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LISTS OF SPECIES

Amphibia, Anura, Parque Natural Municipal da Taquara, municipality of Duque de Caxias, state of Rio de Janeiro, southeastern Brazil

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Abstract: Herein is presented a list of the amphibians from the *Parque Natural Municipal da Taquara* (22°35'S, 43°14'W), an area of Atlantic Rainforest at municipality of Duque de Caxias, state of Rio de Janeiro, southeastern Brazil. The work was carried out from September 2006 to October 2008. Expeditions were made three times a week during the day, and once a month at night. We recorded 50 species of anuran amphibians distributed in 13 families: Amphignathodontidae (1 species), Brachycephalidae (2), Bufonidae (2), Centrolenidae (1), Craugastoridae (1), Cycloramphidae (3), Hylidae (29), Hylodidae (3), Leiuperidae (1), Leptodactylidae (4), Microhylidae (1), Strabomantidae (1), and Ranidae (1). Some species had their range extended. The present study demonstrates that the *Parque Natural Municipal da Taquara* is a conservation area of huge importance to the preservation of the amphibian communities that inhabit this Atlantic Rainforest lowland environment.

Introduction

The *Parque Natural Municipal da Taquara* is situated in the municipality of Duque de Caxias, lowlands of state of Rio de Janeiro, Brazil, and included in the Atlantic Rainforest domain (*sensu* Ab'Saber 1977). This complex environment presents high number of species, with high levels of endemism as well (Myers et al. 2000). About 286 amphibian species are endemic of this environment (Mittermeier et al. 2004).

Currently, the Atlantic Rainforest is probably one of the most highly threatened forests. From the 139,584,893 original hectares, the forest is now restrict to only about 16,377,472 ha, most existing in small fragments (<100 ha as suggested by Ranta et al. 1998) that represent 11.73 % of its original extension (Ribeiro et al. 2009), and these last priority areas are under enormous anthropogenic action and strong risk of extinction (Morellato and Haddad 2000). The fragmentation of the Atlantic Rain Forest and its conservation are subjects of several recent studies (Brown and Freitas 2000; Machado and Fonseca 2000; Strier 2000; Tabanez and Viana 2000). It is of common agreement among those authors that even these remaining Atlantic Rainforest fragments detain a large variety of species.

The Brazilian amphibian communities of this environment have also been subject of studies from several authors for a long time (e.g. Myers 1946; Lutz 1954; Heyer 1990; Haddad and Sazima 1992; Feio et al. 1998; Izecksohn and Carvalho-e-Silva 2001; Carvalho-e-Silva et al. 2008). The huge diversity of the taxa associated to the high endemism in this environment (Brown and Brown 1992), allow vast assortment of works yet to be executed.

However, there are few researches related to the lowland areas of the Atlantic Rainforest and the knowledge about amphibians in this environment is still incipient. Probably, many amphibian species of this environment were extinct before any researcher could have access to some specimens. The vulnerability of many species of amphibians is, in part, due to its endemism (Brown and Brown 1992) and their specialized

reproductive mechanisms as well. Currently, 39 reproductive modes are known for anurans, 25 of them found in species inhabiting the Atlantic Rainforest (Haddad and Prado 2005).

The study of the biodiversity, on the composition and distribution of species, or communities' ecology are among the basic objectives of the Global Strategy to the Diversity (Wilson 1992). In this context, in the attempt of providing additional data on anuran fauna of the lowlands of the state of Rio de Janeiro and its Conservation Units, we herein present an inventory of the amphibians from the *Parque Natural Municipal da Taquara*.

Material And Methods

Study site

The study site is the *Parque Natural Municipal da Taquara* (PNMT; 22°35'S, 43°14'W) and its neighboring areas, situated in the municipality of Duque de Caxias, state of Rio de Janeiro, southeastern Brazil (Figure 1). The PNMT, placed at Serra do Mar complex, has approximately 20.14 ha and altitudes under 100 meters. The native vegetation of this region is classified as Ombrophilous Forest, found in subtropical to tropical parts of the southeastern Atlantic Rainforest (Rizini 1979; Fernandes 1998).

