

Herpetofauna, Estação Ecológica Estadual do Paraíso, state of Rio de Janeiro, southeastern Brazil

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ABSTRACT: The Brazilian Atlantic Forest is one of the richest and most threatened biomes on Earth. In the state of Rio de Janeiro it is presently reduced to less than 20% of its original extension, and faunal lists are needed for several areas. Here we present a species list of amphibians and reptiles for the Estação Ecológica Estadual do Paraíso (EEEP), a forest reserve located in the central portion of Rio de Janeiro state. The list is based on both primary (gathered during a short-term survey by the authors) and secondary data (obtained from a local reference collection). A total of 30 amphibian (of which six are endemic to the state) and 29 reptile species were recorded from the area (of which 25 and 13, respectively, were obtained by primary data). No threatened or presumably threatened species were present among the herpetofauna of the EEEP.

INTRODUCTION

The Brazilian Atlantic Rainforest is considered one of the world's 34 biodiversity "hotspots" (Mittermeier *et al.* 2004), with an amazing species richness and high degree of endemism of plants and animals (Ribeiro *et al.* 2009). It is also one of the most threatened biomes on Earth, and is currently reduced to an estimated 11% -16% of its original area (Ribeiro *et al.* 2009). The state of Rio de Janeiro is entirely contained within the Atlantic Rainforest domain, though more than 80 % of its original forest cover has been extirpated (Rocha *et al.* 2003). The state harbors a rich vertebrate fauna totaling more than 1000 species (Rocha *et al.* 2003), with a relatively high rate of endemism, especially for amphibians (Rocha *et al.* 2004). Regarding the state's herpetofauna, in particular, Rocha *et al.* (2004) listed 166 amphibian and 127 reptile species. Since then, several species have been added due to descriptions of new taxa (Carvalho-e-Silva and Carvalho-e-Silva 2005; Canedo and Pombal 2007; Pombal *et al.* 2008; Prado and Pombal 2008; Silva and Alves-Silva 2008, 2011; Carvalho-e-Silva *et al.* 2009, 2010; Targino *et al.* 2009; Fernandes *et al.* 2010; Weber *et al.* 2011), to resurrection of taxa from synonymy (Pombal 2010), and to new records of species for the state (Marques *et al.* 2006; Vrcibradic *et al.* 2006a, b, 2010; Pimenta *et al.* 2007; Silveira and Evers Jr. 2007; Carvalho-e-Silva *et al.* 2008; Silveira 2008; Goyannes-Araújo *et al.* 2009; Silva-Soares *et al.* 2009; Silveira *et al.* 2009; Caramaschi 2010; Caram *et al.* 2011), raising the lists of amphibians and reptiles to 189 and 132 species, respectively.

Preliminary lists of species of amphibians and/or reptiles currently exist for some rainforest areas within

the state of Rio de Janeiro (Rocha *et al.* 2000a; Rocha and Van Sluys 2006; Carvalho *et al.* 2007; Almeida-Gomes *et al.* 2008, 2010; Carvalho-e-Silva *et al.* 2008; Pontes *et al.* 2008; Silva *et al.* 2008; Salles *et al.* 2009, 2010; Silva-Soares *et al.* 2010), but for many others this type of information is still lacking. One of these is the Estação Ecológica Estadual do Paraíso (EEEP), which has an area of nearly 5000 ha and is adjacent to other conservation units such as the Parque Nacional da Serra dos Órgãos (*ca.* 11,800 ha) and the Parque Estadual dos Três Picos (*ca.* 46,000 ha). These areas together encompass a large continuous area of mostly montane and low montane rainforest. Information on the herpetofauna of the EEEP currently consists of occurrence records and ecological observations on individual species of frogs (Jordão-Nogueira *et al.* 2006; Siqueira *et al.* 2006; Weber *et al.* 2009) and one snake (Vrcibradic *et al.* 2007), all of which derive from data obtained in an inventory we carried out at the area in 2004. Here, we present the complete species list obtained during that inventory through both primary (*i.e.* obtained through fieldwork during a short-term survey) and secondary data (*i.e.* obtained from a local reference collection).

