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Herpetofauna of Marechal Newton Cavalcanti Instruction Center, a hotspot Atlantic Forest fragment in Pernambuco, north-eastern Brazil

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***Abstract.*—Determining the richness and composition of species in an area provides indispensable information for understanding their natural history, habitat requirements, and other ecological interactions; in addition to improving our knowledge of their geographic distributions and a better understanding of their ecophysiological restrictions. The development of strategies that reconcile human population growth with biodiversity conservation is a current challenge for humanity, especially in areas with exceptionally high historical rates of destruction, such as the Atlantic Forest. This work contributes to our understanding of the biodiversity of the Atlantic Forest in the state of Pernambuco, Brazil, by documenting the anuran and reptile species found in the largest Atlantic Forest remnant in the state: the Integral Conservation Protection Rainforest Unit of the Marechal Newton Cavalcanti Instruction Centre (CMINIC). Sampling was carried out between August 2008 and December 2009, and a total of 83 species were recorded, including 30 anuran amphibians and 53 reptiles (three testudines, 19 lizards, two amphisbaenians, 27 snakes, and two crocodilians). Most of the species that were recorded are widely distributed in the Atlantic Forest, although at the state, national and international levels, three of the anurans (10%) and four of the reptiles (7.5%) are in the threatened conservation status classifications. The occurrence of species listed on national and state lists in categories representing critically endangered, endangered, and vulnerable status in this region reinforces the need for conservation actions, and the necessity of obtaining better knowledge about the area, which continues to be poorly studied even today.**

Keywords. Lissamphibia, Sauropsida, richness, diversity, herpetology, South America

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Introduction

The production of updated lists which detail the richness and composition of the species in an area are indispensable for studying diversity, ecosystem compositions, and species distributions (Pedrosa et al. 2014; Freitas et al. 2017). Moreover, such lists are indispensable for developing conservation initiatives, because they provide not only present-day information, but also historic information on the species composition of an area in a past state of preservation (Freitas et al. 2017). The accumulated information brings together records of the occurrence (or disappearance) of species, as well as the occurrence of species in various threat status categories, in areas that may have undergone changes due to anthropogenic degradation, climate shifts, or other modifications (Pedrosa et al. 2014).

Through documenting biodiversity, researchers can contribute to the development of effective management plans for the conservation of individual species, as well as the ecosystems they inhabit (Dixo and Verdade 2006; Pereira et al. 2015). This is particularly important for the Atlantic Forest biome which has been extensively degraded since the period of Brazilian colonization (Dixo and Verdade 2006; Palmeira and Gonçalves 2015). As a result of human population growth, the forest fragments are highly exposed to predators and the anthropogenic degradation of fauna and flora, as well as soil and water pollution (Dixo and Verdade 2006). This situation makes the knowledge of the fauna from this ecosystem a top priority for creating conservation plans (Condez et al. 2009; Palmeira and Gonçalves 2015).

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The Atlantic Forest biome is known to harbor a high richness of anurans (530 species, or 53.6% of the anuran species in Brazil, Santos et al. 2016; Costa and Bérnils 2018) and reptiles (200 species, or 23.7% of reptile species in Brazil, Palmeira and Gonçalves 2015; Costa and Bérnils 2018). This diversity has been attributed to the great variety of habitats and microhabitats in this domain, which also favor a number of specialist species, as well as endemics (Condez et al. 2009; Palmeira and Gonçalves 2015). This work contributes to our knowledge of the biodiversity in the Atlantic Forest of Pernambuco, by providing a list of the anurans and reptiles found in the largest Atlantic Forest remnant in the state, the Integral Conservation Protection Rainforest Unit of the Marechal Newton Cavalcanti Instruction Center (CMINIC).

Materials and Methods

Study area. This study was conducted at the Marechal Newton Cavalcanti Instruction Center (CIMNC; 7.8312°S, 35.1033°W), which is the largest Atlantic Forest fragment of the mesoregion in the rainforest region of the state of Pernambuco, northeastern Brazil (Guimarães 2008; Lucena 2009). It encompasses a total area of 7,342 ha, including the cities of Araçoiaba, Paulista, Igarassu, Paudalho, and Tracunhaem (Lucena 2009), and is approximately 42 km from the state capital of Recife (Fig. 1). It is mostly characterized by a relatively homogeneous conservation state, composed of secondary forests with medium-to-advanced stages of regeneration, with some parts of the area also showing traces of initial regeneration and recent disturbance (Guimarães 2008).

The relief in the region is strongly undulating, and the elevation ranges from 60 to 254 m asl. The climate is tropical with dry summers and an average annual temperature of 25.2 ºC. The rainy season begins in February and ends in October, with an average annual rainfall of 1,634 mm (Guimarães 2008).

Field sampling. Sampling efforts were carried out from August 2008 through December 2009, totaling one year and five months of uninterrupted sampling. Three different sampling strategies were employed: a passive method through pitfall traps (Condez et al. 2009); active searches limited by time; and searches by third parties (i.e., by locals). These three complementary methods were used in order to maximize the diversity of species encountered (Condez et al. 2009; Palmeira and Gonçalves 2015). The naming of species on the list follows *Amphibian Species of the World 6.0, an Online Reference* (Frost 2019) and Costa and Bérnils (2018). Specimens were collected under a scientific permit issued by IBAMA/RAN (088/07).