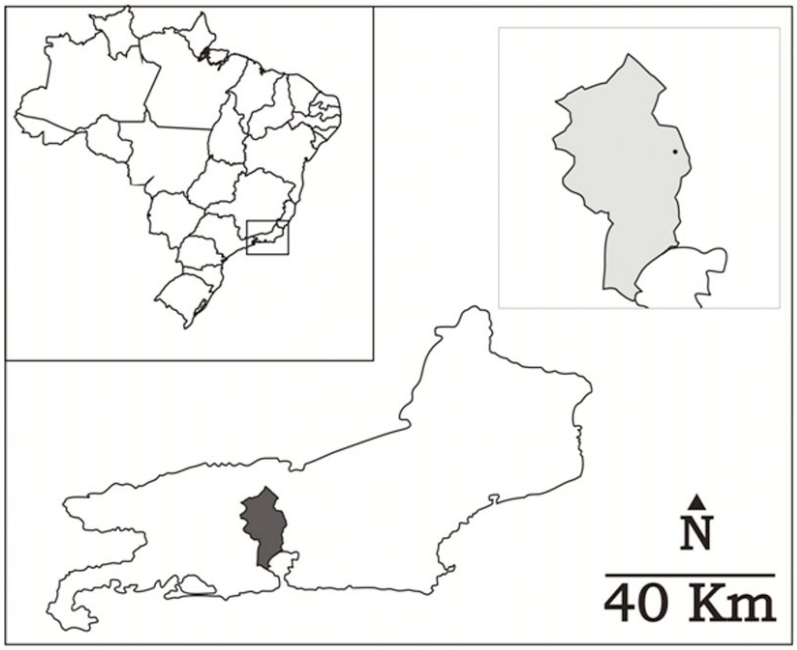

Figure 1. Location of the municipality of Duque de Caxias in state of Rio de Janeiro, Brazil (gray), and the *Parque Natural Municipal da Taquara* (dot).

Data collection

Field work was carried out three times a week during the day and once a month during the night from September 2006 to October 2008. Amphibians were captured using the active-searching method (Franco et al. 2002), with the aid of flashlights during night samplings. Adult specimens were manually collected and field notes were taken according to Lehner (1979). Tadpoles were collected with fishnets. All specimens collected were preserved according to the usual techniques for the group proposed by McDiarmid (1994).

Voucher specimens are housed at the herpetological collection of *Museu Nacional*, *Universidade Federal do Rio de Janeiro* (MNRJ), Rio de Janeiro, Brazil (Appendix 1). Collection permits were issued by the *Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renováveis* (IBAMA; permit # 14495, process 2027009).

Results

We have recorded 50 anuran species in the PNMT, distributed in 13 families (number of species in parenthesis): Amphignathodontidae (1), Brachycephalidae (2), Bufonidae (2), Centrolenidae (1), Craugastoridae (1), Cycloramphidae (3), Hylidae (29), Hylodidae (3), Leiuperidae (1), Leptodactylidae (4), Microhylidae (1), Strabomantidae (1) and Ranidae (1) (Table 1; Figures 2-7).

Figure 2. Anurans from *Parque Natural Municipal da Taquara*: A - *Flectonotus goeldii*; B - *Haddadus binotatus*; C - *Ischnocnema guentheri*; D - *Ischnocnema parva*; E - *Rhinella ornata*; F - *Rhinella icterica*.

Figure 3. Anurans from *Parque Natural Municipal da Taquara*: A - *Proceratophrys appendiculata*; B - *Thoropa miliaris*; C - *Dendropsophus bipunctatus*; D - *Dendropsophus berthalutzae*; E - *Dendropsophus elegans*; F - *Dendropsophus decipiens*.

Figure 4. Anurans from *Parque Natural Municipal da Taquara*: A - *Dendropsophus giesleri*; B - *Dendropsophus minutus*; C - *Dendropsophus meridianus*; D - *Hypsiboas albomarginatus*; E - *Hypsiboas faber*; F - *Hypsiboas semilineatus*; G - *Hypsiboas pardalis*.

