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CARTA DO EDITOR

Como podemos preencher, em apenas 12 meses, as lacunas de conhecimento da biodiversidade Amazônica? Essa é uma pergunta cuja resposta tem uma importância extraordinária, já que toda a política de conservação para essa região, notável quanto à sua vasta gama de serviços ambientais ofertada para todo o planeta, se baseia no conhecimento sobre quais, quantas e como estão distribuídas as espécies de organismos que nela ocorrem.

A demarcação de cinco unidades de conservação estaduais em áreas remotas do norte Pará em 2006, numa região batizada nos anos 70 de "Calha Norte", foi o ponto de partida para o preenchimento de uma importante lacuna sobre o conhecimento da biodiversidade Amazônica. As cinco unidades decretadas cobrem juntas mais de 13 milhões de hectares na porção mais preservada de toda a Amazônia, que se manteve neste estado até hoje por uma razão logística simples: os rios, que em outras partes da bacia funcionam como vias principais de transporte, na Calha Norte são encachoeirados em vários trechos, inviabilizando a navegação de embarcações de médio e grande porte. Por esse motivo, os poucos a navegarem os rios da Calha Norte foram os indígenas e quilombolas em suas caçadas e expedições para a coleta de borracha a castanha. A mesma barreira logística que vem impedindo o acesso da indústria do desmatamento à Calha Norte também impediu que a sua biodiversidade fosse estudada por naturalistas e biólogos, gerando uma grande lacuna de conhecimento.

Em 2007, a Secretaria de Estado de Meio Ambiente do Pará (SEMA) formou um consórcio de instituições para produzir planos de manejo para as cinco novas unidades de conservação da Calha Norte recém-criadas, ficando os inventários biológicos sob responsabilidade técnica do Museu Paraense Emílio Goeldi. A meta traçada pelo consórcio foi bastante ambiciosa: finalizar todos os planos de manejo até 2010. Para isso, os inventários biológicos deveriam começar o quanto antes e depois prosseguir num regime de "expedição permanente" até a sua finalização, período esse estimado em 12 meses. Para resolver o grande entrave logístico que historicamente havia tornado a Calha Norte inacessível a biólogos, um acordo entre a SEMA e uma empresa de mineração assegurou o imprescindível apoio do transporte aéreo, sempre que necessário, na execução dos inventários biológicos. Recursos da organização Conservação Internacional (CI-Brasil) financiariam gastos com alimentação, materiais de consumo e equipamentos, pessoal e despesas de transporte complementares.

Após os devidos arranjos institucionais e financeiros, entre janeiro de 2008 e janeiro de 2009, sete inventários biológicos com a duração aproximada de duas semanas cada, foram realizados nas cinco unidades de conservação alvo do consórcio. Em conjunto, as sete expedições cobriram os principais setores da Calha Norte no estado do Pará, um feito inédito e que gerou um grande acúmulo de conhecimento para todos os grupos biológicos trabalhados durante os inventários.

Logo após o final das expedições, ficou claro que toda a informação acumulada para essa região da Amazônia antes nunca amostrada sistematicamente, deveria ser analisada e publicada o quanto antes, com o objetivo maior de não apenas subsidiar os planos de manejo das unidades de conservação, mas também preencher lacunas sobre o conhecimento científico básico da biodiversidade amazônica. Neste espírito, o **Boletim do Museu Paraense Emílio**

Goeldi. Ciências Naturais ofereceu espaço para a publicação de um conjunto de artigos científicos sobre os resultados obtidos para os diferentes grupos biológicos amostrados durante as sete expedições à Calha Norte. Esses artigos terão como título geral **Notas sobre os vertebrados do norte do Pará, Brasil: uma parte esquecida da Região das Guianas**. Têm como objetivo principal sistematizar e sintetizar o conhecimento da fauna de vertebrados do norte do Pará a partir dos novos resultados obtidos, contextualizando-os em relação a outros setores mais bem conhecidos da mesma unidade biogeográfica: a região das Guianas ou centro de endemismo Guiana.

O primeiro artigo a vir a lume é o referente à herpetofauna. Juntos, os três autores deste artigo talvez possuam o maior número de horas de campo na região amazônica do que qualquer outro herpetólogo, além de um histórico de trabalhos na região das Guianas. A contribuição deles é chave para o conhecimento da herpetofauna do centro de endemismo das Guianas, até então incompleto pela lacuna de conhecimento que o norte do Pará representava, situação que deve ser replicada para futuros artigos.

Mais do que efetivamente colocar o conhecimento sobre a fauna de vertebrados do centro de endemismo das Guianas num outro patamar, os artigos do conjunto **Notas sobre os vertebrados do norte do Pará, Brasil: uma parte esquecida da Região das Guianas** mostram como é possível, num prazo relativamente curto de 12 meses, preencher uma importante lacuna sobre o conhecimento da biodiversidade Amazônica, servindo assim como um modelo para outras iniciativas com os mesmos objetivos. Quando há vontade nas esferas governamentais e da sociedade civil, além de uma equipe de biólogos de campo dedicados e dispostos a encarar condições adversas em prol de um projeto de interesse público, o resultado, ilustrado nas páginas desta revista, não pode ser outro além do sucesso.

Dr. Alexandre Aleixo
Editor Associado de Zoologia
Notas sobre os vertebrados do norte do Pará, Brasil:
uma parte esquecida da Região das Guianas

EDITOR'S NOTE

How can the knowledge gaps on Amazonian biodiversity be filled in just 12 months? The importance of answering this question is extraordinary, given that conservation policies for this region offering a wide array of environmental services to the world are established ultimately based on the knowledge of its species composition, richness, and distribution.

The creation of five state-owned conservation units in 2006 in the pristine north of the Pará, Brazil, an area known as "Calha Norte", was the starting point for filling in one of the major knowledge gaps on Amazonian diversity. Together, those five conservation units cover *ca.* 13 million hectares in the best preserved sector of Amazonia, which has remained as such for a simple reason: unlike other parts of the region where rivers are the main venues for transportation, ubiquitous rapids prevent vessels from reaching most of Calha Norte. Only indigenous populations and "quilombolas" (Afro-descendents originally fleeing slavery) have coped with Calha Norte waterfalls during hunting expeditions and searches for rubber and Brazil nuts. The same logistical hurdle preventing the so called "deforestation industry" from reaching deep into Calha Norte has also adversely affected naturalists and biologists, leading ultimately to one of the major gaps concerning biological information in Amazonia.

In 2007, the Secretariat of Environment of the State of Pará (SEMA) created a consortium of several institutions to consolidate management plans for the five recently established conservation units, bestowing upon the Goeldi Museum the technical responsibility for conducting the necessary Rapid Assessment Surveys of biodiversity (RAPs). The goal established was bold: finish all five management plans by 2010. To this end, RAPs had to start as soon as possible and continue with a nearly full-time dedicated field team until their completion in an estimated time frame of 12 months. To solve the long standing transportation hurdle that rendered Calha Norte historically inaccessible to biologists, an agreement was reached between SEMA and a mining company to provide critical aerial support for RAPs whenever needed. Conservation International was to cover costs related to food, personnel, research supplies, and supplementary transportation.

With all institutional and financial details settled, between January 2008 and January 2009, seven RAPs lasting roughly two weeks each were conducted in all five conservation units worked by the consortium. Together, those seven expeditions covered all main Calha Norte sectors in northern Pará, an unprecedented feat resulting in the accumulation of a large amount of novel information for all biological groups sampled.

Shortly after the end of the RAPs, it became clear that all biological information amassed for this part of Amazonia that had never been systematically sampled before, was going to be useful not only for the management plans themselves, but also to fill in knowledge gaps concerning Amazonian biodiversity at a much broader scale. With this idea in mind, the Editorial Board of the **Boletim do Museu Paraense Emílio Goeldi. Ciências Naturais** offered space to publish a set of scientific papers focusing on the results obtained for the different biological groups sampled during all seven RAPs in northern Pará. This special set of papers, entitled **Notes on the Vertebrates of northern Pará, Brazil: a forgotten part of the Guianan Region**, aims to provide a synthesis and systematize the knowledge on the vertebrates of northern

Pará in a broader context that also includes other better known parts of the same biogeographical unit: the Guianan Region or Guiana center of endemism in northeastern South America.

The first paper to inaugurate this series, presented herein, pertains to the herpetofauna. Summed up among themselves, Avila-Pires, Hoogmoed, and Rocha have probably accumulated the greatest number of field hours in Amazonia than any other single herpetologist, in addition to having a long-term experience with the herpetofauna of the Guianan Region. Their contribution is essential to the understanding of the entire herpetofauna associated with the Guiana center of endemism, which until now was incomplete due to the knowledge gap in northern Pará, a pattern that should repeat itself in future papers published in the same series.

More than merely raising the knowledge on the vertebrates from the Guiana center of endemism to a new level, papers published in **Notes on the Vertebrates of northern Pará, Brazil: a forgotten part of the Guianan Region** also show how it is possible to fill in a major knowledge gap concerning Amazonian biodiversity in the relatively short period of time of 12 months, thus serving as template for similar enterprises. When both government and the organized society as a whole share the same "can do" attitude, added to a team of dedicated field biologists willing to overcome several hardships towards a major goal of general public interest, the outcome can be no other than sheer success, as illustrated in the pages of this special set of papers.