For pitfall samplings, a total of two trap lines were installed, each composed of ten 60-L buckets, interconnected by 110 m of a 50 cm-high fence, which remained active for 518 days (August 2008 through December 2009), for a total sampling effort of 10.360 d/bucket. The active searches were conducted from August 2008 through December 2009, for a total of 24 searches, each one being 9 h in duration. These were divided into three stages of 3 h each at nightfall (1600–1900 h), at night (2000–2300 h), and at dawn (0430–0730 h), and were always conducted by three collectors, totaling a sampling effort of 648 person-h.

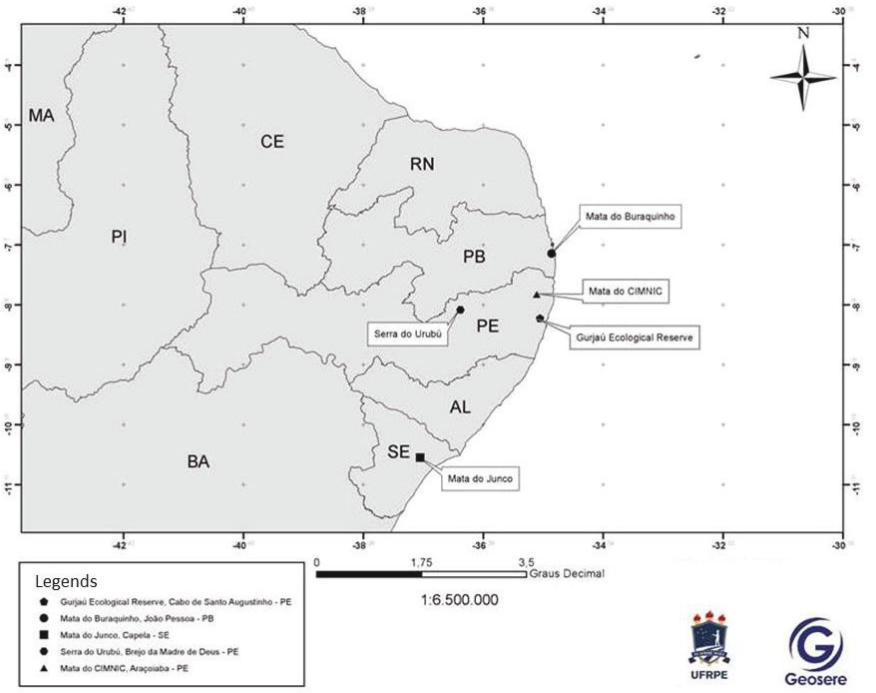

Fig. 1. Atlantic Forest fragment of Marechal Newton Cavalcanti Instruction Center (CIMNIC), Pernambuco, Northeastern Brazil. A few other Ecological Reserves located in Pernambuco State, as well as other states in Northeastern Brazil, are also shown.

