



Herpetological biodiversity of the Maranhão ecotone, Brazil

K. Cavalcante-Pinto^{1*}, L. R. Pinheiro¹, J. B. Ferreira¹, L. S. S. Cruz⁵, S. F. dos Anjos², K. D. L. Pereira^{3,4}, D. M. Araújo³, and A. L. S. Castro¹

¹Instituto Federal Goiano - Campus Urutaí

² Universidade Federal de Mato Grosso, Campus Universitário de Sinop

³ Biota Projetos e Consultoria Ambiental

⁴ Universidade Federal de Goiás

⁵Instituto de Especialização e Pós-graduação

Autor for correspondence: karllcavalcante@gmail.com

Abstract. Brazil has a great biological diversity, however transition areas still presents little representation in environmental research. The ecotone as the transition areas are known, present a large and varied wealth, housing a large amount of animals from adjacent areas. The present work was carried out in the year 2012 to 2015 in a transition area in the State of Maranhão, Brazil. During the monitoring of fauna were captured approximately 3000 individuals distributed 23 families and 76 species and morphospecies.

Keywords: Check list. Herpetology. Transition area.

Introduction

With four biomes and one domain with a megadiversity, Brazil owns approximately 13% of all biota in the world (Brandon et al 2005, Mittermeier et al. 1997, Mittermeier et al. 2005, Batalha, 2011, Myers, 2000, Colli, 2002, Segalla et al. 2016, Costa and Bérnils, 2018). Although these plant formations are well defined, transition areas or ecological tension, they present unique characteristics, providing a high degree of heterogeneity. (Remanamanjeto et al., 2002, Ab'saber, 2002, Haidar et al., 2013, Hofer, 2000).

Even if they occupy small areas, ecotones present a great wealth of ecosystems with diverse types of ecological modifications. It can refuge a large number of animals from adjacent biomes and domain, where they play an important role in the flow of species, gene and matter. Providing evolutionary conditions for the formation of endemic populations (Remanamanjeto et al., 2002, Smith et al., 1997, Ab'saber, 2002, Urbina-Cardona, 2006; Haidar et al., 2013, Hofer, 2000).

The region between the Amazon, Cerrado and Caatinga is an extensive transitional area, located in the mid-microregion of the state of Maranhão where it is of great ecological importance (IBGE, 1992 e Galvão, 1955, Mistério do Meio

Ambiente, 2018). However, the region has undergone several anthropogenic changes (Galvão, 1955, Ferreira, 2005). The process of habitat transformation affects populations of vertebrates, among them the herpetofauna because they have great sensitivity (Forman 1995, Stuart et al. 2004; Blaustein et al, 2011, Primack, Rodrigues, 2001).

We emphasize the importance of fauna surveys to know and understand biodiversity, helping to prevent and/or mitigate environmental disturbances. However, even though it is an important area of knowledge, there is a large gap in herpetofauna research in ecotone (Governar, 2012, Rodrigues, 1999; Cintra, 2009; Pombal, 2010, Kopp, 2010, Nogueira, 2010, Rodrigues, 2011, Dantas 2014, Freitas et al., 2017, Pinto et al., 2017, Cardoso, 2018, Menke, 2013).

Methods

The study was carried out in the area of influence of the Parnaíba Thermolectric Power Plant, located in the municipality of Santo Antônio dos Lopes (4 ° 48 '35' S, 44 ° 21 '33' W) State of Maranhão (Figure1), inserted in the medium meirim microregion that presents characteristics of the environments of Cerrado, Caatinga and Amazon

Forest, with formations of babassu and carnaúba (IBGE, 1992 e Galvão, 1955, Pinto et al., 2017).

The works were performed semiannually during the years 2012 to 2016, considering the seasonal periods (rain and dry), with 16 sampling points, where seven had pitfall fall trap (Gibbons & Semlitsch 1981, Nogueira et al., 2005). In each monitoring campaign, the traps were kept open for seven days, being checked daily in the morning and late afternoon. At all sampling points, daytime and

nighttime active searches were carried out on potential microenvironments of amphibians and reptiles. During the sweeps were used *playback* techniques for recording and aiding the identification of anurans using Tascan recorder with unidirectional microphone (Duellman 1970, Duellmann e Trueb 1986). To complement the species list, specimens found outside the standardized methodology (rescue) were considered.

