dropped the carcass from its mouth and stood on the side of the road looking at the carcass, apparently unwilling to retrieve it. After we tried to remove the carcass from the middle of the road the crab-eating fox ran towards the forest and disappeared inside, in the same direction in which it was moving when it passed in front of the vehicle. Unfortunately, collecting morphometric data from the carcass was not possible, as it was quickly removed from the road, photographed and left in the direction where the fox went, to increase the chances of the predator returning to retrieve its prey.



Figure 1. Part of the carcass of a common boa (*Boa constrictor*) carried by a crab-eating fox (*Cerdocyon thous*).

The carcass was fresh, clean, and bleeding. The only of damage were caused by several crab-eating fox bites. We placed the boa carcass in an area far from the edge of the forest, at the same place location the crab-eating fox entered the forest. Although not seen by the team, the consumption of the common boa by the animal seemed to be the result of a predation interaction, as the carcass was still fresh, bleeding and exhibited no other injuries, such as signs of being run over by vehicles. Furthermore, the time at which the incident was observed is consistent with the nocturnal habits of crab-eating foxes (Courtenay & Maffei 2004). Finally, the fact that the prey's head was not found may suggest that the common boa was consumed head-first, similar to that described in other reports concerning crab-eating fox common boa predation events (Silva *et al.* 2018; Lima *et al.* 2022).

At the time of this record, several municipalities in the state of Piauí were experiencing a severe drought period. The municipality of Dom Inocêncio was one of the 41 for which the government of the state of Piauí decreed a natural disaster emergency caused by the Drought on August 22, 2022 (Governo Do Estado Do Piauí 2022). The only previous record of a crab-eating fox common boa predation event in the Caatinga biome was reported by Lima *et al.* (2022) in the municipality of Mossoró, Rio Grande do Norte, on January 19, 2021. Similarly to our report, a significant drought was in place in that region, due to below-average rainfall between the months of October and December 2020 (Monitor De Secas Do Brasil 2021). As *C. thous* represents a potential *B. constrictor* prey, it is possible that the

prolonged drought in the region contributed to the crab-eating-fox risking attacking the common boa. In turn, the extreme drought that occurred at the time of this record may have favored the encounter between these animals, culminating in the predation event. In this sense, many snake species alter their activity patterns in response to seasonal environmental temperature changes, for example, those that are essentially diurnal during cold periods of the year become nocturnal during warmer seasons (Moore 1978). In a population study carried out in Argentina on the subspecies *Boa constrictor occidentalis*, 85% of specimen captures occurred during the dry season, possibly because during snakes move to shadier and more covered areas during rainy and hot season, making them more difficult to detect (Chiaraviglio *et al.* 2003).

The present record is especially relevant when considering that the Caatinga biome, one of the major Brazilian ecosystems, is severely susceptible to the effects of climate change, mainly increasing aridity (Santos *et al.* 2014; Araújo *et al.* 2017; Antongiovanni *et al.* 2020). In fact, some ecological studies have indicated that seasonality consistently drives trophic interactions in this biome for other taxonomic groups, such as birds, with higher attack rates in lizards observed during the dry season (Ferreira & Faria 2021). This type of scenario, therefore, represents an interesting opportunity to examine the emerging impacts of extreme climate events on the biodiversity of this sensitive semi-arid region (Rito *et al.* 2017), where other Carnivora representatives, such as jaguars and pumas, have been shown to suffer direct climate change effects, mainly in the form of reduced water sources (Astete *et al.* 2017).

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