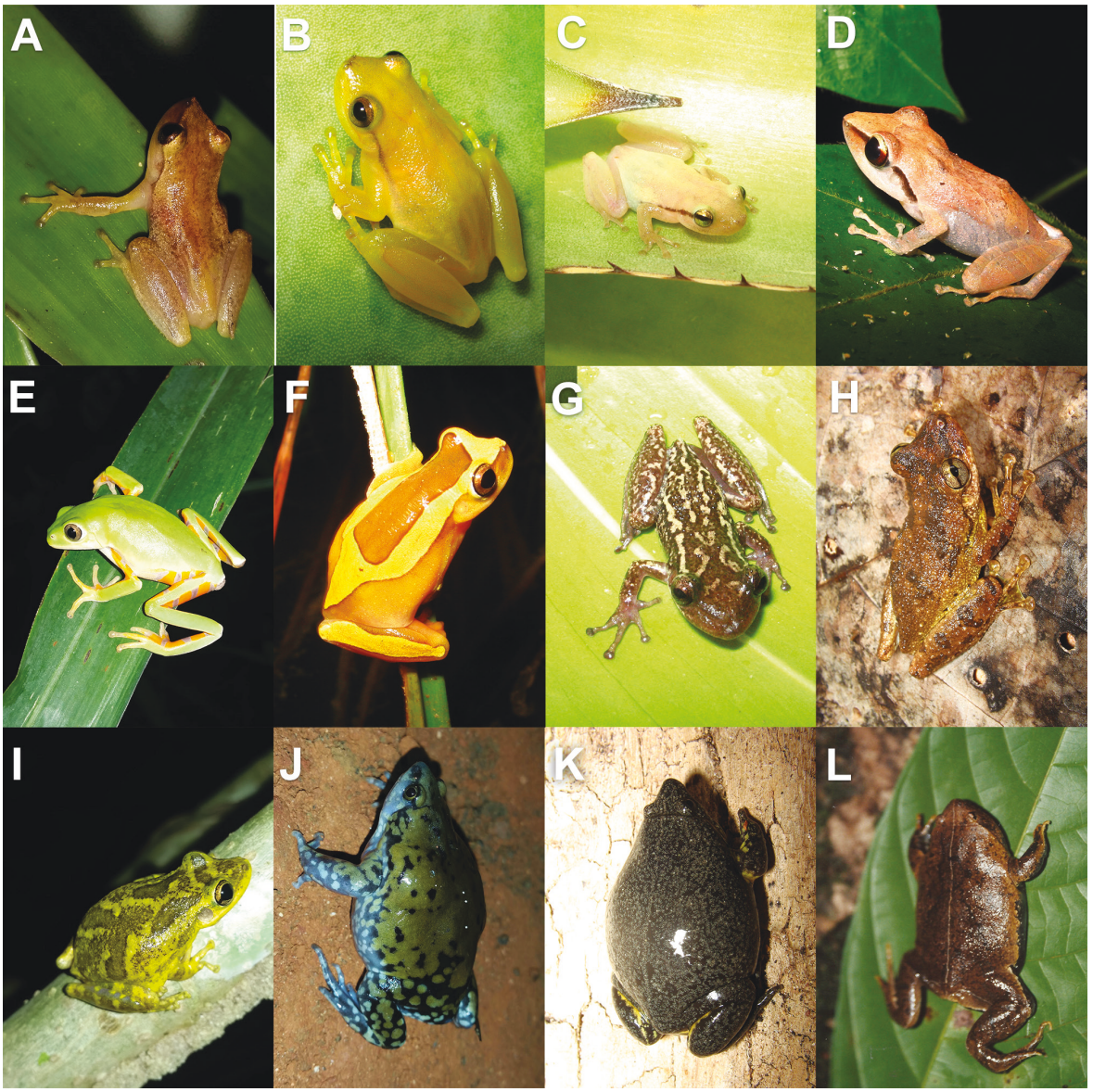

Fig. 2. Anuran species found in the Marechal Newton Cavalcanti Instruction Center Atlantic Forest fragment. **(A)** *Phyllodytes gyrinaethes* (Peixoto, Caramaschi, and Freire, 2003); **(B)** *Phyllodytes edelmoi* (Peixoto, Caramaschi, and Freire, 2003); **(C)** *Phyllodytes luteolus* (Wied-Neuwied, 1824); **(D)** *Pristimantis ramagii* (Boulenger, 1888); **(E)** *Pithecopus nordestinus* (Caramaschi, 2006); **(F)** *Dendropsophus elegans* (Wied-Neuwied, 1824); **(G)** *Scinax cretatus* (Nunes and Pombal, 2011); **(H)** *Scinax eurydice* (Bokermann, 1968); **(I)** *Scinax x-signatus* (Spix, 1824); **(J)** *Dermatonotus muelleri* (Boettger, 1885); **(K)** *Elachistocleis ovalis* (Schneider, 1799); **(L)** *Stereocyclops incrassatus* (Cope, 1870). *Photos: M.A. Freitas*.

One specimen of each species was collected and euthanized with lidocaine application to the ventral region (anuran) or intramuscular ketamine injections (reptiles). The specimens were fixed in 10% formaldehyde, and later preserved in 70% ethanol. All of the collected specimens were deposited at the UFRPE (Universidade Federal Rural de Pernambuco) herpetological and paleoherpetological collection, although for some species only visual and photographic records were obtained. The species conservation status categories were determined using the classification of the International Union for Conservation Nature *Red List of Threatened Species* (IUCN 2017) as well the Brazilian National (MMA 2014) and Pernambuco State lists (SEMAS 2015, 2017) of threatened amphibian and reptile classifications. The information on these lists has been combined into a comprehensive list at the laboratory's website (LEHP 2018). When collections were only obtained from third parties, or represent just one individual captured for a species without accounting, the data were insufficient to generate a reliable sampling curve.

Results

In total, 30 anuran amphibians and 53 reptile species were recorded, which included three testudines, 27 snakes, 19 lizards, two amphisbaenians, and two crocodilians (Figs. 2–6).