Dr. Alexandre Aleixo
Associate Editor of Zoology
Notes on the Vertebrates of northern Pará, Brazil:
a forgotten part of the Guianan Region

Artigo

Notes on the Vertebrates of northern Pará, Brazil: a forgotten part of the Guianan Region, I. Herpetofauna

Notas sobre os vertebrados do norte do Pará, Brasil: uma parte esquecida da Região das Guianas, I. Herpetofauna

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Abstract: We discuss the herpetological results of seven expeditions to the Guianan part of Pará, which resulted in a total of 80 species of amphibians (77 frogs and three caecilians) and 95 species of reptiles (36 species of lizards, three species of amphisbaenians, 49 species of snakes, five species of chelonians and two species of caiman). We report six species new to science (three frogs, one caecilian, one lizard, one amphisbaenian), six new records for Brazil (five frogs, one caecilian) and 23 new records for Pará (13 frogs, four lizards, six snakes). For each of the new records we provide comments. Special comment is made about a large population of the toad *Atelopus hoogmoedi* that seems to be doing well and does not show any signs of population decline as many species of *Atelopus* at higher elevations do. We provide a complete list of species collected per locality containing data on endemicity, habitat, reproduction and food. For each of the seven collecting sites we provide data on richness and abundance of species. The sites are compared regarding their species composition, even though we can not say how much of the differences are due to specific habitats or geographic variation, seasonal variation or sampling deficiency. We synonymised the Bufonid *Rhinella martyi* with *Bufo margaritifer* and selected a lectotype for *Rana margaritifera* in order to resolve the problems about this name.

Keywords: Amphibia. Reptilia. Guiana Centre of Endemism. Brazil. Species richness. Species list.

Resumo: Os resultados herpetológicos de sete expedições à parte guianense do estado do Pará são apresentados e discutidos, registrando-se um total de 80 espécies de anfíbios (77 anuros e três Gymnophiona) e 95 espécies de répteis (36 espécies de lagartos, três espécies de anfisbenídeos, 49 espécies de ofídios, cinco espécies de quelônios e duas espécies de jacarés). Dessas espécies, seis são novas para a ciência (três anuros, um Gymnophiona, um lagarto, um anfisbenídeo), seis representam novos registros para o Brasil (cinco anuros, um Gymnophiona) e 23 novos registros para o Pará (13 anuros, quatro lagartos, seis ofídios). Comenta-se cada um dos novos registros. Comentários especiais são feitos sobre uma grande população do sapo *Atelopus hoogmoedi*, a qual parece estar bem saudável e não mostra sinais de declínio populacional, como muitas espécies de *Atelopus* em outros lugares de maior altitude. Uma lista completa das espécies coletadas por localidade, incluindo dados sobre endemismo, habitat, reprodução e alimentação, é apresentada. Para cada uma das sete áreas de coleta, apresentamos dados sobre riqueza e abundância de espécies. As áreas são comparadas quanto à similaridade na composição das espécies, ainda que não seja possível indicar quanto das diferenças encontradas deve-se a ambientes específicos ou variação geográfica, variação sazonal ou deficiência na amostragem das espécies. O Bufonidae *Rhinella martyi* é considerado sinônimo de *Bufo margaritifer* e um lectótipo para *Rana margaritifera* é selecionado visando dirimir dúvidas sobre o nome da espécie.

Palavras-chave: Amphibia. Reptilia. Centro de Endemismo Guiana. Brasil. Riqueza de espécies. Lista de espécies.

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INTRODUCTION

On December 4, 2006, the State of Pará created five new conservation units in the northern part of Pará, north of the Amazon, in order to establish a large and protected, mostly forested, area that would form a continuous block with similarly protected areas in Amapá (Parque Nacional [PARNA] Montanhas de Tumucumaque), French Guiana, Suriname and Guyana, and with Indian Territories in the region (Figure 1) (Governo do Estado do Pará, 2006). The five conservation units created by the state were: Estação Ecológica (ESEC) Grão-Pará (4.2 million ha), Reserva Biológica (REBIO) Maicuru (1.2 million ha), and the Florestas Estaduais (FLOTA) de Faro (0.6 million ha), Trombetas (3.2 million ha) and Paru (3.6 million ha). Together they cover an area of 13.2 million ha and, with the already existing protected areas – Indian territories (TI) of Trombetas-Mapuera, Tumucumaque, rio Paru d'Este, Nhamundá-Mapuera and Zo'é; two 'Quilombola' (African-Brazilian) territories; the Florestas Nacionais (FLONA) Saracá-Taquera and da Mulata, REBIO do rio Trombetas, and ESEC Jari – they form an enormous block, although with different degrees of protection (besides TI and 'quilombola' sites, that harbour traditional populations, FLOTA's and FLONA's aim at the sustainable use of natural resources). Most of the newly created conservation units are covered by non-flooded tropical rainforest ('terra-firme' forest), but in several places other vegetation types, like flooded forests ('várzea' and 'igapó'), savanna and 'cerradão', are present as well. Only a relatively narrow band of land in 'Calha Norte Paraense' (CNP) along the Amazon is not protected and open to unregulated human occupation. We here consider as CNP that part of Pará that is situated north of the Amazon River.

On February 14, 2007 several parties (Government of Pará [SEMA-PA], Conservação Internacional [CI-Brasil], Museu Paraense Emílio Goeldi [MPEG], Instituto do Homem e Meio Ambiente da Amazônia [IMAZON], Instituto de Desenvolvimento Florestal do Estado do Pará [IDEFLOR], Instituto de Manejo e Certificação Florestal e Agrícola [IMAFLORA], and the German Technical Cooperation Agency [GTZ]) signed an agreement to form a consortium to provide data to develop management plans for the five state protected areas ('Projeto Diagnóstico da Biodiversidade das Unidades de Conservação Estaduais do Mosaico Calha Norte, Estado do Pará'). As a result of this agreement seven expeditions to investigate the biodiversity of the recently established protected areas were planned. The localities to be inventoried were chosen by specialists from SEMA-PA, CI-Brasil, Imazon and MPEG, on the basis of satellite photographs, georeferenced databases, and vegetation and altitude data, with the goal to optimize the coverage of the different phytophysionomies and altitudes present in the area during seven three-week long expeditions distributed over a year. An additional overflight helped with the final definition of the areas chosen for sampling. As final transportation to five of the research areas was planned by helicopter, the localities could be chosen independent of road or river transport. Fieldwork started in January 2008 and ended in January 2009. During this period three expeditions to different localities in ESEC Grão-Pará and one each to a locality in the other four newly created conservation units were carried out by 12 – 13 researchers of the MPEG and about ten technical assistants.

Due to its continental size, many Amazonian areas are still poorly known regarding their herpetofauna. The northern part of the state of Pará, in Brazil, is one of these areas, with only a few spots reasonably well surveyed. This area north of the Amazon River forms part of the Guianan Region (or 'Guianas') as defined by Hoogmoed (1979b), mainly delimited by the Orinoco, Negro and Amazonas rivers on the west and south, and the Atlantic Ocean on the north and east. The Guianan Region encompasses the three Guianas (Guyana, Suriname, French Guiana), the southeastern part of Venezuela, and in Brazil the states of Amapá and Roraima, the state of Pará north of the Amazon River, and the relatively small northeastern part of the state of Amazonas, north of the Amazon River and east and north of the rio Negro. Silva *et al*. (2005) considered the area as

the Guianan Area of Endemism, the largest of eight areas of endemism in the Amazon region, with half of its surface in Brazil. According to Silva *et al*., 2005) in the Brazilian part of this area of endemism, only 4.06% had been deforested, although this percentage may have gone up in the past few years. We do not include part of Colombia in the Guianan Region (and neither do Silva *et al*., 2005), as was done by the 2002 Paramaribo workshop (Hollowell & Reynolds, 2005 and articles therein), as there are no good zoogeographical reasons for that inclusion. Concerning herpetofauna, the area west of the rio Negro has no Guiana endemics. The Guianan Region has a number of species in common with other areas of Amazonia, but also has a number of endemic species. This is especially true for the 'tepuis', sandstone mountains with elevations above 1,500 m, usually considered a distinct biogeographic region ('Pantepui') within the Guianan Region (Hoogmoed, 1979b; McDiarmid & Donnelly, 2005), in Venezuela, western Guyana and extreme northern Brazil (Roraima and Amazonas States). In Suriname there is one sandstone mountain of 1,200 m altitude, but it has no Pantepui endemics (MSH, pers. obs.), which generally only occur above 1,500 m. In northern Pará, Amapá and French Guiana no tepuis are found and elevations just reach 900 m, thus explaining the absence of any herpetological tepui endemics in the area. A number of lowland species are also endemic to the Guianan region or part of it, although numbers have dropped when new range extensions became available (e.g. Caldwell & Hoogmoed, 1998).

About 350 species of amphibians and a similar number of reptiles are known from the whole of Amazonia, including the Guianas (see Eva & Huber, 2005: 11 for the limits of Amazonia, here considered as the area named Amazonia *sensu lato* [Ia+IIa+IIb]), of which c. 82% of the amphibians and 62% of the reptiles are endemic (Avila-Pires *et al*., 2007; Duellman, 1999). Hoogmoed (1979b) estimated that, for the Guianan lowlands, c. 52% of the amphibians and 26% of the reptiles were endemic. However, as more areas were better surveyed, many of the lowland species considered endemic to the Guianas in 1979 were shown to have a wider distribution throughout Amazonia (e.g. *Allophryne ruthveni* [Caldwell & Hoogmoed, 1998], *Bufo guttatus* and *Lithodytes lineatus* [MSH, unpublished data, material in MPEG]). Including also the fauna of the tepuis, Señaris & MacCulloch (2005) found that 54% of the amphibian species from the Guianas were endemic to the region, while Avila-Pires (2005) indicated that 30% of the reptile species were endemic. As there are still large gaps in our knowledge about the herpetofauna of the Guianan Region, both range extensions and new species are expected to be found in northern Pará.