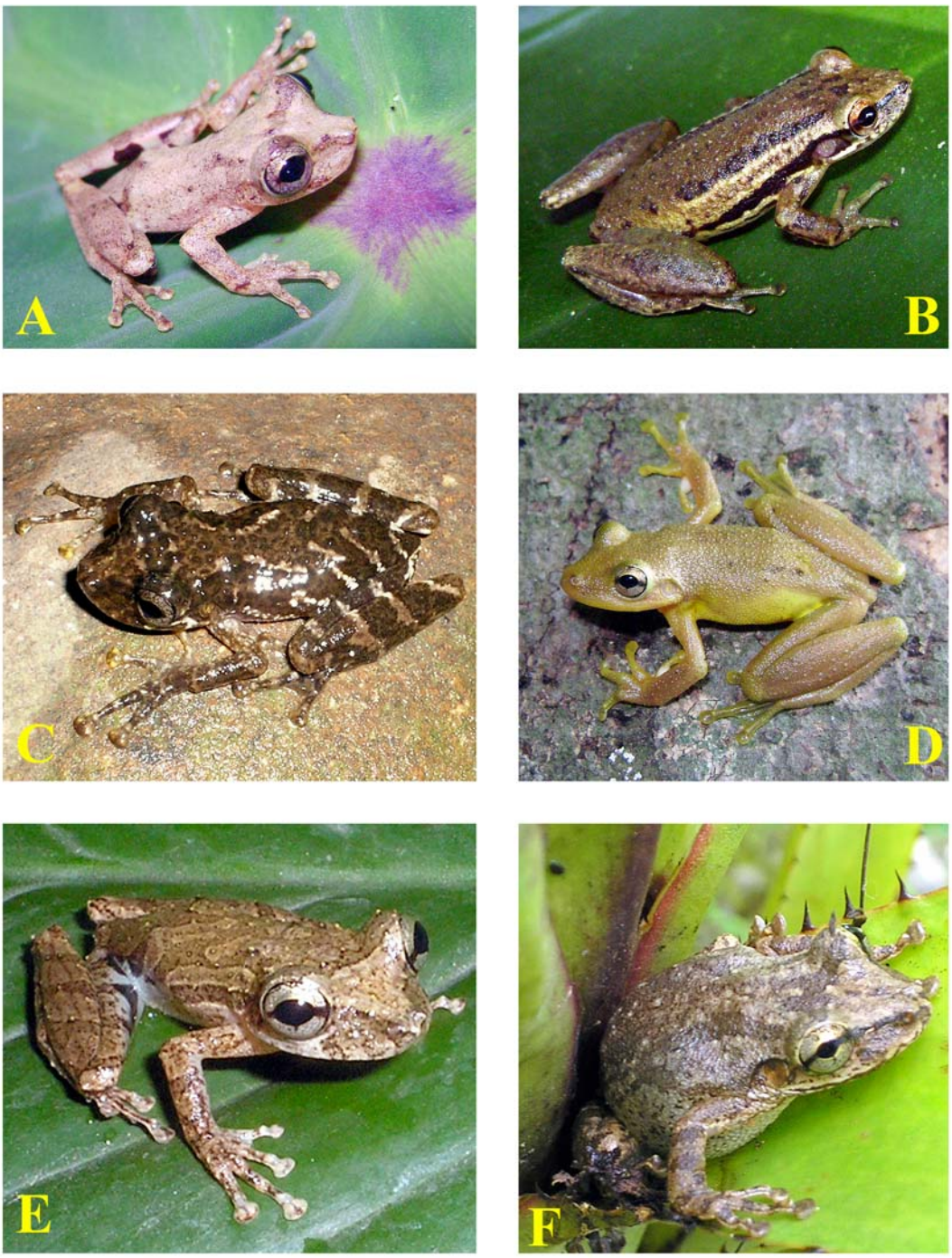

Figure 5. Anurans from *Parque Natural Municipal da Taquara*: A - *Scinax albicans*; B - *Scinax alter*; C - *Scinax flavoguttatus*; D - *Scinax hayii*; E - *Scinax humilis*; F - *Scinax similis*.