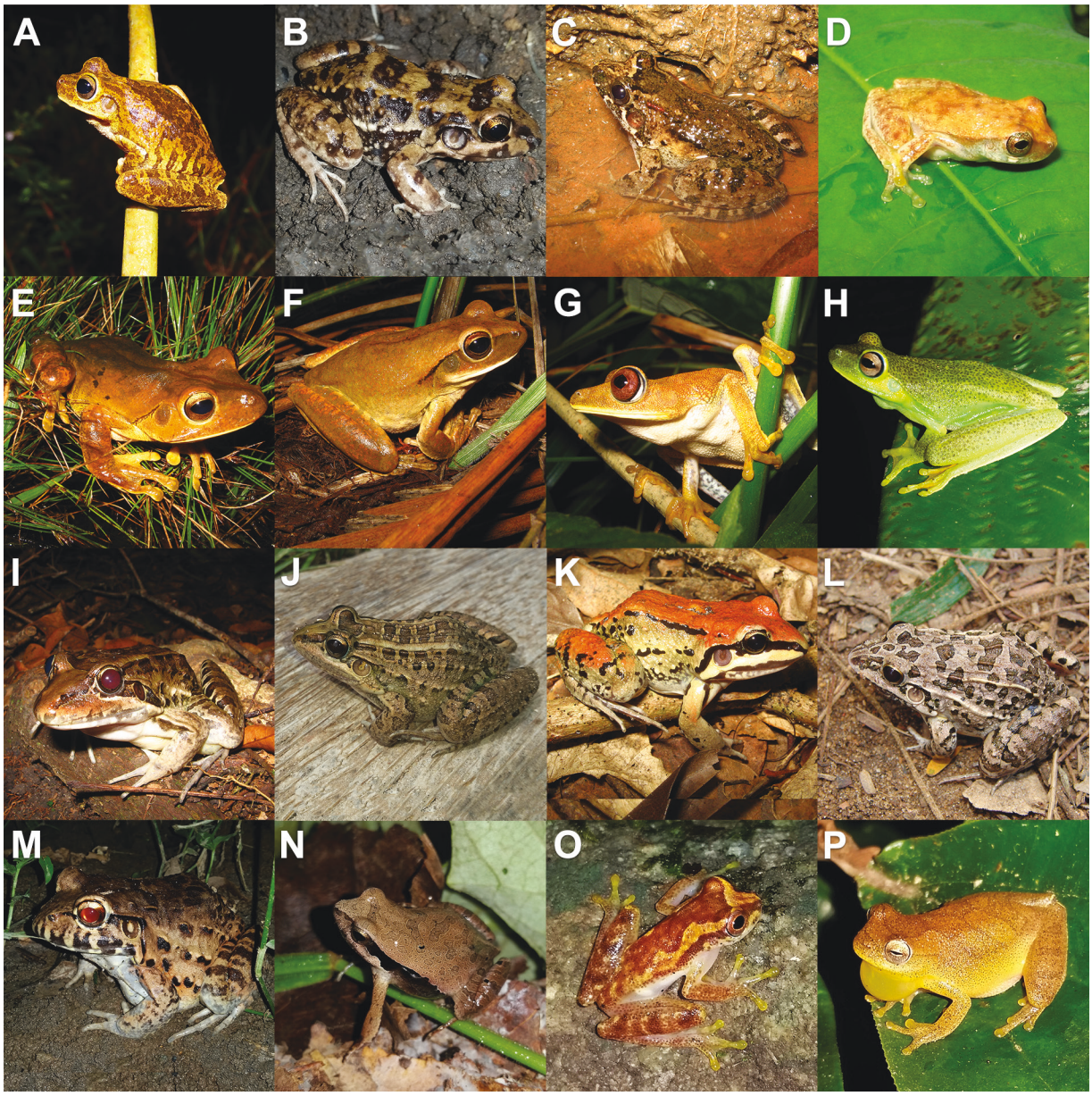

Fig. 3. Additional anuran species found in the Marechal Newton Cavalcanti Instruction Center Atlantic Forest fragment. **(A)** *Boana crepitans* (Wied-Neuwied, 1824); **(B)** *Leptodactylus troglodytes* (A. Lutz, 1926); **(C)** *Leptodactylus natalensis* (A. Lutz, 1930); **(D)** *Dendropsophus branneri* (Cochran, 1948); **(E)** *Boana faber* (Wied-Neuwied, 1821); **(F)** *Boana raniceps* (Cope, 1862); **(G)** *Boana semilineatus* (Spix, 1824); **(H)** *Boana albomarginatus* (Spix, 1824); **(I)** *Leptodactylus latrans* (Linneaus, 1758); **(J)** *Leptodactylus marmoratus* (Steindachner, 1867); **(K)** *Leptodactylus mystacinus* (Burmeister, 1861); **(L)** *Leptodactylus fuscus* (Schneider, 1799); **(M)** *Leptodactylus vastus* (A. Lutz, 1930); **(N)** *Physalaemus cuvieri* (Cruz and Pimenta, 2004); **(O)** *Dendropsophus haddadi* (Bastos and Pombal, 1996); **(P)** *Dendropsophus minutus* (Peters, 1872). *Photos: M.A. Freitas*.

Regarding the conservation status of the reported anuran species for the roughly comparable categories at the three levels (state, national, and international), three (10%, *Phyllodytes acuminatus*, *Phyllodytes edelmoi,* and *Phyllodytes gyrinaethes*) were in the threatened categories, one (3.3%) was Near Threatened (NT), three (10%) were Data Deficient (DD), and 23 (76.7%) were Least Concern (LC). Among reptiles, four species were threatened (7.5%, two lizards, *Strobilurus torquatus* and *Cercosaura ocellata,* and two snakes, *Siphlophis compressus* and *Lachesis muta*), four (7.5%) were DD and 45 (85%) were LC (Table 1; MMA 2014; SEMAS 2015, 2017; IUCN 2017; LEHP 2018).

With respect to the sampling methods, 67 species were collected by active search, 33 by passive search, and 24 by third parties (Table 1). All anuran species were collected by active search, with 18 collected only by active search, while the remaining 12 species were collected by both passive and active searches. For lizards, 11 species were collected through active searching exclusively, while eight species were also captured by passive search. Testudines were not collected by active search, with one

Table 1. Herpetofauna recorded between August 2008 and December 2009 at Marechal Newton Cavalcanti Instruction Center, Pernambuco, Northeastern Brazil. Type of record: CP = Passive collection; CA = Active collection; CT = Collected by third parties; Conservation status codes listed below for either the international, national or state levels: LC = limited concern; DD = insufficient data; NA = not evaluated; NT = near threatened; CT = critically threatened; EN = endangered; VU = vulnerable.