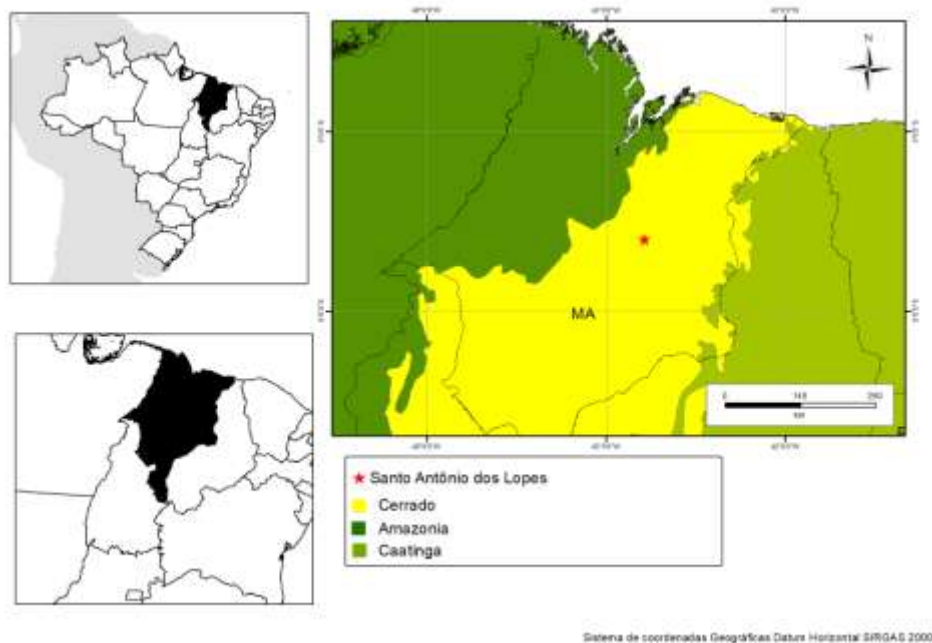


Figure 1. Location of UTE Parnaíba in the municipality of Santo Antônio dos Lopes, state of Maranhão Brazil.

Results and discussion

During the monitoring, 3084 individuals were distributed in five orders, 23 families and 76 species and morphospecies (Table1), of which 37 anurans and one Gymnophiona. The anura order was represented by five families and one Siphonopidae. Among the five families of anurans found, Leptodactylidae and Hylidae were the families with the highest abundance respectively, corroborating with Frost, 2018 and Segalla et al, 2016. Due to the fossorial behavior presented by the Gymnophiona order, the Siphonopidae family presented little representativeness in the sampling once that lifestyle makes observations difficult (Gower & Wilkinson, 2005). Reptiles were represented by three orders (Crocodylia, Squamata and Testudines), divided into 18 families. *Tropidurus oreadicus* and *Caiman crocodilus* were the most abundant species. Due mainly to extensive distribution (Meira et al, 2007, Farias et al, 2013). Other seven species (*Amphisbaena alba*, *Amphisbaena fuliginosa*, *Hoplocercus spinosus*, *Eunectes murinus*, *Crotalus durissus*, *Erythrolamprus reginae* and *Sibynomorphus mikanii*) were represented only once throughout the monitoring. The low representativity may be associated mainly with cryptic behavior (Colli, et al.,

2016, Vitti et al., 1993, Henderson et al., 1995, Tozetti, Martins, 2008, Albarelli & Santos-Costa, 2010, Marques et al., 2009). the Squamata the family Dipsosidae presented greater wealth, confirming with Rodrigues, 2011 and Costa, HC & Bérnils 2018.

Amphibians such as *Rhinella mirandaribeiroi*, *Dendropsophus leucophyllatus*, *Trachycephalus typhonius*, *Dendropsophus cruzi*, *Leptodactylus syphax*, *Physalaemus centralis* and Reptiles *Leptodeira annulata*, *Thecadactylus rapicauda*, *Polychrus marmoratus*, *Chatogekko amazonicus*, *Mesoclemmys gibba* and *Notomabuya frenata* present great importance in the biogeographic context for the Maranhão ecotone, because they are a species that are usually associated with a particular biome or domain (Vazolini 1988, Sazima and Haddad, 1992, Frost, 2018, Vogt et al. Maschio, 2008, Macedo et al., 2008, Avila-Pires, 1995, Valdujo, et al., 2012). The only exotic species recorded in the monitoring was *Hemidactylus mabouia* (Rödder et al., 2008; Rocha et al., 2011, Leão et al, 2011).

Table 1. Amphibians and reptiles recorded in the region in ecotone of state Maranhão, Brazil.