MATERIALS AND METHODS

Study site

The Estação Ecológica Estadual do Paraíso (22°26' - 22°32' S, 42°50' - 42°56' W) comprises an area of 4920 ha included in the municipalities of Guapimirim and Cachoeiras de Macacu, in the central portion of the state of Rio de Janeiro, southeastern Brazil (Figure 1). Most of the reserve is covered by Atlantic Forest in different stages of conservation, including portions of relatively undisturbed

forest. Altitude in the reserve varies from 20 to 1350 m above sea level. Climate of the region is wet and warm, with a total annual rainfall between 2000 and 3000 mm and a mean annual temperature of 23°C (Kurtz and Araújo 2000).

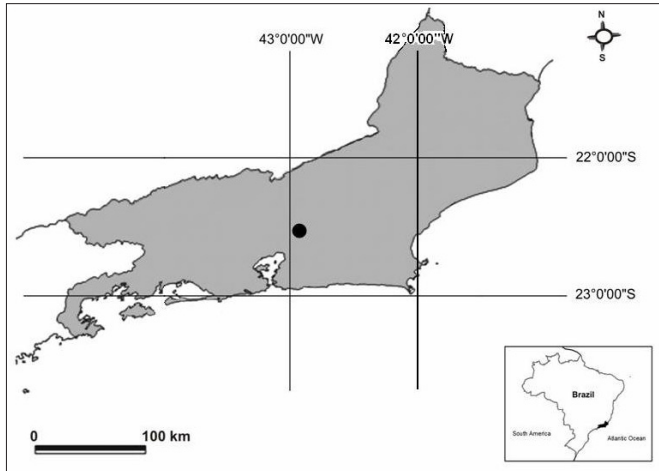


FIGURE 1. Map showing the location of the Estação Ecológica Estadual do Paraíso in the state of Rio de Janeiro, southeastern Brazil (dot).

Data collection

The present inventory was carried out in portions of the forest located between 40 and 300 m elevation, in the municipality of Guapimirim. Most of the fieldwork was carried out during late September 2004. Sampling of amphibians and reptiles was done using three methodologies: time-constrained visual searches (see Crump and Scott Jr. 1994) totaling 107 hours of searching, 28 quadrats (plots) of 25 m² (see Jaeger and Inger 1994) totaling 700 m² of forest floor area sampled, and three systems of pitfall traps with drift fences (see Corn 1994) containing ten buckets each. Pitfall traps were used for a total of 20 days between mid-September and early October. All specimens of amphibians and reptiles found during casual encounters (*i.e.* not using the above methodologies) were also collected. Collections were done under license 067/06 issued by Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis (IBAMA). Voucher specimens of all reptile and amphibian species collected by us during fieldwork at the EEEP were deposited at the Museu Nacional, in Rio de Janeiro (Appendix 1).

Additionally, we examined and identified all specimens of amphibians (N = 55) and reptiles (N = 35) from the reference collection of the Centro de Primatologia do Rio de Janeiro (CPRJ), which is located within the EEEP. These specimens were all preserved in alcohol, with numbered tags attached, but lacked any taxonomic identification. All species present at the CPRJ collection that we had not recorded during fieldwork were added to our list.

The nomenclature of amphibian and reptile taxa herein follows Frost (2011) and Uetz (2011), respectively.

RESULTS AND DISCUSSION

We recorded 25 amphibian species (all anurans) and 13 reptile species (seven lizards and six snakes) during our field surveys at the EEEP. Additionally, we added five amphibian species and 16 reptile species from the CPRJ

collection that had not been recorded during our surveys. Therefore, a total of 30 amphibian species (all anurans) (Table 1; Figure 2) and 29 reptile species (nine lizards, one amphisbaenian, and 19 snakes) (Table 2; Figure 3) are currently known to occur at the EEEP. This corresponds to *ca.* 16% and *ca.* 22%, respectively, of the total species richness of amphibians and reptiles occurring in the state. Although the species list reported here for the EEEP should be considered as preliminary, and would certainly increase with further sampling, it indicates that this reserve harbors nearly 20% of the state's herpetofauna. Also, six of the amphibians in our list (*Ischnocnema octavioi* (Bokermann, 1965), *Hypsiboas secedens* (Lutz, 1963), *Scinax albicans* (Bokermann, 1967), *S. humilis* (Lutz, 1954), *Euparkerella*