		Conservation status			Sampling method		
Taxon	**Voucher**	**International (IUCN)**	**National**	**State**	**CA**	**CP**	**CT**
Amphibia: Anura							
Craugastoridae							
Pristimantis ramagii (Boulenger, 1888)	0591–0592	LC	LC	LC	X		
Hylidae							
Dendropsophus branneri (Cochran, 1948)	0593	LC	LC	LC	X		
Dendropsophus elegans (Wied-Neuwied, 1824)	3466	LC	LC	LC	X		
Dendropsophus haddadi (Bastos and Pombal, 1996)	VR	LC	LC	LC	X		
Dendropsophus minutus (Peters, 1872)	2495	LC	LC	LC	X		
Boana albomarginatus (Spix, 1824)	2496	LC	LC	LC	X		
Boana crepitans (Wied-Neuwied, 1824)	3789	LC	LC	LC	X		
Boana faber (Wied-Neuwied, 1821)	VR	LC	LC	LC	X		
Boana raniceps (Cope, 1862)	3451–3452	LC	LC	LC	X		
Boana semilineatus (Spix, 1824)	3596	LC	LC	LC	X		
Phyllodytes acuminatus (Bokermann, 1966)	VR	LC	LC	EN	X		
Phyllodytes edelmoi (Peixoto, Caramaschi, and Freire, 2003)	VR	DD	NT	EN	X		
Phyllodytes gyrinaethes (Peixoto, Caramaschi, and Freire, 2003)	VR	DD	CR	EN	X		
Phyllodytes luteolus (Wied-Neuwied, 1824)	VR	LC	LC	LC	X		
Pithecopus nordestinus (Caramaschi, 2006)	2546–2547	DD	LC	LC	X		
Scinax cretatus (Nunes and Pombal, 2011)	VR	LC	LC	LC	X		
Scinax eurydice (Bokermann, 1968)	3477–3478	LC	LC	LC	X		
Scinax x-signatus (Spix, 1824)	2552–2553	LC	LC	LC	X		
Leptodactylidae							
Physalaemus cuvieri (Cruz and Pimenta, 2004)	3401–3402	LC	LC	LC	X	X	
Leptodactylus fuscus (Schneider, 1799)	3556–3557	LC	LC	LC	X	X	
Leptodactylus marmoratus (Steindachner, 1867)	3568	LC	LC	LC	X	X	
Leptodactylus mystacinus (Burmeister, 1861)	VR	LC	LC	LC	X	X	
Leptodactylus natalensis (A. Lutz, 1930)	2651	LC	LC	LC	X	X	
Leptodactylus latrans (Linneaus, 1758)	0840	LC	LC	LC	X	X	
Leptodactylus troglodytes (A. Lutz, 1926)	VR	LC	LC	LC	X	X	
Leptodactylus vastus (A. Lutz, 1930)	1328	LC	LC	LC	X	X	
Mycrohylidae							
Dermatonotus muelleri (Boettger, 1885)	3542	LC	LC	LC	X	X	
Elachistocleis ovalis (Schneider, 1799)	VR	LC	LC	LC	X	X	
Stereocyclops incrassatus (Cope, 1870)	0588–0590	LC	LC	LC	X	X	
Ranidae							
Lithobates palmipes (Spix, 1824)	0852	LC	LC	LC	X	X	
Reptilia: Testudines							
Knosternidae							
Kinosternon scorpioides (Linneaus, 1766)	VR	LC	LC	LC		X	X
Mesoclemmys tuberculata (Lüederwalt, 1926)	VR	NA	LC	LC		X	
Phrynops geoffroanus (Schweigger, 1812)	VR	NA	LC	LC		X	X

Table 1 (continued). Herpetofauna recorded between August 2008 and December 2009 at Marechal Newton Cavalcanti Instruction Center, Pernambuco, Northeastern Brazil. Type of record: CP = Passive collection; CA = Active collection; CT = Collected by third parties; Conservation status codes listed below for either the international, national or state levels: LC = limited concern; DD = insufficient data; NA = not evaluated; NT = near threatened; CT = critically threatened; EN = endangered; VU = vulnerable.

		Conservation status			Sampling method		
Taxon	**Voucher**	**International (IUCN)**	**National**	**State**	**CA**	**CP**	**CT**
Reptilia: Squamata (lacertids)							
Leiosauridae							
Enyalius catenatus (Wied-Neuwied, 1821)	VR	LC	LC	LC	X		
Phyllodactylidae							
Gymnodactylus darwinii (Gray, 1845)	0587	LC	LC	LC	X	X	
Dactyloidae							
Norops fuscoauratus (D'Orbigny, 1837)	VR	LC	LC	LC	X		
Norops punctatus (Daudin, 1802)	0567	LC	LC	LC	X		
Tropiduridae							
Tropidurus hispidus (Spix, 1825)	3600	LC	LC	LC	X		
Tropidurus semitaeniatus (Spix, 1825)	VR	LC	LC	LC	X		
Strobilurus torquatus (Wiegmann, 1834)	VR	LC	LC	VU	X		
Teiidae							
Ameiva ameiva (Linneaus, 1758)	VR	LC	LC	LC	X	X	
Ameivula ocellifera (Spix, 1825)	2540	LC	LC	LC	X	X	
Kentropyx calcarata (Spix, 1825)	0694	LC	LC	LC	X	X	
Salvator merianae (Dumeril and Bíbron,1839)	VR	LC	LC	LC	X		
Gymnophythalmidae							
Acratosaura mentalis (Amaral, 1933)	VR	LC	LC	LC	X	X	
Dryadosaura nordestina (Rodrigues, Xavier Freire, Machado Pellegrino, and Sites, 2005)	VR	LC	LC	LC	X	X	
Cercosaura ocellata (Wagler, 1830)	VR	LC	LC	VU	X	X	
Gekkonidae							
Hemidactylus mabouia (Moreau de Jonnés, 1818)	VR	LC	LC	LC	X		
Iguanidae							
Iguana iguana (Linneaus, 1758)	0831	LC	LC	LC	X		
Polychrotidae							
Polychrus acutirostris (Spix, 1825)	VR	LC	LC	LC	X		
Polychrus marmoratus (Linneaus, 1758)	VR	LC	LC	LC	X		
Coleodactylus meridionalis (Boulenger, 1888)	2865, 2869	LC	LC	LC	X	X	
Reptilia: Squamata (Amphisbaenians)							
Amphisbenidae							
Amphisbaena alba (Liennaeus, 1758)	VR	LC	LC	LC	X		X
Amphisbaena vermiculares (Wagler, 1824)	4468	NA	LC	LC	X		X
Reptilia: Squamata (snakes)							
Boidae							
Boa constrictor (Linneaus, 1758)	VR	NA	LC	LC	X		
Epicrates cenchria (Linneaus, 1758)	VR	NA	LC	LC	X		X
Colubridae							
Chironius flavolineatus (Jan, 1863)	0549	NA	LC	LC	X		
Dendrophidion atlantica (Freire, Caramaschi, and Gonçalves, 2010)	0546	NA	LC	NA	X		X
Spilotes pullatus (Linneaus, 1758)	0554	NA	LC	LC	X		X
Tantilla melanocephala (Linneaus, 1758)	0547	NA	LC	LC	X	X	