A number of recent herpetofaunal studies focus on (part of) the Guianan Region, among them those on amphibians (Fouquet *et al*., 2007a, b; Lescure & Marty, 2000; Kok, 2000; Kok *et al*., 2006a), lizards (Hoogmoed & Lescure, 1975; Hoogmoed & Avila-Pires, 1989; Gasc, 1990), amphisbaenians and snakes (Gasc & Rodrigues, 1980; Chippeaux, 1986; Starace, 1998) from French Guiana; anurans (Hoogmoed, 1969a, b, 1971a, b, 1979a), wormsalamanders (Nussbaum & Hoogmoed, 1979), lizards and amphisbaenians (Hoogmoed, 1973), and some groups of snakes (Hoogmoed, 1977, 1980, 1983, 1985) from Suriname; an increasing number of studies on the herpetofauna of Guyana, especially the western (Pantepui) part of this country (Cole & Kok, 2006; Kok, 2005, 2006a, b, 2008a, b, 2009; Kok *et al*., 2006b; Kok & Castroviejo-Fisher, 2008; Kok & Kalamandeen, 2008; Lathrop & MacCulloch, 2007; MacCulloch & Lathrop, 2001, 2002, 2004a, b, 2005, 2009; MacCulloch *et al*., 2006, 2007, 2008a, b), several from the central and southern Guyana lowlands, like the Mabura Hill and Iwokrama region (Donnelly *et al*., 1998, 2005a, b, 2006; Ernst *et al*., 2005, 2007; Kok & Ernst, 2007, Kok *et al*., 2007, Señaris *et al*., 2008) and from the coastal area (EMC, 2006); the study by Gorzula & Señaris (1999) on the herpetofauna of Venezuelan Guayana, and by Pritchard & Trebbau (1984) on chelonians from Venezuela; and those on amphibians (Lima *et al*., 2006), snakes (Martins

& Oliveira, 1993, 1998), and lizards (Vitt *et al*., 2008) from the Manaus area, Amazonas, Brazil. More specific papers are those by Hoogmoed & Avila-Pires (1991a), with data on Amphisbaenidae; by Hoogmoed & Avila-Pires (1992) on the lizard genus *Arthrosaura*, by Cunha *et al*. (1980), Carvalho (1997, 2002) and Vanzolini & Carvalho (1991), on lizards and snakes from Roraima. Some publications deal with species that occur throughout a large part of the Guianan Region (Campbell & Lamar, 2004; Dixon *et al*., 1993; Medem, 1983; Noonan & Gaucher, 2005, 2006; Noonan & Wray, 2006; Roze, 1996; Wollenberg *et al*., 2006, 2008). Conservação Internacional organized a series of expeditions to the Tumucumaque Mountains on the border of French Guiana and Amapá, between 2004 and 2006, but the herpetological results (Lima, 2008) are still under discussion and at the moment only can be used with much care, checking each species record. Hoogmoed (1979b, 1983), Hoogmoed & Avila-Pires (1991b), Señaris & MacCulloch (2005) and Avila-Pires (2005) present lists of Guianan herpetofauna, including data from Amapá, Amazonas, Pará and Roraima. In Avila-Pires (1995), a catalogue of the lizards of Brazilian Amazonia, data on lizards from the Guianan Region can also be found, while data on chelonians may be found in Vogt (2008). Bartlett & Bartlett (2003) is a good general introductory book for the Amazonian herpetofauna, and Rueda-Almonacid *et al*. (2007) is an excellent fieldguide for chelonians and crocodiles, but both are not complete for the Guianan Region. Avila-Pires *et al*. (2009) compared the lizard faunas from three sites on the Guiana Shield (Brokopondo and Sipaliwini [both Suriname, the last one on the border with Brazil] and Balbina [Amazonas, Brazil]) with ten sites in other areas of the Amazon Region. They showed that the Guianan sites were most closely related to Belém and Caxiuanã (both in Pará) in the lower Amazon area.

A list of species of amphibians and reptiles present in CNP as a whole does not exist. The areas that have been better studied are the lower Trombetas River, where environmental studies have been done in the context of a large bauxite mining project in the area (U. Galatti, pers. obs.); and the Jari (Monte Dourado) area, at the border with Amapá state, as part of a two-year multidisciplinary study by C. Peres and T. A. Gardner of the University of East Anglia (United Kingdom), and collaborators. Most data on the Trombetas studies, however, are not published. Part of the results of the Jari project, regarding herpetofauna, can be found in Gardner *et al*. (2007) and Ribeiro-Junior *et al*. (2008). Hoogmoed and Avila-Pires made collections (material in Museu Paraense Emílio Goeldi, Belém, Pará [MPEG] and in the National Museum of Natural History, Leiden, The Netherlands [RMNH]) in the rio Nhamundá area in 1988, the results of which have only partly (lizards) been published by Avila-Pires (1995). Between 1980 and 2006 personnel of MPEG made several collecting trips to the municipalities Almeirim and Monte Alegre and obtained small, but interesting collections, which are now in MPEG. Besides, occasional expeditions have been made, especially following the large rivers, which account for the sparse data found in the literature and specimens in collections. Avila-Pires (1995) registered a number of lizards from this area, even though only from few localities, showing large gaps of information for the area as a whole. Vogt (1994, 2008) and Haller & Rodrigues (2005, 2006) give data on chelonian species from the Trombetas River.

Based on the existing literature, for CNP we may expect approximately 100 species of anurans and up to nine species of Gymnophiona (Lescure & Marty, 2000; Lima *et al*., 2006; Señaris & MacCulloch, 2005; A.O. Maciel & Hoogmoed, unpublished data). Among reptiles, we could expect about 40 species of lizards, ten species of amphisbaenians, 100 of snakes, 11 of chelonians, and three species of caimans (Hoogmoed, 1973; Chippeaux, 1986; Martins & Oliveira, 1993, 1998; Avila-Pires, 1995, 2005; Starace, 1998; Rueda-Almonacid *et al*., 2007; Vogt, 2008; MSH, unpublished data). As no tepuis are present in the CNP area, tepui endemics are not expected to be found there, only lowland species (< 750 m). On the other hand, a number of species not present in other Guianan countries (French Guiana, Suriname, Guyana and Venezuela)

possibly can be expected to occur in the areas under influence of the Amazon River.

The study here presented as part of the CNP Project intended to inventory the herpetofauna from key localities surveyed during seven expeditions (Figure 2), taking into account the necessity to produce management plans for the five conservation units created by the State of Pará, Brazil, in 2006 – Floresta Estadual de Faro (FLOTA Faro), Floresta Estadual do Paru (FLOTA Paru), Floresta Estadual do Trombetas (FLOTA Trombetas), Reserva Biológica de Maicuru (REBIO Maicuru) and Estação Ecológica do Grão-Pará (ESEC Grão-Pará). Considering the large extension of the area covered by the five conservation units (13.2 million ha), it was impossible, within the period of 13 months, to accomplish intensive studies on the fauna of each of them. Therefore it was decided to select a number of points that together could cover the different phytophysionomies encountered in northern Pará, as explained before, and to perform in each of them a Rapid Assessment Program (RAP). Although the results obtained are not exhaustive, and new studies will be necessary to improve our understanding of the herpetofauna of the area, they represent an important advance in our knowledge, and provide the basis for management plans. We present here an analysis based on all expeditions, because much information is common to all or is complementary, and after that we highlight several species that represent new or interesting zoogeographic data.

MATERIAL AND METHODS

STUDY AREAS

The greater part of CNP is on the Guiana Shield, only a wide band north of the Amazon belongs to the alluvial Amazon valley. The core of the Guiana Shield is made up of pre-Cambrian metamorphic and igneous rocks, especially granites and gneisses. On all sides the core of the Guiana Shield is surrounded by a band of low areas of varying width consisting of alluvial sediments. The higher part of the Guiana Shield is covered with sandstone remnants of the Roraima Formation, which was deposited in Proterozoic time, 1.6-1.8 billion years ago. After uplift, this formation covered the Guiana Shield as an extensive sandstone plateau or tableland. During the Late Cretaceous and in the Tertiary there were new periods of further uplift of the area, at the same time that erosion shaped the present-day table mountains or tepuis, which are concentrated in the NW part of the Guiana Shield, in SE Venezuela and adjacent W Guyana, with some tepuis on the border of Brazil (Roraima and Amazonas States) with these countries (Hoogmoed, 1979b and literature cited therein). In northern Pará no sandstone tepuis are present, and consequently, by definition, no herpetofaunal tepui endemics. The northern and southern part of the Guianan Region are separated by the divide between rivers that are part of the Amazon basin and flow S from the divide to that river, and rivers of the Guianas that flow north directly to the Atlantic Ocean. The mountains of the divide, which is formed by the Acarai Mountains in the West (between Brazil and Guyana) and the Tumucumaque Mountains in the East (between Suriname and French Guiana on one side and Brazil on the other) are relatively low (in some places, like the Sipaliwini area, not higher than 250 m, in one place reaching up to about 900 m, but generally below 800 m). From the Amazon River the area of northern Pará gradually slopes north, up towards the divide. The area is hilly, with rounded hills and elevated plateaus at a level of about 500 m, that at least in part contain bauxite deposits. All rivers in the area run roughly N-S and have numerous rapids and waterfalls from their upper reaches to close to the Amazon, and therefore are difficult to navigate. The Trombetas River in the South and the Suriname River in the north (Hoogmoed, 1973) seem to divide the Guianan Region in an estern and a western part and may form a distribution barrier for some species.

Most areas we inventoried have a wet tropical climate (Am according to the Köppen classification), but site ESEC Grão-Pará North is in an area that is

characterized as Aw (Peel *et al*., 2007; SUDAM, 1984). The rainy season generally is between December and June, with a short drier break in February/March, the dry season is between July and November. Total mean annual rainfall is around 2,100-2,500 mm per year for most areas inventoried, except for sites ESEC Grão-Pará North and ESEC Grão-Pará Centre, which are in areas with 2,000-2,100 mm, and site FLOTA Paru, which is in an area with a mean annual rainfall of 1,500-2,000 mm (Figure 3). Mean annual temperatures in most of the area are about 25-26 °C, but sites FLOTA´s Faro, Trombetas and Paru are in areas where that temperature is about 27 °C (Figure 4) (SUDAM, 1984).