TABLE 1. Amphibian species of Estação Ecológica Estadual do Paraíso, in Rio de Janeiro state, Brazil. Species that have not been recorded during fieldwork by the authors but that are represented in the reference collection of the Centro de Primatologia do Rio de Janeiro are followed by the letters "CPRJ".

TAXA
Brachycephalidae
<i>Ischnocnema guentheri</i> (Steindachner, 1864)
<i>Ischnocnema octavioi</i> (Bokermann, 1965)
Bufonidae
<i>Dendrophryniscus brevipollicatus</i> Jiménez de La Espada, 1870 CPRJ
<i>Rhinella hoogmoedi</i> Caramaschi and Pombal Jr., 2006
<i>Rhinella icterica</i> (Spix, 1824)
<i>Rhinella ornata</i> (Spix, 1824)
Craugastoridae
<i>Haddadus binotatus</i> (Spix, 1824)
Cycloramphidae
<i>Cycloramphus brasiliensis</i> (Steindachner, 1864)
<i>Proceratophrys appendiculata</i> (Günther, 1873) CPRJ
<i>Proceratophrys boiei</i> (Wied, 1824)
<i>Thoropa miliaris</i> (Spix, 1824)
<i>Zachaeus parvulus</i> (Girard, 1853)
Hylidae
<i>Aplastodiscus eugenioi</i> (Carvalho-e-Silva and Carvalho-e-Silva, 2005)
<i>Hypsiboas albomarginatus</i> (Spix, 1824) CPRJ
<i>Hypsiboas faber</i> (Wied-Neuwied, 1821) CPRJ
<i>Hypsiboas secedens</i> (Lutz, 1963)
<i>Hypsiboas semilineatus</i> (Spix, 1824)
<i>Scinax albicans</i> (Bokermann, 1967)
<i>Scinax alter</i> (B. Lutz, 1973)
<i>Scinax argyreornatus</i> (Miranda-Ribeiro, 1926)
<i>Scinax humilis</i> (Lutz, 1954)
<i>Scinax aff. x-signatus</i> (Spix, 1824)
<i>Trachycephalus mesophaeus</i> (Hensel, 1867)
Hylodidae
<i>Crossodactylus aeneus</i> Müller, 1924
<i>Hylodes</i> sp. CPRJ
Leiuperidae
<i>Physalaemus signifer</i> (Girard, 1853)
Leptodactylidae
<i>Leptodactylus latrans</i> (Steffen, 1815)
<i>Leptodactylus</i> (= <i>Adenomera</i>) <i>marmoratus</i> (Steindachner, 1867)
Strabomantidae
<i>Euparkerella brasiliensis</i> (Parker, 1926)
<i>Euparkerella cochraniae</i> Izecksohn, 1988