Table 1 (continued). Herpetofauna recorded between August 2008 and December 2009 at Marechal Newton Cavalcanti Instruction Center, Pernambuco, Northeastern Brazil. Type of record: CP = Passive collection; CA = Active collection; CT = Collected by third parties; Conservation status codes listed below for either the international, national or state levels: LC = limited concern; DD = insufficient data; NA = not evaluated; NT = near threatened; CT = critically threatened; EN = endangered; VU = vulnerable.

		Conservation status			Sampling method		
Taxon	**Voucher**	**International (IUCN)**	**National**	**State**	**CA**	**CP**	**CT**
Dipsadidae							
Boiruna sertaneja (Zaher, 1996)	VR	NA	LC	LC	X	X	X
Erythrolamprus almadensis (Wagler, 1824)	VR	NA	LC	LC		X	
Erythrolamprus poecilogyrus (Wied-Neuwied, 1825)	4466	NA	LC	LC		X	
Erythrolamprus viridis (Wagler, 1824)	0564, 0566	LC	LC	LC		X	
Helicops angulatus (Linneaus, 1758)	VR	NA	LC	LC			X
Oxybelis aeneus (Wagler, 1824)	4969	NA	LC	LC			X
Oxyrhopus petolarius (Linneaus, 1758)	4492	NA	LC	LC			X
Oxyrhopus trigeminus (Duméril, Bibron, and Dumeril, 1854)	0552	NA	LC	LC	X	X	X
Philodryas olferssi (Lichtenstein, 1823)	VR	NA	LC	LC	X		X
Philodryas patagoniensis (Girard, 1825)	0556	NA	LC	LC	X		
Sibon nebulatus (Linneaus, 1758)	0553	NA	LC	NA			X
Sibynomorphus neuwiedi (Ihering, 1911)	0550	NA	LC	LC	X	X	X
Siphlophis compressus (Daudin, 1803)	0565	LC	LC	VU			X
Thamnodynastes pallidus (Linneaus, 1758)	0548	LC	LC	LC	X		
Xenodon merremii (Wagler, 1824)	0555	NA	LC	LC			X
Elapidae							
Micrurus ibiboboca (Merrem, 1820)	0560–0562	NA	LC	DD		X	X
Micrurus leminiscatus (Linneaus, 1758)	VR	NA	LC	DD		X	X
Micrurus potyguara (Pires, Da Silva Jr. Feitosa, Costa-Prudente, Pereira-Filho, and Zaher, 2014)	0563	NA	LC	DD	X		X
Typhlopidae							
Amerotyphlops brongersmianus (Vanzolini, 1976)	VR	NA	LC	LC	X		
Viperidae							
Crotalus durissus (Linneaus, 1758)	0558	LC	LC	LC	X	X	X
Lachesis muta (Linneaus, 1766)	0559	NA	LC	VU			X
Reptilia: Crocodylia							
Alligatoridae							
Caiman latirostres (Daudin, 1802)	VR	NA	LC	LC	X		X
Paleosuchus palpebrosus (Cuvier, 1807)	VR	LC	LC	DD	X		X
Total					68	33	24

species exclusively captured using a specific trap (funnel trap), and the other two captured by funnel traps and third parties. For crocodilians and amphisbaenians, the traps did not prove to be an adequate collection method, with all four species captured by active search or third parties. The snake species showed the greatest variation in method suitability. Of the 27 snake species, four were captured by all three methods, while three species were found by passive search, five by active search, and seven by third parties. Eight of the snake species were collected using at least two of the collecting methods (Fig. 7).

Discussion

To the best of our knowledge, this study represents the first initiative to catalog the diversity of herpetofauna in the CMNIC area. Several other studies in similar Atlantic Forest remnants (by biome and phytophysiognomy), which covered the same seasons and had similar sample efforts, reported less richness (Fig. 1). These studies were conducted in Serra do Urubú (69 species; 8.5666°S, 35.6166°W; 207 km from our study site; Roberto et al. 2017), Mata do Junco (59 species; 10.5416°S, 37.0583°W; 649 km from our study site; Morato et al.

Fig. 4. Testudines, amphisbaenians, and crocodilians found in the Marechal Newton Cavalcanti Instruction Center Atlantic Forest fragment. **(A)** *Phrynops geoffroanus* (Schweigger, 1812); **(B)** *Kinosternon scorpioides* (Linneaus, 1766); **(C)** *Mesoclemmys tuberculata* (Lüederwalt, 1926); **(D)** *Amphisbaena vermiculares* (Wagler, 1824); **(E)** *Amphisbaena alba* (Liennaeus, 1758); **(F)** *Caiman latirostris* (Daudin, 1802); **(G)** *Paleosuchus palpebrosus* (Cuvier, 1807). *Photos: M.A. Freitas*.

2011), Gurjaú Ecological Reserve (62 species; 8.2291°S, 35.0597°W; 77 km from our study site; Santos et al. 2016; Silva et al. 2017), and Mata do Buraquinho (51 species; 7.145°S, 34.865°W; 110 km from our study site; Santana et al. 2008). However, at these study sites, the thinning curves were not stabilized, which indicates that the diversity could have been even higher.