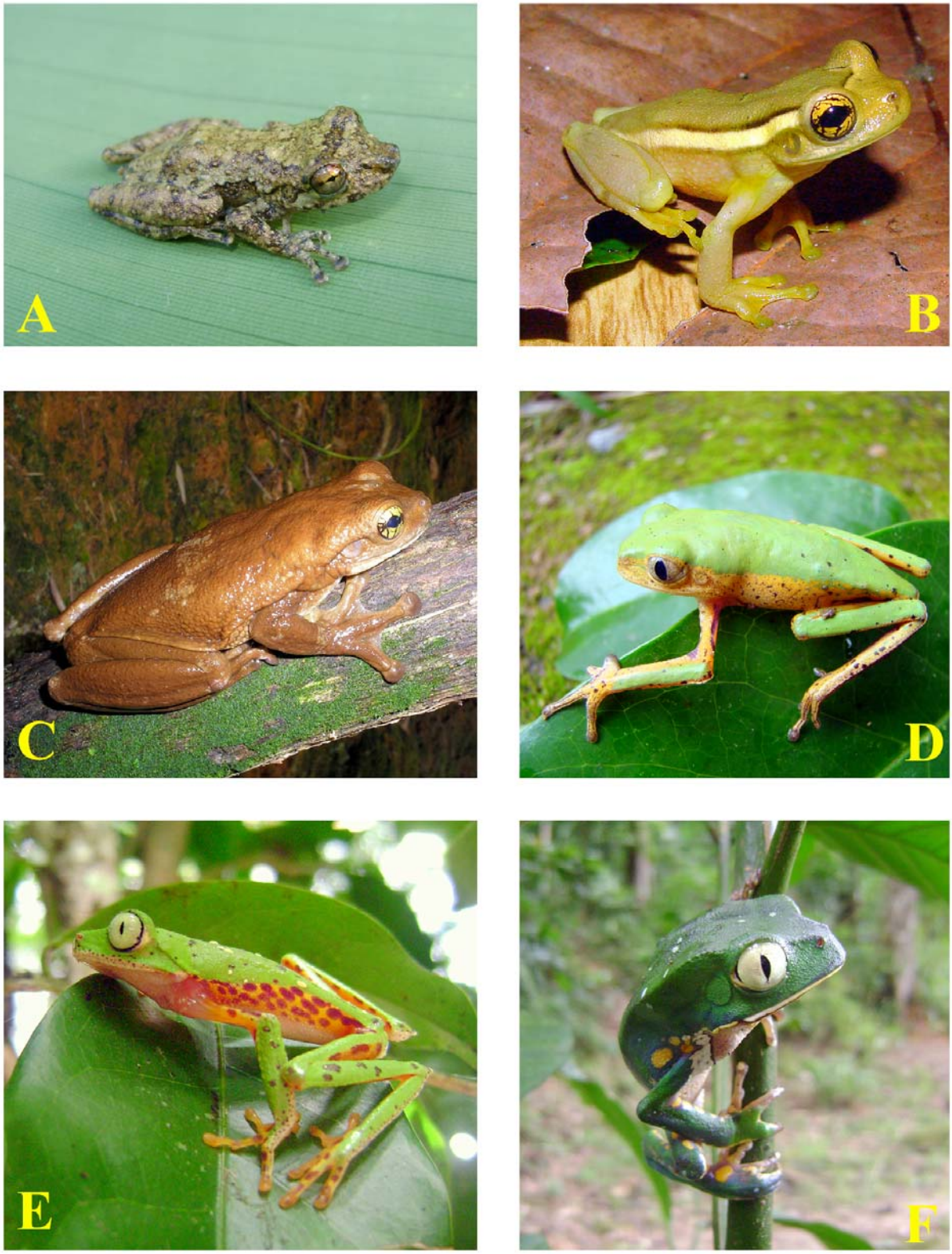

Figure 6. Anurans from *Parque Natural Municipal da Taquara*: A – Scinax perpusillus; B - *Trachycephalus mesophaeus*; C - *Trachycephalus* sp.; D - *Phyllomedusa rohdei*; E - *Phasmahyla guttata*; F - *Phyllomedusa burmeisteri*.

Figure 7. Anurans from *Parque Natural Municipal da Taquara*: A - *Physalaemus signifer*; B - *Leptodactylus fuscus*; C - *Leptodactylus spixi*; D - *Leptodactylus ocellatus*; E - *Leptodactylus marmoratus*.

Discussion

According to IUCN (2008) and Stuart et al. (2008), 43 species found in the park are listed in the "Least Concern" (LC) category of the Red List for having large distribution ranges and no apparent risk of population decline or other threats. *Aplastodiscus eugenioi* (Figure 8) and *Cycloramphus brasiliensis* (Figure 9) are listed as "Near Threatened" (NT). *Chiasmocleis carvalhoi* is listed as "Endangered" (EN) for having a distribution severely fragmented and also for having a living area smaller than 500 km² which is probably being deforested. A single species, *Crossodactylus aeneus* (Figure 10), is listed in the "Data Deficient" (DD) category, because there is no sufficient information to assess its real conservation status. *Hylodes pipilans* is not included in any category because it was only recently described. The conservation status of *Scinax* aff. *x-signatus* and *Trachycephalus* sp. can only be assessed after their identities are determined.