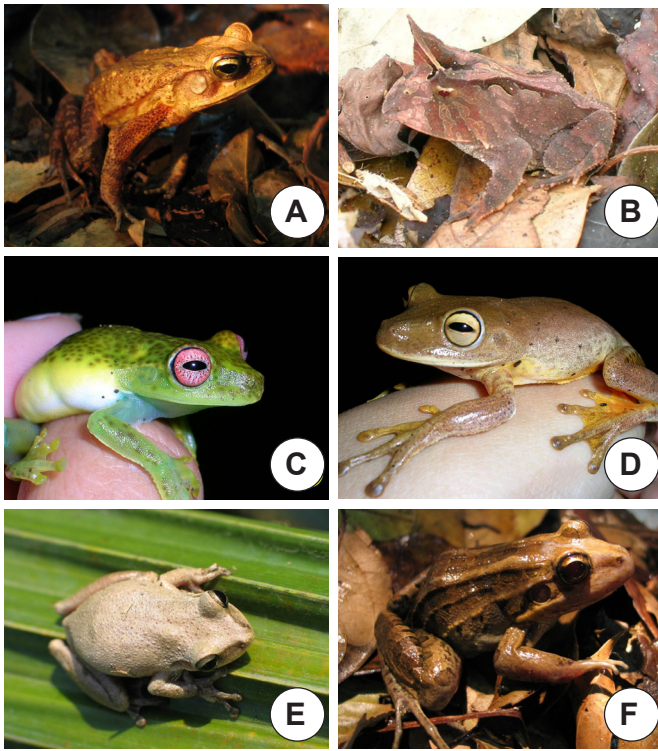


FIGURE 2. Some species of amphibians recorded at the Estação Ecológica Estadual do Paraíso, state of Rio de Janeiro, southeastern Brazil: A) *Rhinella ornata* (Photo by C. F. D. Rocha); B) *Proceratophrys boiei* (Photo by T. Klaion); C) *Aplastodiscus eugenioi* (Photo by T. Klaion); D) *Hypsiboas secedens* (Photo by T. Klaion); E) *Scinax* aff. *x-signatus* (Photo by C. F. D. Rocha); F) *Leptodactylus latrans* (Photo by C. F. D. Rocha).

brasiliensis (Parker, 1926), and *E. cochranæ* Izecksohn, 1988) are considered endemic to the state of Rio de Janeiro (Rocha et al. 2004; Weber et al. 2009).

The only exotic species recorded among the local herpetofauna was the gekkonid lizard *Hemidactylus mabouia* (Moreau de Jonnès, 1818). This is a species of African origin that is currently widespread throughout Brazil, being usually associated to disturbed habitats, although in some cases it has been known to successfully invade natural habitats (Anjos and Rocha 2008). Nevertheless, the sole individual of *H. mabouia* collected during the present study was found on the wall of a building, with no records of the species occurring in natural habitats within the reserve. This suggests that *H. mabouia* may not have become an invasive species in the area and is possibly confined to perianthropic environments.

None of the species listed for the EEEP is considered threatened or presumably threatened at either a state-wide (Caramaschi et al. 2000; Rocha et al. 2000b), a country-wide (Machado et al. 2008), or a global scale (IUCN 2011). In the case of amphibians, the four species considered as threatened within the state of Rio de Janeiro are all typical of relatively high altitudes at the Itatiaia and Serra dos Órgãos mountain ranges (Caramaschi et al. 2000). Thus, the absence of threatened species among the herpetofauna of the EEEP could be partly due to the lack of sampling at higher altitudes. Nevertheless, two of

the amphibian species recorded at the EEEP, *Aplastodiscus eugenioi* (Carvalho-e-Silva and Carvalho-e-Silva, 2005) and *Cycloramphus brasiliensis* (Steindachner, 1864), are listed as “Near Threatened” by the IUCN (2011), with the latter also categorized as having decreasing population trends. This highlights the importance of those species occurring within a conservation unit such as the EEEP.

TABLE 2. Reptile species of Estação Ecológica Estadual do Paraíso, in Rio de Janeiro State, Brazil. Species that have been observed by the authors but not collected are marked with an asterisk (*). Species that have not been recorded during fieldwork by the authors but that are represented in the reference collection of the Centro de Primatologia do Rio de Janeiro are followed by the letters “CPRJ”.