Based on the inventories published for the Brazil Northeast Atlantic Forest, the richness of the anurans and reptiles shows great diversity in various remnants of this ecosystem (Palmeira and Gonçalves 2015; Santos et al. 2016). In conjunction with the intrinsic aspects of the biological potential of the locality (i.e., microclimate, succession history, etc.), the reported richness also depends on methodological aspects, such as capture strategies and sampling effort. The data reported here suggests that this area is important for conservation, due to the high representation of the species richness (214 sp.) in the state (38.8%) (Martins-Sobrinho et al. 2016; SEMAS 2015). Most of the recorded species (74.6%) are widely distributed in the Atlantic Forest (Dias et al. 2014; Palmeira and Gonçalves 2015; Roberto et al. 2017), as well as other domains (Pedrosa et al. 2014). However, some of the species reported locally in this study, 10% of anurans and 7.5% of reptiles, represent some threatened status categories, reinforcing the need for conservation actions in this region.

Considering the sampling methods, this study revealed that all of the methods used were complementary, being affected by several factors such as species habits (Freitas

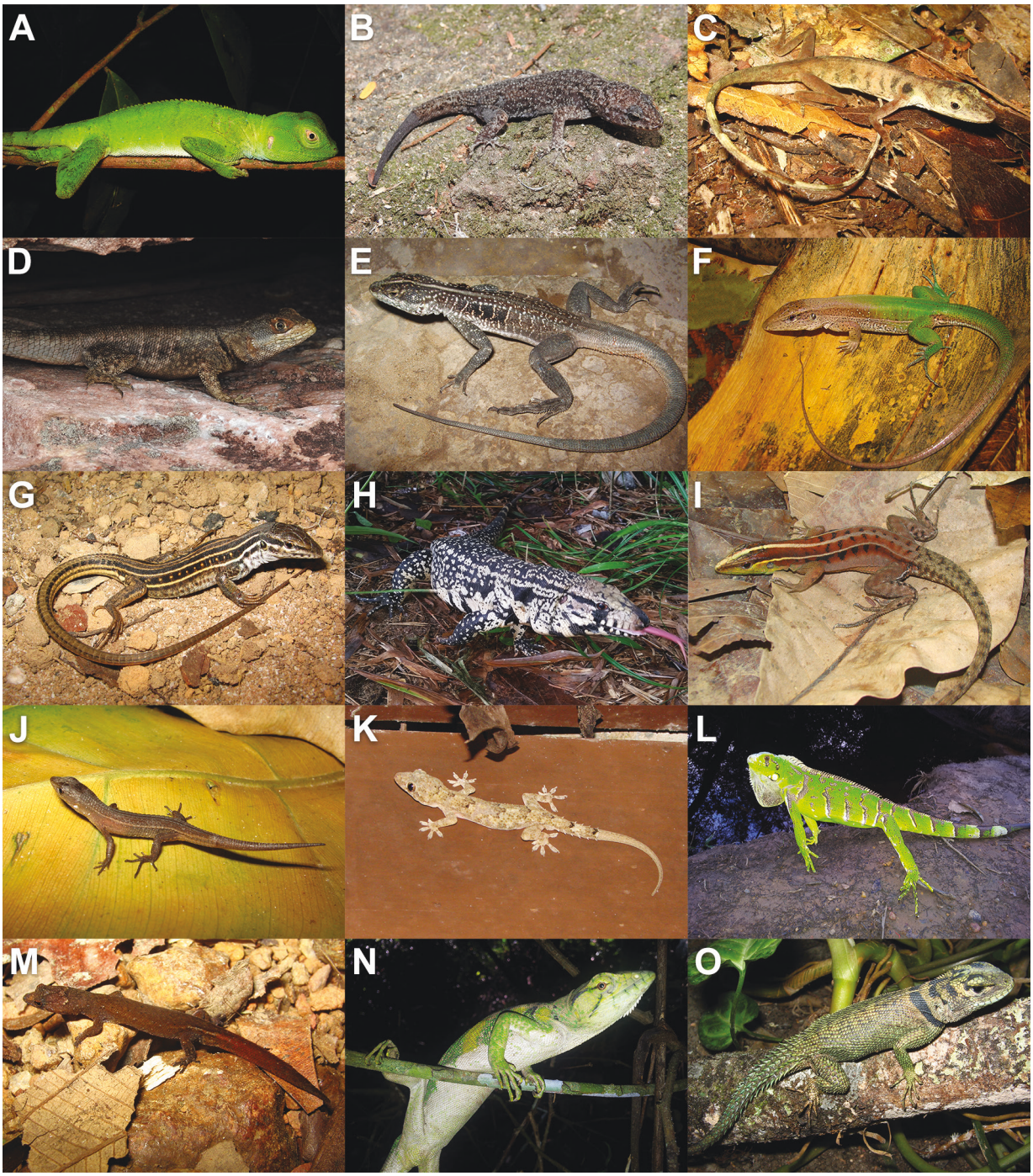

Fig. 5. Lacertid species found in the Marechal Newton Cavalcanti Instruction Center Atlantic Forest fragment. **(A)** *Enyalius catenatus* (Wied-Neuwied, 1821); **(B)** *Gymnodactylus* aff. *darwinii* (Gray, 1845); **(C)** *Norops fuscoauratus* (D'Orbigny, 1837); **(D)** *Tropidurus hispidus* (Spix, 1825); **(E)** *Tropidurus semitaeniatus* (Spix, 1825); **(F)** *Ameiva ameiva* (Linneaus, 1758); **(G)** *Ameivula ocellifera* (Spix, 1825); **(H)** *Salvator merianae* (Dumeril and Bíbron, 1839); **(I)** *Kentropyx calcarata* (Spix, 1825); **(J)** *Cercosaura ocellata* (Weagler, 1830); **(K)** *Hemidactylus mabouia* (Moreau de Jonnés, 1818); **(L)** *Iguana iguana* (Linneaus, 1758); **(M)** *Coleodactylus meridionalis* (Boulenger, 1888); **(N)** *Polychrus marmoratus* (Linneaus, 1758); **(O)** *Strobilurus torquatus* (Wiegmann, 1834). *Photos: M.A. Freitas*.