The study areas are located in the Guianan Region of the northern part of Pará, north of the Amazon River, in the five conservation units established in December 2006: one each in the FLOTA's Faro, Trombetas and Paru, one in the REBIO Maicuru and three in the ESEC Grão-Pará (Figure 2). Because of its large size, covering several vegetation types, three expeditions were made to ESEC Grão-Pará: one to the most northwestern part, close to the frontier with Guyana, one to the central part, just south of the Indian Territory of Tumucumaque, and one to the southeastern part, close to the border with FLOTA Paru. A short description of the research areas is provided below. Unfortunately, no details on the vegetation have been provided by the botanists yet, so general terms are used.

FLOTA Faro (0.6 million ha) is situated in the municipalities of Faro and Oriximiná, on the right bank of the rio Nhamundá, which forms the border of Pará with Amazonas. The area belongs to the rio Nhamundá basin and is covered by tropical rain forest (terra-firme forest = 'Floresta Ombrófila Densa das Terras Baixas' according to RADAM-Brasil ["Radar na Amazônia" project] terminology), except in a band of about 700 m along the river and some distance up along the creeks, that is covered by várzea forest ('Floresta Ombrófila Densa Aluvial'), which is inundated during part of the year (Figure 5). Four trails (all in the municipality of Faro) were cut, radiating from a base camp (S 1° 42' 50.44" W 57° 12' 47.88") that was located on the northern (left) bank of the rio Nhamundá, some distance WNW of Faro, where the river runs more or less east-west. Trails 1-3 ran in a northerly direction, parallel to each other and separated by 800 m, for a distance of 3 km. They started out in várzea forest and after about 700 m entered terra-firme forest. Trail 4 ran 1.5 km SW and 1.5 km SE of the camp, following the riverbank through várzea forest. The area studied was between 0 and 30 m above sea level, with low hills. The river is in open contact with the Amazon, no rapids or waterfalls being present downstream from the collecting area. Pitfall traps were installed in each of the trails 1, 2 and 3, with a distance of 250 m between them within each trail. Because of inundation, no poitfalls were installed in trail 4. The first two pitfalls in trail 1 were inundated and did not work. Trail 1 had pitfalls at 50 m, 250 m, 500 m and 750 m. Trail 2 had pitfalls at 600 m, 850 m, 1,100 m and 1,350 m. Trail 3 had pitfalls at 200 m, 450 m, 700 m, 950 m, 1,200 m, 1,450 m, 1,700 m and 1,950 m. FLOTA Faro was sampled during the first expedition, between January 14 and 28, 2008, during the wet season. At that time the level of the river was high.

FLOTA Trombetas (3.2 million ha) is situated in the municipalities of Oriximiná, Óbidos and Alenquer. It forms part of the basin of the Trombetas River and in the north it borders on the western part of ESEC Grão-Pará. Our camp (S 0° 57' 45.97" W 55° 31' 20.28") was in the municipality of Óbidos, in the southeastern corner of the unit, in an area mainly covered by terra-firme forest ('Floresta Ombrófila Aberta Submontana'). The camp was situated in an opening in a forest with many old *Cecropia* trees, at about 100 m from a creek with rocks and a sandy bottom. It was at the base of a higher area with large rocks and an open forest resembling secondary forest ('capoeira'). Three trails radiated from the camp. Trail 1 ran initially E for 2 km, passing the helicopter landing area at 500 m and than turned N for 7 km, reaching the rio Cuminapanema in a transitional area. Trail 2 ran W for 5 km, first rather level, but after crossing two small creeks steadily uphill, in the last

few hundred meters reaching 'Floresta Ombrofila Densa Submontana'. Trail 3 ran SE for 3 km, the first kilometer up a hill (the same one with the helicopter landing area on top) that was strewn with large granite boulders and covered by a low, open type of forest with lianas (Figure 6), and then descending into a lower, flat area with several creeks. The area studied was between 300 and 450 m above sea level, and was hilly, with a number of small, shallow, clear water creeks, sometimes with steep banks, cut about 10 m into the surrounding terrain. The helicopter landing area was at an altitude of 350 m on a rocky hill top with rockslates (lajedos) and an open vegetation of low bushes, cactus (*Cereus*) and bromeliads (Figure 7). This area formed a distinctive habitat, quite different from the surrounding terra-firme forest. Some large rockslates and boulders also were present in part of the adjacent terra-firme forest (between the helicopter landing area and the camp), which caused some of the open habitat and rockdwelling species to enter the forest. Pitfalls and driftfences were placed in trail 1 at 100 m, 400 m and 950 m from camp. In trail 2 at 200 m, 450 m, 700 m, 1,000 m, 1,250 m, 1,500 m, 1,750 m, 2,100 m, 3,250 m, 3,500 m, 3,750 m, 4,000 m and 4,250 m. The pitfalls at distances over 3,250 m on April 19, 2008 were relocated to 300 m, 1,100 m, 1,350 m, 1,600 m and 1,900 m because of logistical problems with pitfalls beyond 2,100 m. In trail 3 no pitfalls were placed. FLOTA Trombetas was the target of the second expedition, which took place between April 16 and May 1, 2008, in the middle of the rainy season.

REBIO Maicuru (1.2 million ha) is situated in the municipalities of Almeirim and Monte Alegre and is drained by the rivers Maicuru, Paru and Jari. On the north-northeast it reaches the rio Jari (border with Amapá), on the southeast and south it is bordered by FLOTA Paru, and on the west (and partly northwest) it borders on the ESEC Grão-Pará (for a short distance), and the Indian Territories (TI) Rio Paru d'Este and Tumucumaque. Our camp (N 0° 49' 43.03" W 53° 55' 52.32") was located in the municipality of Almeirim, in the middle of the conservation unit, at an altitude of 150 m above sea level, at some distance from the rio Ipitinga and about 15 m above the river plain. The research area was covered with terra-firme forest ('Floresta Ómbrofila Densa Submontana') (Figure 8), but the forest along the river apparently was regularly flooded, as shown by high water marks on the vegetation. This river forest (igapó) differed from terra-firme forest by being denser, with many low-slung lianas and growth of smaller trees and in some places by the presence of large *Guadua* bamboo stands. The banks of the river were steep, but in several places there were sandy beaches that dropped steeply in the water (Figure 9). From the camp, trail 1 ran NNW for 4.7 km, parallel to, but at some distance from, the river, through terra-firme forest; at about 1 km from camp it crossed a large inundated area along a creek. Trail 2 ran WNW for 5 km through terra-firme forest in terrain with steep hills and ridges. Trail 3 ran SW for 6 km, steadily climbing and near its end reached an altitude of about 550 m. Trail 4 ran S, closely following the river bank through regularly flooded (dry at the time) forest. The area was rather flat, with isolated small hills, but in the SW part there was a large hill-complex reaching an altitude of 550 m. Pitfalls and driftfences were placed in trail 1 at 360 m, 600 m, 800 m and 950 m from camp. In trail 2 they were placed at 350 m, 500 m, 700 m and 900 m from camp. Both trails 1 and 2 ran through terra-firme forest. In trail 3, also through terra-firme forest, no pitfalls were installed. Trail 4 ran through regularly flooded (dry at the time) forest close to the riverbank. In order to get a comparable effort in terra-firme and river bank forest, eight pitfalls were installed in trail 4, at 370 m, 750 m, 900 m, 1,040 m, 1,450 m, 1,600 m, 1,800 m and 2,000 m from camp. The fifth expedition visited REBIO Maicuru between October 21 and November 6, 2008, during the dry season.

FLOTA Paru (3.6 million ha) is situated in the municipalities of Monte Alegre, Alenquer and Óbidos and is drained by the rivers Maicuru, Paru and Jari. On the north it is bordered by the eastern part of ESEC Grão-Pará and REBIO Maicuru, on the east it is bordered by the rio Jari,

that forms the border with Amapá. Our camp (S 0° 56' 38.29" W 53° 14' 10.68") was locateded in the municipality of Almeirim, in the SE part of the FLOTA, where its border is formed by the rio Paru (Figure 10). The camp was situated at about 100 m from the W bank of the river, in a large patch of low secondary vegetation, and on the S and E side it was bordered by a belt of dense liana forest of 500 m wide. Along the river there was an irregular band of 'Floresta Ombrófila Aberta de Terras Baixas' with antropogenic influences, in several places caused by the presence of isolated houses on this bank of the river. The vegetation on the riverbank itself was rather open, apparently regularly flooded ('igapó'), with hardly any undergrowth in the forest, although in some places there were large clearings, completely taken over by grass and bamboo. The banks of the river were gently sloping and the water of the river was clear, but not very transparent. Some distance downriver from our camp there was a complex of rapids, separating this part of the river from direct contact with the waters of the Amazon. The vegetation away from the river consisted of terra-firme forest ('Floresta Ombrófila Densa de Terras Baixas'). The area along the riverbank was flat, but at about one kilometer from the river bank became hilly with steep slopes, no plateaus, and traversed by several large and small creeks with clear, transparent water. From the camp, trail 1 ran for 5 km NE through 'Floresta Ombrófila Aberta de Terra Baixa', crossing one creek and ending on the river bank upstream from the camp. There were many signs of human activities in this area, with hunting trails, felled trees, open areas and overgrown agricultural fields. Trail 2 ran NW for 9 km through terra-firme forest, crossing several creeks and with many changes in altitude. Trail 3 ran SW for 4 km, first crossing the liana forest around the camp, after 1 km it reached an open cultivated area and then ran through terra-firme forest, crossing a partly dry creek with isolated pools of water in a rocky bed and reaching a creek with running water. In the creeks there were rock outcrops. Trail 4 branched off from trail 3 at the open cultivated area and then ran S for 4 km, closely following the river bank through open river-bank vegetation ('Floresta Ombrófila Aberta de Terra Baixa'), and crossing some creeks. Altitude in the study area varied from 30 to 100 m. Four pitfalls were placed along each trail at distances of 250 m, 500 m, 750 m and 1,000 m, all in level terrain of about 30 – 90 m. The sixth expedition inventoried FLOTA Paru between December 4 and 19, 2008, at the beginning of the rainy season.