Figure 8. *Aplastodiscus eugenioi*, a recently described treefrog found in *Parque Natural Municipal da Taquara*.

Figure 9. *Cycloramphus brasiliensis*, a species usually found at high elevations occurring at *Parque Natural Municipal da Taquara*.

Figure 10. *Crossodactylus aeneus*, a species usually found at high elevations occuring at *Parque Natural Municipal da Taquara*.

Hylidae is the richest among the 13 anuran families represented at PNMT, a common result for areas into the Atlantic Rainforest domain (Feio et al. 1998; Izecksohn and Carvalho-e-Silva 2001; Pombal and Gordo 2004; Rödder et al. 2007).

Two species had their geographic distribution extended. *Hylodes pipilans* (Figure 11) was previously known only from the type locality, near the Soberbo river at *Serra dos Órgãos*, municipality of Guapimirim (Canedo and Pombal 2007) and has been recently reported to the *Reserva Ecológica de Guapiaçu*, municipality of Cachoeiras de Macacu (Silva-Soares et al. 2008), both localities in the state of Rio de Janeiro. Now its distribution range is extended in ca. 28 km SW. *Euparkerella cochranae* (Figure 12) was previously known from the type locality in the *Parque Nacional da Serra dos Órgãos* (Izecksohn 1988) and the *Reserva Ecológica de Guapiaçu* (Rocha et al. 2007), both in the municipality of Guapimirim, and also from *Morro São Paulo*, municipality of Casimiro de Abreu, state of Rio de Janeiro (Vrcibradic et al. 2008). Now its distribution range is extended in ca. 55 km SW.

Scinax aff. *x-signatus* (Figure 13) is a new species currently being described (U. Caramaschi and M. Cardoso-e-Silva, pers. comm.). *Vitreorana eurygnatha* (Figure 14), typically found in mountainous regions in altitudes up to 1.700 m above sea level (a.s.l.) (Heyer 1985; Freitas et al. 2004, 2007), was recorded in the study site at 60 m a.s.l. *Crossodactylus aeneus* and *Cycloramphus brasiliensis* are known to occur at altitudes between 800 and 1.200 m a.s.l. (Pimenta and

Segalla 2004, Frost 2008), but in the present study were recorded at ca. 70 m a.s.l.

The total number of anuran species in the state of Rio de Janeiro is 166 (Rocha et al. 2004) and the number of amphibians in the municipality of Rio de Janeiro is 69 (Izecksohn and Carvalho-e-Silva 2001). Thus, the PNMT houses approximately 30 % of all anurans of the state and 72.5 % of the species of municipality of Rio de Janeiro. *Hylodes pipilans* and *Aplastodiscus eugenioi* are not listed in those studies because they were described after their publication.

Lithobates catesbeianus, known as the American bullfrog, was introduced in Brazil in 1935, when several specimens were imported from the USA for commercial breeding (IBAMA - RAN 2008). The species was introduced in the PNMT in the 1990's due to several structural and methodological flaws in a neighboring breeding station, which allowed adults and tadpoles to escape and occupy different habitats into the park. *Lithobates catesbeianus* seems well established and was found breeding in the PNMT.

Figure 11. *Hylodes pipilans*, species which had its distribution range extended with the record in the *Parque Natural Municipal da Taquara*.

Figure 12. *Euparkerella cochranae*, species which had its distribution range extended with the record in *Parque Natural Municipal da Taquara*.

Figure 13. *Scinax* aff. *x-signatus* from *Parque Natural Municipal da Taquara*.

Figure 14. *Vitreorana eurygnatha*, a species usually found at high elevations occuring at *Parque Natural Municipal da Taquara*.

Several other studies on amphibian communities were carried out in different areas of the Atlantic Rain Forest in southeastern Brazil and the number of amphibian species here reported to occur in the PNMT is similar or, in most part, superior to those reported in the studied areas (Table 2). It is noteworthy that each one of those localities are much larger than the PNMT, such as the *Estação Ecológica Juréia-Itatins*, with ca. 79,230 ha (Marques and Duleba 2004), the *Parque Estadual do Rio Doce*, with ca. 36,000 ha (Feio et al. 1998) and the *Reserva Particular do Patrimônio Natural Rio das Pedras*, with ca. 1.361 ha (Carvalho-e-Silva et al. 2008).