et al. 2017). Pit traps are very useful in the Atlantic Forest due to the rarity of some of the species. In addition, some of the places are difficult to access, especially for terrestrial and fossorial species such as those in the families Microhylidae (Crump and Scott 1994), Gymnophytalmidae (Garda et al. 2014), and Elapidae (Viana and Mendes 2015). The active search represents a good method for sampling species with arboreal habits (Mesquita et al. 2015), large size (Pedrosa et al. 2014), or species-specific vocalizations (Crump and Scott 1994). Due to the aquatic habitat and difficult conditions for visualizing the individuals through the water, the passive

Fig. 6. Snakes species found in the Marechal Newton Cavalcanti Instruction Center Atlantic Forest fragment. **(A)** *Boa constrictor* (Linneaus, 1758); **(B)** *Epicrates cenchria* (Linneaus, 1758); **(C)** *Chironius flavolineatus* (Jan, 1863); **(D)** *Dendrophidion atlantica* (Freire, Caramaschi, and Gonçalves, 2010); **(E)** *Spilotes pullatus* (Linneaus, 1758); **(F)** *Tantilla melanocephala* (Linneaus, 1758); **(G)** *Erythrolamprus almadensis* (Wagler, 1824); **(H)** *Erythrolamprus poecilogyrus* (Wied-Neuwied, 1825); **(I)** *Erythrolamprus viridis* (Wagler, 1824); **(J)** *Helicops angulatus* (Linneaus, 1758); **(K)** *Oxybelis aeneus* (Wagler, 1824); **(L)** *Oxyrhopus petolarius* (Linneaus, 1758); **(M)** *Oxyrhopus trigeminus* (Duméril, Bibron, and Dumeril, 1854); **(N)** *Philodryas olferssi* (Lichtenstein, 1823); **(O)** *Philodryas patagoniensis* (Girard, 1825); **(P)** *Sibynomorphus neuwiedi* (Ihering, 1911); **(Q)** *Siphlophis compressus* (Daundin, 1803); **(R)** *Xenodon merremii* (Wagler, 1824); **(S)** *Thamnodynastes pallidus* (Linneaus, 1758); **(T)** *Micrurus leminiscatus* (Linneaus, 1758); **(U)** *Micrurus ibiboboca* (Merrem, 1820); **(V)** *Amerotyphlops brongersmianus* (Vanzolini, 1976); **(W)** *Crotalus durissus* (Linneaus, 1758); **(X)** *Lachesis muta* (Linneaus, 1766). *Photos: M.A. Freitas*.

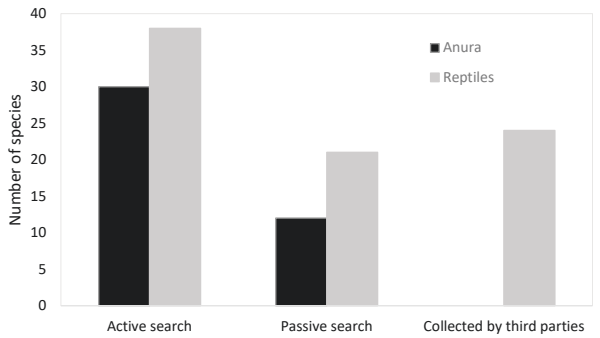

Fig. 7. Comparative evaluation of the sampling methods for anurans and reptiles recorded at Marechal Newton Cavalcanti Instruction Center (CMNIC) Atlantic Forest fragment, from August 2008 through December 2009.

search by funnel trap represents the best option for Testudines, as well as crocodilians (Balestra et al. 2016). The results obtained here are consistent with those from studies which used similar methods (Morato et al. 2011; Dias et al. 2014; Palmeira and Gonçalves 2015; Santos et al. 2016), revealing that the various kinds of methods used are governed by the sample effort, in conjunction with the species-specific and environmental conditions (Pedrosa et al. 2014).

Considering that this study represents the first effort to identify the herpetofauna diversity in this region, the results are able to reveal gaps in the knowledge, raising the awareness of the region's size and unexplored areas. In addition, this work reinforces the need for more data on the fauna that inhabit this study site, especially the herpetofauna given its high diversity in this biome, which will be useful for more accurate wildlife conservation and environmental projects, because surveys such as this one increase the number of species registered in the area. We strongly recommend that long-term studies be conducted in this area, in a further attempt to describe the entire herpetofauna, which could include the addition of new species to the list, in addition to the possibility of new species records for the State of Pernambuco.

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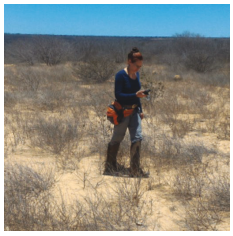

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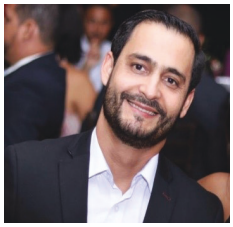

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