ESEC Grão-Pará occupies 4.2 million ha in the municipalities Oriximiná, Óbidos, Alenquer and Monte Alegre, and runs from the frontier with Guyana in the NW to the TI Tumucumaque, TI Rio Paru d'Este and REBIO Maicuru in the E. A large, more or less triangular western part connects by a narrow neck to a smaller more or less rectangular eastern part. On the south it is bordered by the TI Trombetas-Mapuera, FLOTA Trombetas, TI Zo'é and FLOTA Paru. Because of its great size and different physionomies three localities were sampled in this conservation unit, respectively ESEC Grão-Pará North, Centre and South. Some haphazard collections were made in Camp Curuá (Estanífera) of the mining company rio Tinto. The area is drained, from W to E, by the headwaters of the Mapuera and Trombetas rivers, and by the Paru de Oeste, Cuminapanema, Curuá and Maicuru rivers.

Camp ESEC Grão-Pará North (N 1° 17' 7.51" W 58° 41' 45.24") was situated in the NW part of the unit, in the municipality of Oriximiná, close to the border with Guyana in the Acarai Mountains (Figure 11), at an altitude of 500 m on a hill. The area is covered by terra-firme forest ('Floresta Ombrófila Densa Submontana') and is very hilly, with steep slopes leading down to creeks with clear, transparent water. Relatively small rock outcrops occur sparsely in the area, completely covered by forest. From the camp, trail 1 ran SE for 4.35 km, first descending into a valley at 400 m, than climbing out of the valley up a spur of a hill to 600 m, down again to a second valley at about 460 m and up another hillside to 500 m. Trail 2 ran S for 900 m and then SW, following a spur of the hill on which the camp was situated, at the end slightly going down, and to the west, after 2.8 km joining trail 3 at km 2.5. Trail 3 ran SSW for 4.

km, descending into a valley at 400 m altitude, following a creek, at km 2.5 it was joined by trail 2 from the east. Trail 4 started at km 0.9 of trail 2 where it split off to SSE for 2.1 km, down from the camp into a valley at 400 m altitude. Pitfalls were placed in trail 1 at 150 m, 250 m, 450 m, 650 m, 1,800 m, 2,000 m, 2,150 m and 2,260 m from camp; and in trail 3 at 300 m, 550 m, 750 m, 950 m, 1,100 m, 1,250 m, 1,450 m, and 1,650 m from camp. In trails 2 and 4 no pitfalls were placed. Altitudes varied between 350 and 600 m above sea level. ESEC Grão-Pará North was the aim of the fourth expedition, between August 25 and September 11, 2008, during the dry season.

Camp ESEC Grão-Pará Centre (N 0° 37' 49.01" W 55° 43' 42.60") was situated in the municipality of Óbidos, in the northern part of the eastern half of the ESEC, close to the southern border of the TI Tumucumaque. It was at an altitude of 400 m in a transition zone at the W margin of a large island of terra-firme forest ('Floresta Ombrófila Densa Submontana') within a large savanna enclave. The savanna area consisted of hilly terrain (300 to 500 m), with many areas of rock outcrops (from horizonally flat to curved and steep) and with a vegetation of shrubs and low forest (Figure 12), sometimes interrupted by grassy areas with isolated trees (e.g. *Curatella*) (Figure 13). Creeks in the savanna were rare. One encountered was a deep (3 m) gully with vertical banks and did not contain any water. Another creek arose at the base of a large complex of rock outcrops and contained clear, transparent water. This creek ran at the border between open rock outcrop and savanna forest and formed some deeper pools connected by shallower areas. Open rock outcrops were generally wet and retained water in crevices and under loose rocks, well after rains had stopped (Figure 14). Hillsides were generally steep. The forest was terra-firme forest with large trees and a high canopy at about 30 m. The forest island was traversed by a large creek with (at the time shallow) clear, transparent water, in some places forming deeper pools. The transitional forest between forest and savanna consisted of small, slender-stemmed, low trees with some larger trees interspersed; this vegetation was characterized by the botanists as 'cerradão'. From camp, trail 1 ran N for 5 km through terra-firme forest and slightly undulating terrain, crossing the creek in the forest island at about 1 km from camp. Trail 2 ran NE for 5 km, reaching the E edge of the forest, first dropping into the bed of the aforementioned creek, than steeply climbing up to a plateau at 500 m and than dropping again to a level of 400 m. Trail 3 ran S for 4.4 km, generally through savanna over steep hills, but at 700 m and at 2.5 km entering narrow areas of forest with creeks. Trail 4 ran roughly W for 5 km through open savanna, savanna forest and open rock outcrops, twice crossing narrow areas of terra-firme forest without creeks. The first part of the trail was in an area with steep hills, and after 1450 m descended into a relatively flat area. Pitfalls in trails 1 and 2 were placed at 500 m, 750 m, 1,000 m and 1,250 m from camp, all in forest. In trail 3 (savanna) they were placed at 200 m, 450 m, 750 m and 900 m. In trail 4 (savanna) they were placed at 400 m, 800 m, 1,240 m and 1,440 m. Altitudes varied between 310 and 450 m above sea level. ESEC Grão-Pará Centre was inventoried between January 10 and 31, 2009, during the early rainy season.

Camp ESEC Grão-Pará South (S 0° 9' 55.76" W 55° 11' 11.04") was situated in the municipality of Alenquer, in the SE part of the ESEC, close to its border with FLOTA Paru, and only 6 km NW of the Base Curuá (Estanífera) of Rio Tinto, at an altitude of 300 m. It was situated in a wide creek valley surrounded by hills. The area, according to vegetation maps, was covered by 'Floresta Ombrófila Densa Submontana', but along creeks, around a lake present W of the camp, and on top of a plateau, the forest was clearly different from the terra-firme forest covering the hills. In the creek valleys and near a lake were patches of 'açaizal', açaí forest dominated by *Euterpe* palms in shallow water. The forest along creeks in low-lying areas generally was open, with a muddy surface and pools, tufts of grasses, few large trees and many thin trees; it was considered as 'igapó forest' by the botanists. From

the camp, trail 1 ran NNE for 5 km, first crossing the side of a hill, than dipping into a partly inundated creek valley, before starting a long climb up to a plateau that was covered by a low type of forest (canopy at 10 m) that consisted of closely growing small trees with thin stems (called 'cerradão' by the botanists). Only few larger trees were present. Trail 2 ran E for 5 km, first through a level creek valley, but after 2 km climbing a ridge and going down again to the next creek valley. Trail 3 ran SE for 5 km, through a swampy area along a creek, after 3 km continuing on the lower part of a hill, more or less parallel to a creek valley. Trail 4 ran W for 3.4 km through a creek valley, in the first 50 m crossing a very dense liana forest, than entering igapó forest and crossing a large deep creek, with steep sides and water with much organic particles, several times. Along this trail there were several ponds (1.5 m deep) in the forest. At the end the trail reached a sizeable open lake and ran around it. The lake on most sides was bordered by palms (*Attaleia spinosus*, *A. maripa*, *Mautitia flexuosa*), but on its north side was bordered by a sloping area with terra-firme forest that reached the water margin. The centre of the lake was covered by a vegetation of Cyperaceae and grasses, along its edges there were waterlilies. The water was very clear and transparent (at least 2 m view). A creek flowed out of the lake on the east and passed the camp about 3 km downstream. On the west a small creek, completely overgrown with vegetation, flowed into the lake. The altitude varied from 300 m in the creek valleys to 450 m on top of the plateaus. Pitfalls were only placed in trails 1 (10 sets) and 3 (6 sets). In trail one they were at 1,550 m, 1,650 m, 1,800 m, 2,000 m, 4,000 m, 4,100 m, 4,200 m, 4,300 m, 4,400 m and 4,500 m. The first four were in terra-firme forest between 320 and 380 m altitude, the last six, from 4,000 m on, were in cerradão forest at 420 m altitude. Those in trail 3 were at distances of 800 m, 1,230 m, 1,280 m, 1,500 m, 1,650 m, and 1,750 m from camp. No pitfalls were placed in trails 2 and 4 because large areas of those trails were inundated creek valley. The third expedition targeted ESEC Grão-Pará South between June 6 and 21, 2008, towards the end of the wet season.

Base Curuá (Estanífera) of mining company Rio Tinto (S 0° 13' 16.5" W 55° 09' 45.0"), in the municipality of Alenquer, although not an area that was systematically collected, like the ones described before, is shortly mentioned because some species were collected here that were not collected elsewhere. It is situated 8 km SE of ESEC Grão-Pará South, on top of a plateau (450 m), with an airstrip and an area where semi-permanent barracks have been mounted for personnel of Rio Tinto working in the area. The area around the campsite and near the airstrip embarking site consists of a low forest (canopy 5 m) with many narrowly spaced thin-stemmed trees (Figure 15). This forest was characterized by the botanists as 'cerradão'. Aong a trail to the rio Curuá there was a small open rock savanna, with large areas of bauxite rock on the surface and a sparse vegetation of herbs, Ananas and shrubs.

LOGISTICS

All expeditions started in Belém and went to Santarém by commercial flight, except the expedition to ESEC Grão-Pará North which flew from Belém to Boa Vista, Roraima. The expedition to FLOTA Faro used a boat as base camp. The expedition to ESEC Grão-Pará North traveled by bus from Boa Vista to Caroebe (still in Roraima) and from there by helicopter to base camp ESEC Grão-Pará North. In the other five expeditions participants were transported from Santarém by one-engine planes to either Camp Curuá (Estanífera) of Rio Tinto, to airstrip '13 de maio' (REBIO Maicuru) or to Monte Dourado (FLOTA Paru). From those places transport to the camps was by helicopter, except for the expedition to FLOTA Paru, which from Monte Dourado went by bus to the rio Paru and crossed the river by canoes with an outboard motor. Base camps, trails and pitfalls were prepared shortly before arrival of the scientific participants. Camp size tended to increase during the year that expeditions were held, from 210 m^2 in FLOTA Trombetas, to 350 m^2 during the last expedition (ESEC Grão-Pará Centre). Helicopter time amounted to 287:10 h, small airplanes time to 334:53 h.