The present study demonstrates that the Parque *Natural Municipal da Taquara* is a conservation area of huge importance to the preservation of amphibian communities of the lowland Atlantic Rainforest of Rio de Janeiro state because its area, although small, still houses a high diversity comparable to other larger localities in the Atlantic Rain Forest of Southeastern Brazil.

Table 1. Anuran species found in *Parque Natural Municipal da Taquara*, municipality of Duque de Caxias, state of Rio de Janeiro, Brazil, from September 2006 to October 2008. 1 = Observation of adult specimen(s); 2 = recorded by tadpoles; 3 = recorded by vocalizations; 4 = specimen collected.

FAMILY / SPECIES	**1**	**2**	**3**	**4**
Amphignathodontidae Boulenger, 1882				
Flectonotus goeldii (Boulenger, 1895)	**X**	-	**X**	**X**
Brachycephalidae Günther, 1858				
Ischnocnema guentheri (Steindachner, 1864)	**X**	-	-	**X**
Ischnocnema parva (Girard, 1853)	**X**	-	-	**X**
Bufonidae Gray, 1825				
Rhinella icterica (Spix, 1824)	**X**	**X**	**X**	**X**
Rhinella ornata (Spix, 1824)	**X**	**X**	**X**	**X**
Centrolenidae Taylor, 1951				
Centroleninae Taylor, 1951				
Vitreorana eurygnatha (A. Lutz, 1925)	**X**	-	-	**X**
Craugastoridae Hedges, Duellman and Heinicke, 2008				
Haddadus binotatus (Spix, 1824)	**X**	-	**X**	**X**
Cycloramphidae Bonaparte, 1850				
Cycloramphinae Bonaparte, 1850				
Cycloramphus brasiliensis (Steindachner, 1864)	**X**	**X**	**X**	**X**
Alsodinae Mivart, 1869				
Proceratophrys appendiculata (Günther, 1873)	**X**	-	-	**X**
Thoropa miliaris (Spix, 1824)	**X**	**X**	**X**	**X**
Hylidae Rafinesque, 1815				
Hylinae Rafinesque, 1815				
Aplastodiscus eugenioi (Carvalho-e-Silva and Carvalho-e-Silva, 2005)	**X**	**X**	**X**	**X**
Dendropsophus anceps (Lutz, 1929)	**X**	-	-	**X**
Dendropsophus berthalutzae (Bokermann, 1962)	**X**	-	**X**	**X**
Dendropsophus bipunctatus (Spix, 1824)	**X**	-	**X**	**X**
Dendropsophus decipiens (A. Lutz, 1925)	**X**	-	**X**	**X**
Dendropsophus elegans (Wied-Neuwied, 1824)	**X**	**X**	**X**	**X**
Dendropsophus giesleri (Mertens, 1950)	**X**	-	**X**	**X**
Dendropsophus meridianus (B. Lutz, 1954)	**X**	-	**X**	**X**
Dendropsophus minutus (Peters, 1872)	**X**	-	**X**	**X**
Dendropsophus seniculus (Cope, 1868)	**X**	-	-	**X**
Hypsiboas albomarginatus (Spix, 1824)	**X**	**X**	**X**	**X**
Hypsiboas faber (Wied-Neuwied, 1821)	**X**	-	**X**	**X**
Hypsiboas pardalis (Spix, 1824)	**X**	**X**	**X**	**X**
Hypsiboas semilineatus (Spix, 1824)	**X**	**X**	**X**	**X**
Scinax albicans (Bokermann, 1967)	**X**	**X**	**X**	**X**
Scinax alter (B. Lutz, 1973)	**X**	**X**	**X**	**X**
Scinax argyreornatus (Miranda-Ribeiro, 1926)	**X**	-	-	**X**
Scinax flavoguttatus (A. Lutz and B. Lutz, 1939)	**X**	-	**X**	**X**
Scinax hayii (Barbour, 1909)	**X**	-	**X**	**X**
Scinax humilis (B. Lutz, 1954)	**X**	-	**X**	**X**
Scinax perpusillus (A. Lutz & B. Lutz, 1939)	**X**	-	**X**	**X**
Scinax similis (Cochran, 1952)	**X**	-	**X**	**X**
Scinax aff. *x-signatus*	**X**	-	**X**	**X**
Trachycephalus mesophaeus (Hensel, 1867)	**X**	-	-	**X**
Trachycephalus nigromaculatus Tschudi, 1838	-	-	**X**	-
Trachycephalus sp.	**X**	-	-	**X**
Phyllomedusinae Günther, 1858				
Phasmahyla guttata (A. Lutz, 1924)	**X**	**X**	**X**	**X**
Phyllomedusa burmeisteri Boulenger, 1882	**X**	-	-	**X**
Phyllomedusa rohdei Mertens, 1926	**X**	-	**X**	**X**