TAXA
LACERTILIA
Amphisbaenidae
<i>Leposternon microcephalum</i> Wagler, 1824 CPRJ
Anguidae
<i>Ophiodes striatus</i> (Spix, 1825) CPRJ
Gekkonidae
<i>Hemidactylus mabouia</i> (Moreau de Jonnès, 1818)
Gymnophthalmidae
<i>Ecleopus gaudichaudi</i> Duméril and Bibron, 1839
<i>Placosoma glabellum</i> (Peters, 1870)
Leiosauridae
<i>Enyalius brasiliensis</i> (Lesson, 1828)
Phyllodactylidae
<i>Gymnodactylus darwini</i> (Gray, 1845)
Polychrotidae
<i>Anolis punctatus</i> Daudin, 1802 CPRJ
Teiidae
<i>Ameiva ameiva</i> (Linnaeus, 1758)*
<i>Tupinambis merianae</i> (Duméril and Bibron, 1839)*
SERPENTES
Boidae
<i>Boa constrictor</i> Linnaeus, 1758*
<i>Corallus hortulanus</i> (Linnaeus, 1758)
Colubridae
<i>Chironius foveatus</i> Bailey, 1955 CPRJ
<i>Chironius fuscus</i> (Linnaeus, 1758)
<i>Leptophis ahaetulla</i> (Linnaeus, 1758) CPRJ
<i>Pseustes sulphureus</i> (Wagler, 1824) CPRJ
<i>Spilotes pullatus</i> (Linnaeus, 1758) CPRJ
Dipsadidae
<i>Echinanthera cephalostriata</i> Di-Bernardo, 1996 CPRJ
<i>Helicops carinicaudus</i> (Wied, 1825) CPRJ
<i>Leptodeira annulata</i> (Linnaeus, 1758)
<i>Liophis miliaris</i> (Linnaeus, 1758) CPRJ
<i>Liophis reginae</i> (Linnaeus, 1758)
<i>Oxyrhopus petola</i> (Linnaeus, 1758) CPRJ
<i>Siphlophis compressus</i> (Daudin, 1803) CPRJ
<i>Tropidodryas striaticeps</i> (Cope, 1869) CPRJ
<i>Xenodon newwiedii</i> Günther, 1863 CPRJ
Elapidae
<i>Micrurus corallinus</i> (Merrem, 1820) CPRJ
Viperidae
<i>Bothropoides</i> (= <i>Bothrops</i>) <i>jararaca</i> (Wied, 1824)
<i>Bothrops jararacussu</i> Lacerda, 1884 CPRJ

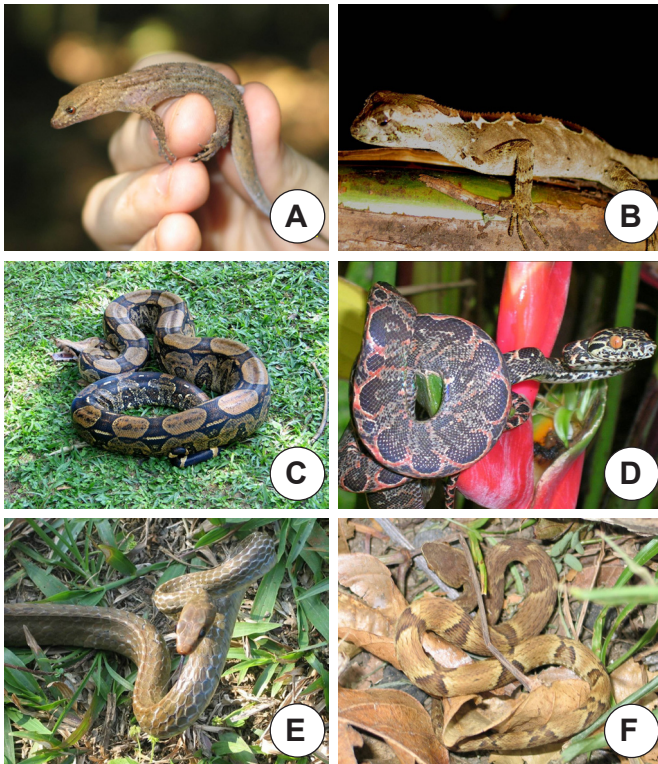


FIGURE 3. Some species of reptiles recorded at the Estação Ecológica Estadual do Paraíso, state of Rio de Janeiro, southeastern Brazil: A) *Gymnodactylus darwini* (Photo by C. F. D. Rocha); B) *Enyalius brasiliensis* (Photo by C. F. D. Rocha); C) *Boa constrictor* (Photo by H. G. Bergallo); D) *Corallus hortulanus* (Photo by T. Klaion); E) *Chironius fuscus* (Photo by C. F. D. Rocha); F) *Bothropoides jararaca* (Photo by C. F. D. Rocha).