COLLECTING AND PREPARATION OF HERPETOFAUNA

Reptiles and amphibians were collected by means of two complementary methods, *viz*. active sampling (AS), which combined two techniques: time constrained searches (TCS) and visual and audio encounter surveys (VES) (no recordings of calls were made); and passive sampling by pitfall traps with drift fences (PD). Systematic collecting took place in all seven expedition areas described above. Camp Curuá (Estanífera) is not a major collecting site, no systematic sampling was done there and it has not been included in any calculations, except for total number of species in the whole area, since a few species have been collected only there. For the same reason it appears in the table presented in the Appendix 1.

All trails and most pitfalls were georeferenced, but we here only present the coordinates of the centrally located campsites (mark 0 of the trails of every expedition).

Active sampling (Crump & Scott, 1994; Scott, 1994; Ribeiro-Junior *et al*., 2008) consisted in actively searching for animals during day and night, along marked trails and in different habitats, noting time spent (unit of collecting = person.hour). AS is important for a general inventory, considering both taxonomic coverage (pitfalls are only adequate for some groups) and coverage of different habitats. This method requires trained personal, and, even with experienced collectors, is subject to personal bias, which causes problems to compare areas or studies done by this method. Another unequal factor, in the present case, was that three expeditions had two herpetologists and four had three, and thus collecting effort in active sampling was not uniform for all expeditions.

Pitfall traps with drift fences (Corn, 1994; Cechin & Martins, 2000; Ribeiro-Junior *et al*., 2008): each trapping unit consisted of four buckets (pitfalls) of 60 l each, that were dug into the ground with their rim flush with the surface, positioned in a Y, with the central bucket connected to the three peripheral ones by eight meters of black plastic sheet with a height of 60 cm. A total of 16 trapping units was used, positioned in two, three or four groups (each group in a different trail), depending on the local conditions (type of substrate, rocks, flooding, logistics). Within each group, trapping units generally were positioned at distances of 250 m from each other, but in FLOTA Trombetas they were partly 125 m apart, and in some cases greater distances were used in order to also sample different vegetations or because of physical problems encountered in the terrain. Pitfalls were checked once a day during the entire sampling period. Trapping units were installed in the week before the start of each expedition and removed at the end of each expedition. Collecting with pitfalls has the advantage to be independent of collector and they collect species (generally (semi) fossorial) that are only rarely caught during active collecting. On the other hand, pitfalls are directed to leaf litter and terrestrial species, although some arboreal species that come to the ground are also collected with certain regularity; other groups, especially arboreal/climbing and aquatic species, large terrestrial species and medium-sized to large snakes, and a number of amphibians that are able to climb or jump out of the buckets, are rarely collected. Besides, it is not always possible to use pitfalls; flooded or rocky areas, or areas far from basecamp, can not be sampled by this method, because of the impossibility to install the buckets in the first areas, and the impossibility to check the pitfalls every day in the last case.

Specimens collected by the fieldworkers or by other researchers were considered as occasional encounters.

For each specimen observed by the herpetologists and/or collected the following data (if applicable) were annotated: identification, locality (GPS or distance in trail), habitat, microhabitat, day, time, and name of collector/observer. Collected animals' standard measurements and weight were taken, and when possible the sex was determined. In many cases notes of life colouration were made, and digital photographs and tissue samples (liver or muscle) for molecular studies were taken.

Collected specimens were euthanized by an overdose of veterinary anesthetic, fixed in formaldehyde

4% (one part of commercial formaldehyde 37% and nine parts of water) for maximally 24 hours, labeled with fieldnumbers (a field series 'CN' [Calha Norte] was created for all specimens collected during the expeditions), and preserved in alcohol 70%, except tadpoles that were preserved in 4% formaldehyde (Franco *et al*., 2002). Tissue samples were preserved in absolute alcohol, maintained at environmental temperature in the field and transferred to a freezer after arrival in the museum. Even though we refer here to number of specimens per site, it is important to keep in mind that each site covers a few square kilometers and different environments. Thus specimens dealt with as coming from one site may have been collected up to 8,000 m apart. All material was deposited in the herpetological collection of Museu Paraense Emílio Goeldi (MPEG) in Belém, Pará, Brazil (Appendix 2). Collections were made under licence 001/2008 of the Secretaria Estadual do Meio Ambiente (SEMA-PA).

Collecting effort, number of specimens collected per group, and rarefaction curves for amphibians and reptiles separately, are presented for each major collecting site (thus, not for Estanífera). Species rarefaction curves were constructed with the help of the program EstimateS version 7.5 (Colwell, 2005), on the basis of grouped AS and PD collections, considering as sampling unit each collecting day – they represent the cumulative number of species against the increase of collecting effort, obtained after 50 randomizations. Species composition in the seven sites is compared, using the Biogeographic Similarity Coefficient (Duellman, 1990), equivalent to $2C/(N_1 + N_2)$, where N_1 = number of species in locality 1, N_2 = number of species in locality 2, and C = number of species common to both localities. We present a gross estimation of relative abundance of amphibians and reptiles, for each site and for each group as a whole, based on numbers of specimens caught by pitfall traps and all those collected by active searches. Species observed but not collected are added to the graphs as presenting '0' (zero) specimens.

Species were considered endemic for the Guianan Region mainly based on Hoogmoed (1979b) (reptiles and amphibians), Señaris & MacCulloch (2005) and Duellman (1999) for amphibians, and Avila-Pires (2005) for reptiles.

For familial and generic nomenclature we adhere to the nomenclature used before the Faivovitch *et al*. (2005), Frost *et al*. (2006), and Grant *et al*. (2006) papers, because we are not convinced that the wholesale changes in nomenclature proposed by these authors are really necessary and correct. We prefer to await further independent studies that corroborate the alterations those publications proposed. We have made an exception for the former species of *Colostethus* in the Guianan Region with a mid-lingual papilla, which are clearly recognizable morphologically and now are named *Anomaloglossus* (Grant *et al*., 2006). Also, we have not yet taken into account the changes proposed for the genus *Eleutherodactylus* by Heinicke *et al*. (2007) and by Hedges *et al*. (2008). Discussion about these issues is still going on, and by maintaining the pre-2005 names we keep the relation with older (= pre-2005) literature, thus facilitating the work of conservationists and managers of natural areas.

Two recent publications, Zaher *et al*. (2009) and Vidal *et al*. (2010), proposed changes in the classification of South American Colubrid snakes. Because of the short time to properly evaluate them (when they appeared this paper already had been completed), we preferred not to incorporate their changes here.

We tried to identify material of the *Bufo granulosus* complex with Narvaes & Rodrigues (2009), but had serious problems trying to separate the species recognized by these autors in the area north of the Amazon River (Gorzula & Señaris (1999) who also doubted the validity of different taxa in Venezuelan Guiana). We doubt whether all taxa recognized by Narvaes & Rodrigues (2009) are real entities and for the time being we have adhered to the use of *Bufo granulosus* for the medium-sized granular toad with dorsally directed nostrils, occurring north of the Amazon, realising that e.g. *Bufo mirandaribeiroi* Gallardo, 1965 is a good taxon.

COLOUR PHOTOS

We present colour photos of some of the species found during the expeditions (Figures 16-75). They generally appear in the same sequence as used in Appendix 1.

RESULTS AND DISCUSSION

COLLECTING EFFORT AND SPECIES RICHNESS

Collecting effort per expedition for each method is shown in Table 1, which also refers to the main habitats found in each site. Taking all areas together we registered 80 species of amphibians (77 frogs and three caecilians) and 95 species of reptiles (36 species of lizards, three of amphisbaenians, 49 species of snakes, five species of chelonians and two species of caiman). The large lizard *Tupinambis teguixin* (Linnaeus, 1758) (jacuraru or teiu) seems to have been seen in some areas, but not by herpetologists. Because of doubts remaining about the identification, we have not included this species in our list, although it is expected to occur throughout the area (see below). Comparing these numbers with what is expected to occur in the area based on the literature (see introduction), we see that lizards are well represented, followed by frogs, while caecilians, amphisbaenians, snakes and chelonians are well below the expected richness, being clearly underrepresented in the samples. Chelonians, living mainly in aquatic environments, need special collecting techniques, not used in the surveys. Caecilians, partially aquatic and partially fossorial, and amphisbaenians, which are mainly fossorial, are only sporadically found, even when digging extensively for them. Snakes have usually secretive habits and are known to need long periods for inventorying them satisfactorily in tropical rainforests.

Table 2 shows the number of species per expedition. The highest number of amphibians (36 species) was registered for ESEC Grão-Pará South and the lowest number (21 species) for the FLOTA Faro. The highest number of reptiles (42 species) was collected in ESEC Grão-Pará North, and the lowest number (27 species) in ESEC Grão-Pará South. However, none of the rarefaction curves, calculated for each site, separately for amphibians and reptiles, reached the asymptote (Figure 76), indicating that more species are expected to occur in each area. The need of prolonged effort to adequately survey the herpetofauna is well documented in the literature (e.g., Duellman, 1978; Myers & Rand, 1969). Duellman (2005) reported that, in Cusco Amazónico, it took 442 person-days to record 89% of the species of anurans, 81% of the lizard species, and 79% of the snake species present in the area. Ribeiro-Junior *et al*. (2008) also showed the necessity of a large collecting effort, using multiple techniques, for an adequate representation of the herpetofauna. Results of collections vary due to several factors, among others time of the year, meteorological circumstances during the expedition, micro- and meso-habitats sampled, and in the case of active collecting the collectors and the number of collectors. For example, in ESEC Grão-Pará South, the larger number of amphibian species was partly due to the presence of ponds and a lake that provided good conditions for amphibians, especially Hylidae. Although similar habitats have not been encountered in the other sampled areas, it is very unlikely that they do not occur in all conservation units. Besides, it should be remembered that some amphibians use for reproduction temporary pools that only form during the rainy season, and some species have explosive reproduction which only lasts a few days. All these factors influence the number of species found during the limited period of an expedition.