FAMILY / SPECIES	1	2	3	4
Hylodidae Günther, 1858				
Crossodactylus aeneus Müller, 1924	X	X	X	X
Hylodes asper (Müller, 1924)	X	X	-	X
Hylodes pipilans Canedo and Pombal, 2007	X	X	X	X
Leiuperidae Bonaparte, 1850				
Physalaemus signifer (Girard, 1853)	X	X	X	X
Leptodactylidae Werner, 1896				
Leptodactylus fuscus (Schneider, 1799)	X	-	X	X
Leptodactylus marmoratus (Steindachner, 1867)	X	-	X	X
Leptodactylus ocellatus (Linnaeus, 1758)	X	-	X	-
Leptodactylus spixi Heyer, 1983	X	-	-	X
Microhylidae Günther, 1858				
Gastrophryninae Fitzinger, 1843				
Chiasmocleis carvalhoi Cruz, Caramaschi and Izecksohn, 1997	X	-	-	X
Strabomantidae Hedges, Duellman and Heinicke, 2008				
Holoadeninae Hedges, Duellman and Heinicke, 2008				
Euparkerella cochranae Izecksohn, 1988	X	-	-	X
Ranidae Rafinesque, 1814				
Lithobates catesbeianus (Shaw, 1802)	X	-	X	X

Table 2. Amphibian richness, time sampled, and size of some areas where other anuran inventories were conducted in the Atlantic Rainforest of southeastern Brazil. Abbreviations and sources: RPPN-SC = *Reserva Particular do Patrimônio Natural Santuário do Caraça*, in *Serra do Caraça*, Catas Altas, MG; PERD = *Parque Estadual do Rio Doce*, Marliéria, MG; SC = *Parque Nacional da Serra do Cipó*, Santana do Riacho, MG; EPDA-P = *Estação de Pesquisa e Desenvolvimento Ambiental de Peti*, São Gonçalo do Rio Abaixo and Santa Bárbara, MG; PEI = *Parque Estadual Intervales*, Capão Bonito, SP; PECB = *Parque Estadual Carlos Botelho*, São Miguel Arcanjo, SP; EBB = *Estação Biológica de Boracéia*, Salesópolis, SP; SJ = *Serra do Japi*, Jundiaí, SP; EEJI = *Estação Ecológica Juréia-Itatins*, Peruíbe, Iguape, Itariri and Miracatu, SP; PASP = *Planalto Atlântico de São Paulo*, Tapiraí and Piedade, SP; RFMG = *Reserva Florestal de Morro Grande*, Cotia, SP; RBSL = *Reserva Biológica Santa Lúcia*, Santa Teresa, ES; PP = *Pousada Paraíso*, Santa Teresa, ES; NL = *Nova Lombardia*, Santa Teresa, ES; VA = *Vargem Alta*, Santa Teresa, ES; G-A = *Goiababa-Açu*, Fundão, ES; RERP = *Reserva Particular do Patrimônio Natural Rio das Pedras*, Mangaratiba, RJ; Ilha de Marambaia, Mangaratiba, RJ.