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APPENDIX 1. Voucher specimens deposited at the collections of the Museu Nacional, Rio de Janeiro (MNRJ) and of the Centro de Primatologia do Rio de Janeiro (CPRJ); only for taxa not recorded by the authors during fieldwork.

AMPHIBIANS: Brachycephalidae: *Ischnocnema guentheri* (MNRJ 76430-32); *Ischnocnema octavioi* (MNRJ 40591-92); Bufonidae: *Dendrophryniscus brevipollicatus* (CPRJ 066); *Rhinella hoogmoedi* (MNRJ 45741); *Rhinella icterica* (MNRJ 45782); *Rhinella ornata* (MNRJ 62332-42); Craugastoridae: *Haddadus binotatus* (MNRJ 76429); Cycloramphidae: *Cycloramphus brasiliensis* (MNRJ 76426-28); *Proceratophrys appendiculata* (CPRJ 037); *Proceratophrys boiei* (MNRJ 68795-809); *Thoropa miliaris* (MNRJ 45692-707); *Zachaeus parvulus* (MNRJ 59403); Hylidae: *Aplastodiscus eugenioi* (MNRJ 45786-89); *Hypsiboas albomarginatus* (CPRJ 007); *Hypsiboas faber* (CPRJ 159); *Hypsiboas secedens* (MNRJ 40615); *Hypsiboas semilineatus* (MNRJ 40738, 47986); *Scinax albicans* (MNRJ 40104-09); *Scinax alter* (MNRJ 40736-37); *Scinax argyreornatus* (MNRJ 47989); *Scinax humilis* (MNRJ 40096-103, 47987); *Scinax* aff. *x-signatus* (MNRJ 39657); *Trachycephalus mesophaeus* (MNRJ 45790, 47988); Hylodidae: *Crossodactylus aeneus* (MNRJ 42293-330); *Hylodes* sp. (CPRJ 104); Leiuperidae: *Physalaemus signifer* (MNRJ 76405-25); Leptodactylidae: *Leptodactylus latrans* (MNRJ 53746, 76439); *Leptodactylus marmoratus* (MNRJ 76440-51); Strabomantidae: *Euparkerella brasiliensis* (MNRJ 40596, 40598); *Euparkerella cochranae* (MNRJ 40593-95, 40597, 40599, 48243). **REPTILES:** Amphisbaenidae: *Leposternon microcephalum* (CPRJ 139); Anguillidae: *Ophiodes striatus* (CPRJ 011); Boidae: *Corallus hortulanus* (MNRJ 12230); Colubridae: *Chironius foveatus* (CPRJ 045); *Chironius fuscus* (MNRJ 12233-34); *Leptophis ahaetulla* (CPRJ 155, 174); *Pseustes sulphureus* (CPRJ 039); *Spilotes pullatus* (CPRJ 074); Dipsadidae: *Echinanthera cephalostriata* (CPRJ 047); *Helicops carinicaudus* (CPRJ 012, 141); *Leptodeira annulata* (MNRJ 12232); *Liophis miliaris* (CPRJ 073, 088, 092); *Liophis reginae* (MNRJ 12080); *Oxyrhopus petola* (CPRJ 098); *Siphophis compressus* (CPRJ 015, 068); *Tropidodryas striaticeps* (CPRJ 072); *Xenodon newwiedii* (CPRJ 016, 167); Elapidae: *Micrurus corallinus* (CPRJ 044, 117, 118, 121, 149, 168, 175); Gekkonidae: *Hemidactylus mabouia* (MNRJ 12094); Gymnophthalmidae: *Ecleopos gaudichaudi* (MNRJ 12089, 12096); *Placosoma glabellum* (MNRJ 12090); Leiosauridae: *Enyalius brasiliensis* (MNRJ 12091-93); Phyllodactylidae: *Gymnodactylus darwini* (MNRJ 12097); Polychrotidae: *Anolis punctatus* (CPRJ 119, 161); Viperidae: *Bothropoides jararaca* (MNRJ 12231); *Bothrops jararacussu* (CPRJ 050, 075, 160).