Comparing species richness obtained for each area with number of specimens collected (Figure 77), the studied sites in FLOTA Trombetas, REBIO Maicuru and ESEC Grão-Pará show an increasing number of species with increasing number of specimens collected. Richness in FLOTA Faro and FLOTA Paru, on the other hand, is proportionally less in relation to the number of specimens collected. These two areas are situated along large rivers bordered by flooded forest, a habitat that usually has less species than terra-firme forest (also present in these sites). However, the savanna vegetation

Table 1. Collecting effort per method, and main habitats at each studied site. AS = Active Search, PD = pitfalls with driftfence.

	FLOTA Faro	FLOTA Trombetas	ESEC Grão-Pará North	ESEC Grão-Pará Centre	ESEC Grão-Pará South	REBIO Maicuru	FLOTA Paru
AS daytime (person.hours)	72	100	180	172 (74f, 98c)	134	162	78
AS night (person.hours)	72	18	20	88 (40f, 48c)	36	58	19
PD (trap.nights)	192	237	240	240 (120f, 120c)	208	240	208
Habitats	Terra-firme forest (3 trails); flooded forest (1 trail); disturbed areas	Terra-firme forest with creeks (some areas with many *Cecropia);* an open area with rock outcrop	Terra-firme forest, with steep slopes and creeks	Terra-firme forest (f) and cerrado (c) with rock outcrops	Terra-firme forest with creeks bordered by flooded areas; an extensive lake bordered by palms	Terra-firme forest and (dry) flooded forest; small beach along margin of river	Terra-firme forest with creeks and different degrees of perturbation (3 trails); (dry) flooded forest along margin of river (1 trail)

Table 2. Number of species per expedition and per taxonomic group. The column "Grão-Pará (Estanífera)" refers to the Rio Tinto basecamp (rio Curuá), where only occasional collections were made, but where two species were collected that were found nowhere else in ESEC Grão-Pará.

	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	**Total**
AMPHIBIA	21	30	24	32	36	1	31	24	**80**
REPTILIA	35	32	42	29	26	1	34	29	**95**
lizards and amphisbaenians	20	16	24	15	14	0	21	18	**39**
snakes	12	13	16	12	10	1	10	10	**49**
chelonians	2	2	1	1	2	0	2	1	**5**
cayman	1	1	1	1	0	0	1	0	**2**
TOTAL	**56**	**62**	**66**	**61**	**62**	**2**	**65**	**53**	**175**

that covered part of ESEC Grão-Pará Centre also harbors a lower number of species than terra-firme forest, but in spite of that, relative richness was proportional to that in other sites. The two FLOTA, Faro and Paru, also had in common areas of disturbed and secondary forests, and one possibility is that the lower relative richness of species in these two areas is a result of environmental disturbance. Habitat alteration may have caused the disappearance, or a population reduction (making them more difficult to be captured), of a number of species.

SPECIES COMPOSITION

A complete list of species (including authors and years), expeditions during which they were collected and basic biological data are presented in the Appendix 1. Looking at the herpetofauna as a whole, only 5.7% of the species were found in all seven sites, while 43.4% were found in only one of the sites (Table 3). Lizards and amphisbaenians, as a group, showed the most even distribution in the samples, with almost 18% of the species captured in all

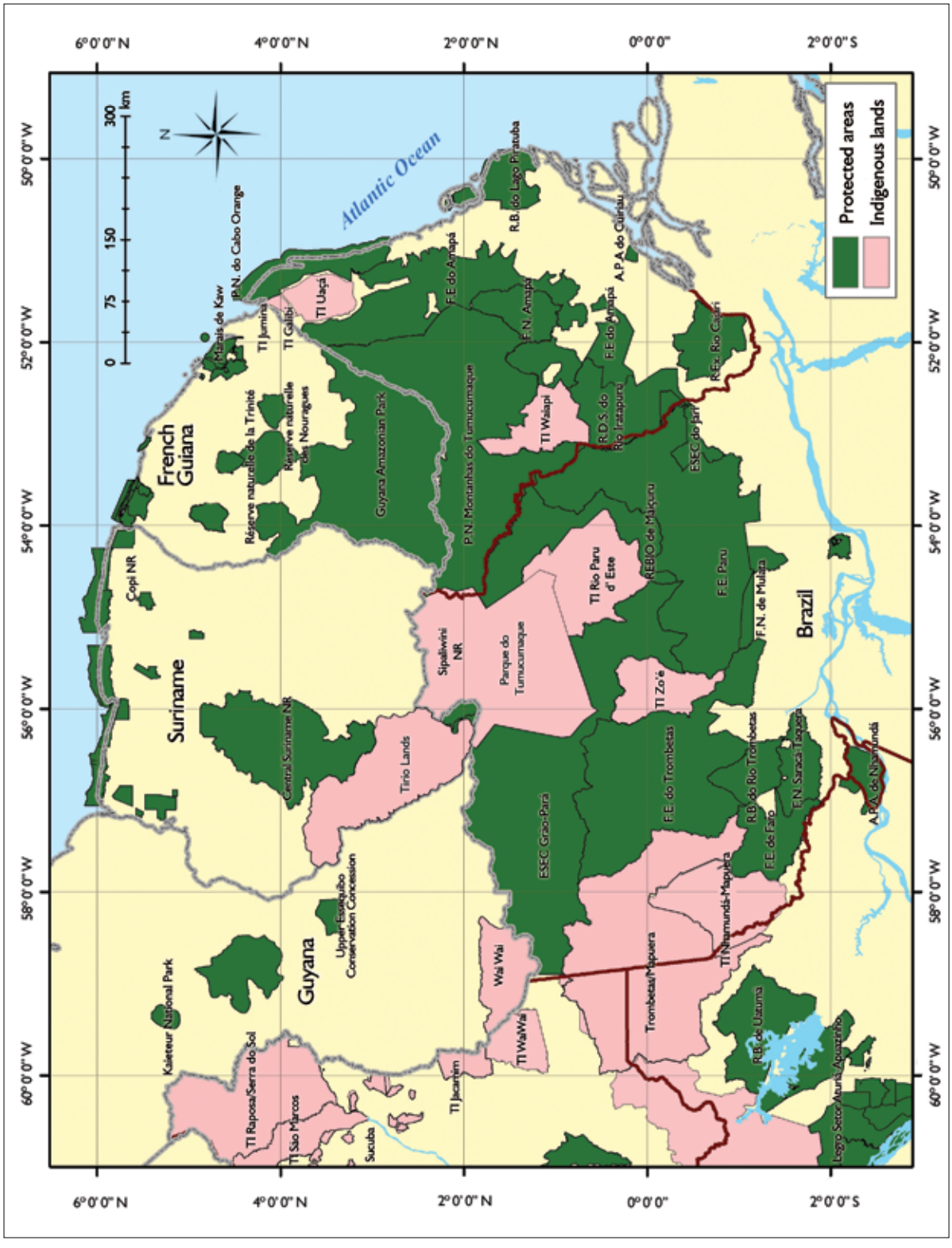


Figure 1. Map of the eastern part of the Guianan Region, showing Indian Territories and protected areas in Brazil (Amapá, northern Pará, eastern Amazonas and Roraima), French Guiana, Suriname and eastern Guyana.