Place	State	Time sampled	Area (ha)	Species richness	References
PERD	MG	> 5 years	36000	38	Feio et al. 1998
EPDA-P	MG	> 3 years	606	30	Bertoluci et al. 2009
PEI	SP	-	41704	47	Bertoluci and Rodrigues 2002
PECB	SP	1 year	37644	19	Moraes et al. 2007
EBB	SP	> 5 years	12079	63	Heyer et al. 1990, Pimenta et al. 2007
SJ	SP	> 5 years	35400	31	Ribeiro et al. 2005
EEJI	SP	1 year	79.230	26	Pombal and Gordo 2004
PASP	SP	> 2 years	26250	48	Condez et al. 2009
RFMG	SP	> 1 year	10870	27	Dixo and Verdade 2006
RBSL	ES	> 2 years	25.00	54	Rödder et al. 2007
PP	ES	3 months	200	21	Rödder et al. 2007
NL	ES	3 months	1000	30	Rödder et al. 2007
VA	ES	3 months	1000	23	Rödder et al. 2007
G-A	ES	2 years	3740	41	Ramos and Gasparini 2004
RERP	RJ	> 5 years	1.361	41	Carvalho-e-Silva et al. 2008
PNMT	RJ	2 years	20,14	50	Present study

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Appendix 1. Amphibians from *Parque Natural Municipal da Taquara*, Duque de Caxias, RJ.

Amphignathodontidae: *Flectonotus goeldii* (MNRJ 54615); **Brachycephalidae**: *Ischnocnema guentheri* (MNRJ 47506, 49712-13, 53704), *Ischnocnema parva* (MNRJ 51573-74); **Bufonidae**: *Rhinella icterica* (MNRJ 53880, 54457-59), *Rhinella ornata* (MNRJ 47485, 53707-09); **Centrolenidae**: *Vitreorana eurygnatha* (MNRJ 47508); **Craugastoridae**: *Haddadus binotatus* (MNRJ 47503-05, 53705); **Cycloramphidae**: *Cycloramphus brasiliensis* (MNRJ 47497-98, 53728, 53729), *Proceratophrys appendiculata* (MNRJ 49715), *Thoropa miliaris* (MNRJ 47507, 47513); **Hylidae**: *Aplastodiscus eugenioi* (MNRJ 47483, 47511, 54586, 54587), *Dendropsophus* anceps (MNRJ 60734), Dendropsophus *berthalutzae* (MNRJ 50838-40, 54699), *Dendropsophus bipunctatus* (MNRJ 47487, 50841, 54681-82), *Dendropsophus decipiens* (MNRJ 50837, 54619-21), *Dendropsophus elegans* (MNRJ 47488, 50831-32, 50842), *Dendropsophus giesleri* (MNRJ 50829-30, 54674-75), *Dendropsophus meridianus* (MNRJ 54687-90), *Dendropsophus minutus* (MNRJ 50825-28), *Dendropsophus seniculus* (MNRJ 60745-47), *Hypsiboas albomarginatus* (MNRJ 47489), *Hypsiboas faber* (MNRJ 49711), *Hypsiboas pardalis* (MNRJ 53663-66), *Hypsiboas semilineatus* (MNRJ 49486, 50846-48), *Scinax albicans* (MNRJ 53670-01), *Scinax alter* (MNRJ 53730, 53813, 54583-84), *Scinax argyreornatus* (MNRJ 60735-39), Scinax *flavoguttatus* (MNRJ 47790, 53688-90), *Scinax hayii* (MNRJ 53659-62), *Scinax humilis* (MNRJ 47491-92, 50835-36), Scinax perpusillus (MNRJ 57938-40), *Scinax similis* (MNRJ 47493), *Scinax* aff. *x-signatus* (MNRJ 50843-45), *Trachycephalus mesophaeus* (MNRJ 50783), *Trachycephalus* sp. (MNRJ 47509), *Phasmahyla guttata* (MNRJ 50850, 54588), *Phyllomedusa burmeisteri* (MNRJ 54769), *Phyllomedusa rohdei* (MNRJ 47510, 50833-34, 54684); **Hylodidae**: *Crossodactylus aeneus* (MNRJ 47499-01, 47512); *Hylodes asper* (MNRJ 47514, 53923), *Hylodes pipilans* (MNRJ 54602-03); **Leiuperidae**: *Physalaemus signifer* (MNRJ 47496, 53718-20); **Leptodactylidae**: *Leptodactylus fuscus* (MNRJ 47494, 54617), *Leptodactylus marmoratus* (MNRJ 47495, 49485, 54585, 54618), *Leptodactylus spixi* (MNRJ 54616, 60740); **Microhylidae**: *Chiasmocleis carvalhoi* (MNRJ 60741-44), **Strabomantidae**: *Euparkerella cochranae* (MNRJ 53184); **Ranidae**: *Lithobates catesbeianus* (MNRJ 54770).