ORDER/FAMILY SPECIES

Anura

Bufonidae

- *Rhinella cf marina*
- Rhinella cf schneideri*
- Rhinella gr marina*
- Rhinella mirandaribeiroi* (Gallardo, 1965)
- Rhinella schneideri* (Werner, 1894)
- Rhinella sp*

Hylidae

- Dendropsophus leucophyllatus* (Beireis, 1783)
- Dendropsophus nanus* (Boulenger, 1889)
- Scinax gr. ruber*
- Trachycephalus typhonius* (Linnaeus, 1758)
- Dendropsophus cruzi* (Pombal e Bastos, 1998)
- Dendropsophus minutus* (Peters, 1872)
- Boana lundii* (Burmeister, 1856)
- Boana punctata* (Schneider, 1799)
- Boana raniceps* (Cope, 1862)
- Scinax fuscmarginatus* (Lutz, 1925)
- Scinax fuscovarius* (Lutz, 1925)
- Corythomantis greeningi* (Boulenger, 1896)

Leptodactylidae

- Adenomera andreae* (Müller, 1923)
- Leptodactylus cf. petersii*
- Leptodactylus fuscus* (Schneider, 1799)
- Adenomera hylaedactyla* (Cope, 1868)
- Leptodactylus labyrinthicus* (Spix, 1824)
- Leptodactylus latrans* (Steffen, 1815)
- Leptodactylus mystaceus* (Spix, 1824)
- Leptodactylus podicipinus* (Cope, 1862)
- Leptodactylus pustulatus* (Peters, 1870)
- Leptodactylus syphax* (Bokermann, 1969)
- Leptodactylus vastus* (Lutz, 1930)
- Physalaemus centralis* (Bokermann, 1962)
- Physalaemus cuvieri* (Fitzinger, 1826)
- Physalaemus sp.*
- Pseudopaludicola sp.*
- Pseudopaludicola mystacalis* (Cope, 1887)
- Leptodactylus troglodytes* (A. Lutz, 1926)

Microhylidae

- Dermatonotus muelleri* (Boettger, 1885)
- Elachistocleis cf. carvalhoi*

Phyllomedusidae

- Pithecopus azureus* (Cope, 1862)

Gymnophiona

Siphonopidae

- Siphonops paulensis* (Boettger, 1892)

Crocodylia

Alligatoridae

- Caiman crocodilos* (Linnaeus, 1758)

Squamata

Amphisbaenidae

- Amphisbaena alba* (Linnaeus, 1758)
- Amphisbaena fuliginosa* (Linnaeus, 1758)
- *Amphisbaena vermicularis* (Wagler, 1824)
- *Leposternon polystegum* (Duméril, 1851)

Boidae

- Corallus hortulanus* (Linnaeus, 1758)
- Epicrates cenchria* (Linnaeus, 1758)
- Eunectes murinus* (Linnaeus, 1758)
- Boa constrictor* (Linnaeus, 1758)

Colubridae

- Chironius carinatus* (Linnaeus, 1758)
- Spilotes pullatus* (Linnaeus, 1758)
- Mastigodryas boddaerti* (Sentzen, 1796)

Dactyloidae

- Norops cf chrysolepis* (Duméril & Bibron, 1837)

Dipsadidae

- Erythrolamprus miliaris* (Linnaeus, 1758)
- Imantodes lentiferus* (Cope, 1894)
- Oxyrhopus trigeminus* (Duméril, Bibron & Duméril, 1854)
- Philodryas sp.*
- Pseudoboa nigra* (Duméril, Bibron e Duméril, 1854)
- Leptodeira annulata* (Linnaeus, 1758)
- Erythrolamprus reginae* (Wagler, 1824)
- Sibynomorphus mikanii* (Schlegel, 1837)
- *Helicops angulatus* (Linnaeus, 1758)
- *Philodryas viridissima* (Linnaeus, 1758)
- Xenodon merremii* (Wagler in Spix, 1824)
- *Erythrolamprus poecilogyrus* (Wied, 1824)
- *Erythrolamprus typhlus* (Linnaeus, 1758)

Gekkonidae

- Hemidactylus mabouia* (Moreau de Jonnés, 1818)

Hoplocercidae

- Hoplocercus spinosus* (Fitzinger, 1843)

Iguanidae

- Iguana iguana* (Linnaeus, 1758)

Mabuyidae

- Copeoglossum nigropunctatum* (Spix, 1825)

Notomabuya frenata (Cope, 1862)

Phyllodactylidae

Thecadactylus rapicauda (Houttuyn, 1782)

Polychrotidae

**Polychrus marmoratus* (Linnaeus, 1758)

Sphaerodactylidae

Gonatodes humeralis (Guichenot, 1855)

Chatogekko aff. amazonicus

Teiidae

Ameiva ameiva ameiva (Linnaeus, 1758)

Kentropyx calcarata (Spix, 1825)

Tupinambis teguixin (Linnaeus, 1758)

Salvator merianae (Duméril & Bibron, 1839)

Tropiduridae

Tropidurus oreadicus (Rodrigues, 1987)

Viperidae

Crotalus durissus (Linnaeus, 1758)

Testudines

Chelidae

Mesoclemmys gibba (Schweigger, 1812)

*species captured during the rescue program of the Parnaíba thermoelectric power plant.

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