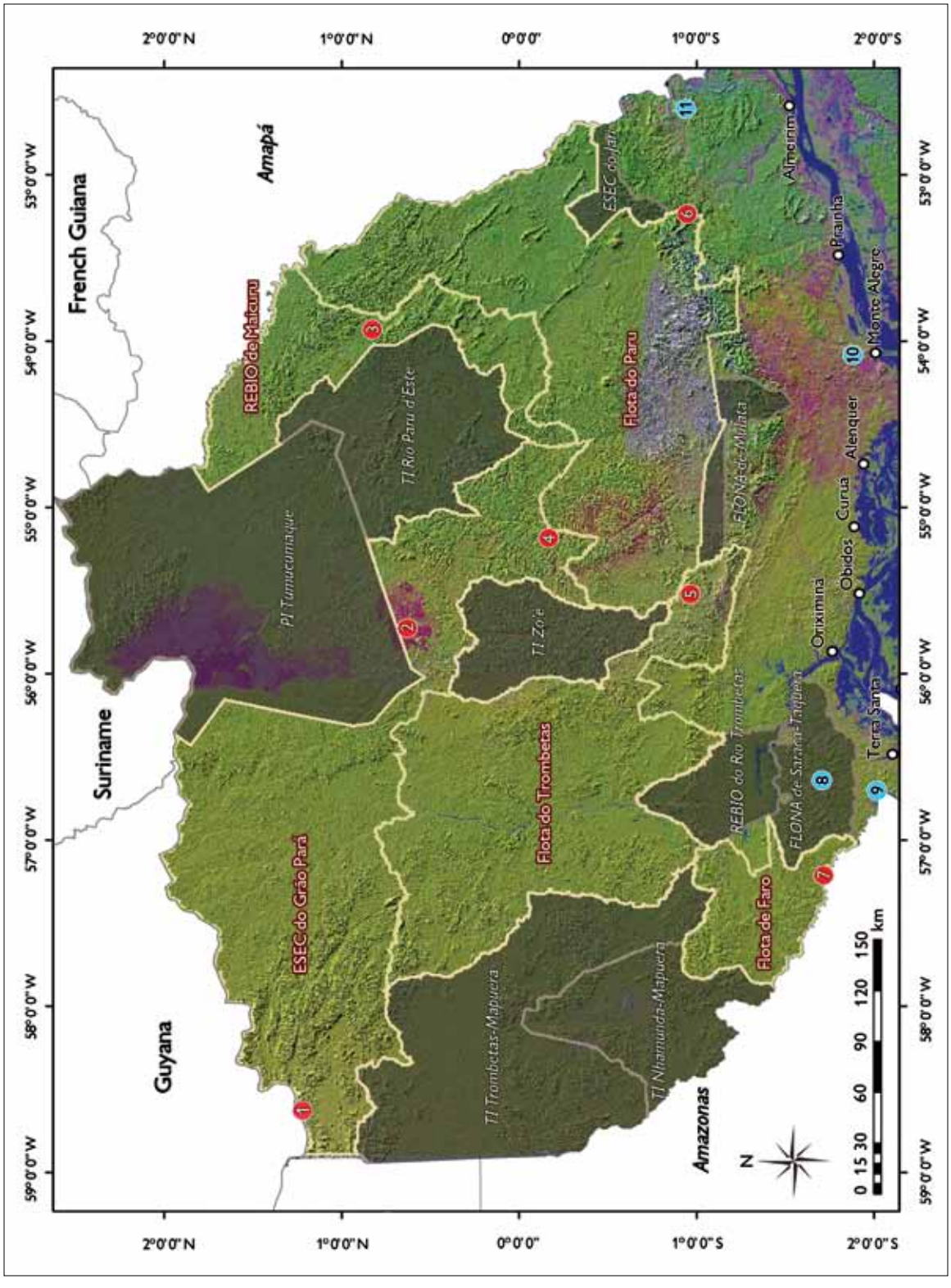


Figure 2. Map of northern Pará with localities inventoried (red dots), and areas where inventories were made before the Calha Norte Project (light blue dots). The purple area around point 2 is savanna. 1. ESEC Grão-Pará North, 2. ESEC Grão-Pará Centre, 3. REBIO Maicuru, 4. ESEC Grão-Pará South and Estanífera, 5. FLOTA Trombetas, 6. FLOTA Paru, 7. FLOTA Faro, 8. FLONA Saracá-Taquera, 9. Rio Nhamundá, Sítio Céu Estrelado-Rio Trombetas, Cruz Alta, 10. Monte Alegre, 11. Jari.

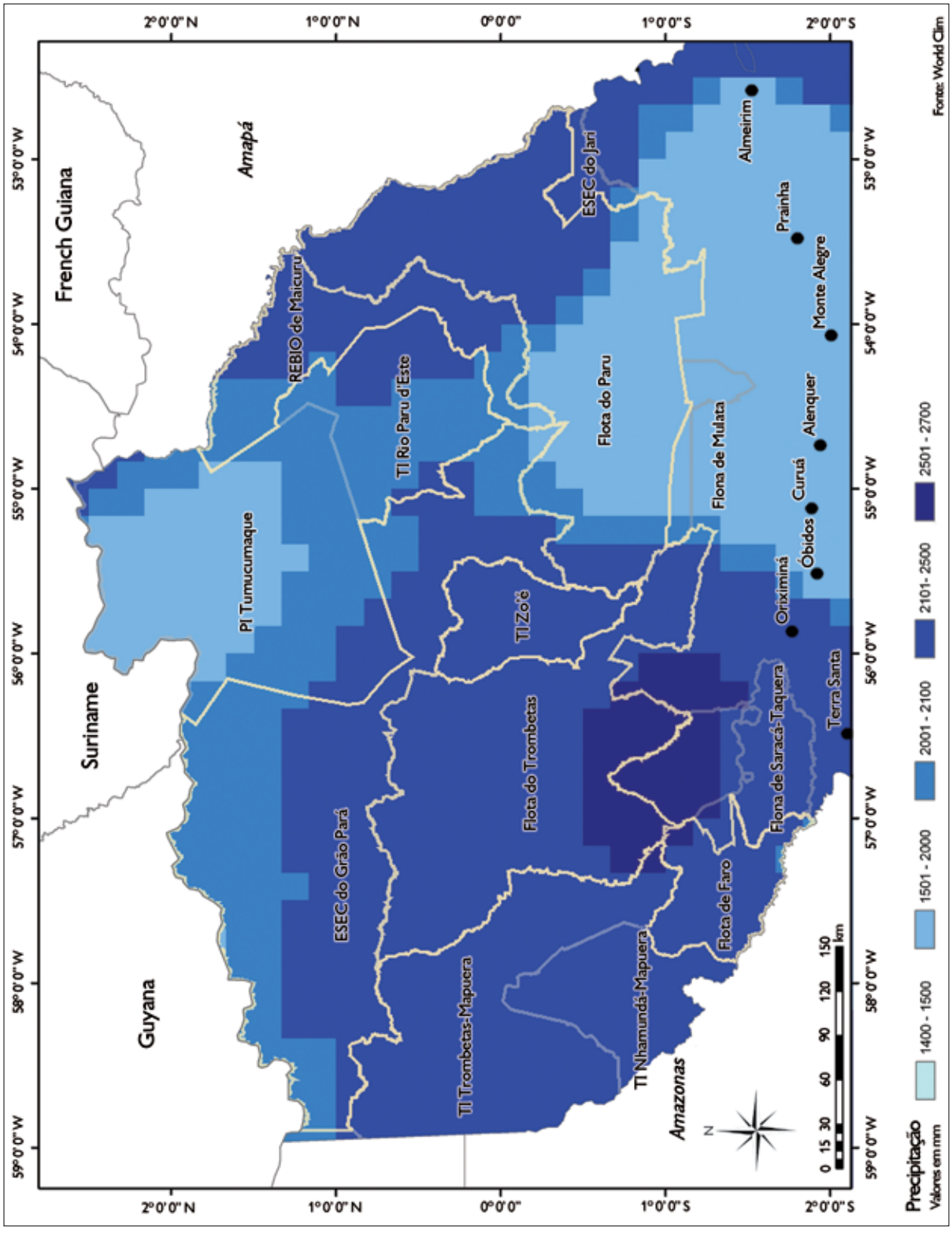


Figure 3. Mean annual precipitation for northern Pará.

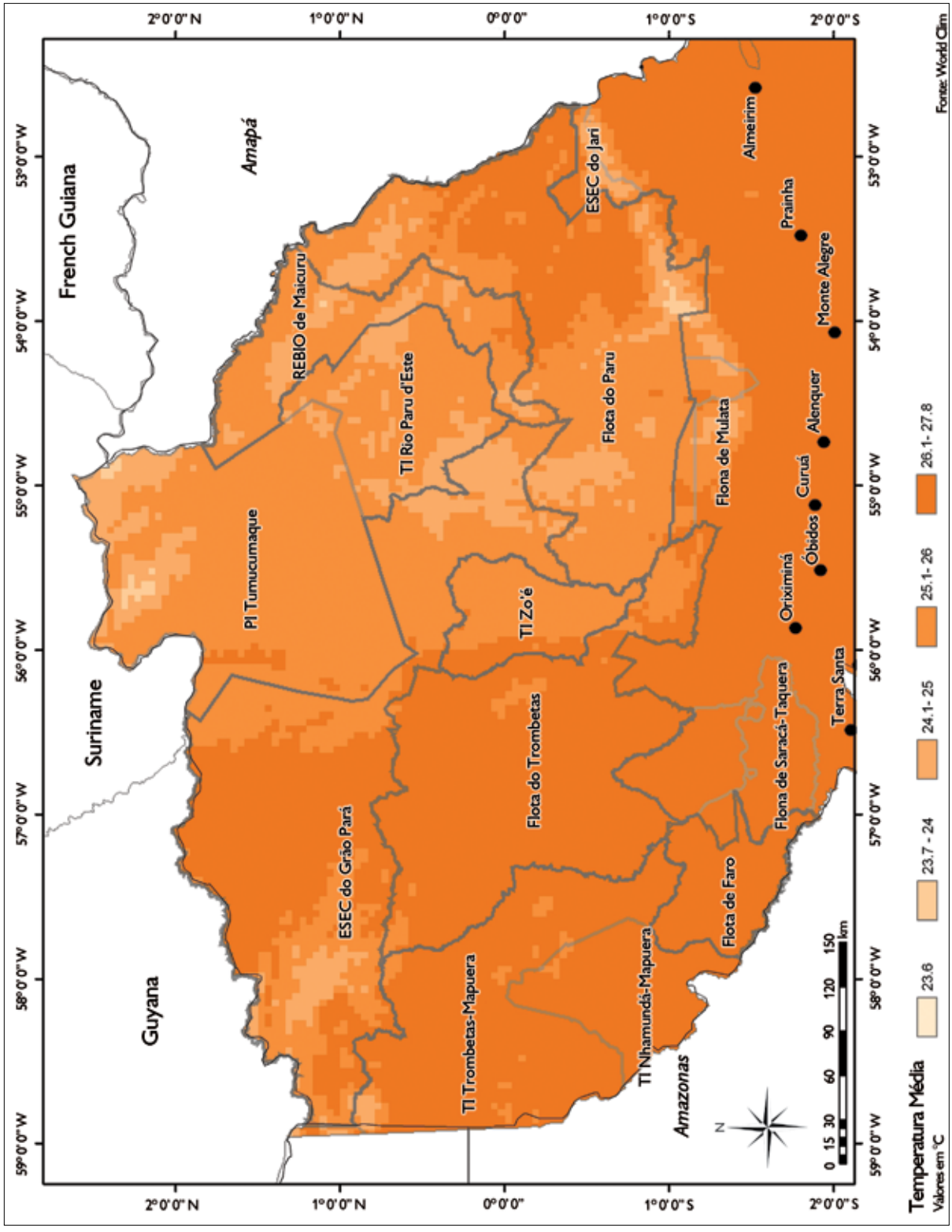


Figure 4. Mean annual temperatures for northern Pará.

Figure 5. FLOTA Faro, view of inundated igapó forest. Photo: Luciano F.A. Montag.

Figure 6. FLOTA Trombetas, trail 3, terra-firme forest with large rocks. Photo: MSH.

Figure 7. FLOTA Trombetas, heliporto with open lajedos and dry-adapted vegetation (cacti, bromeliads). Photo: MSH.

Figure 8. REBIO Maicuru, terra-firme forest with flowering trees (*Tabebuia* sp.) in the dry season. Photo: MSH.

Figure 9. REBIO Maicuru, rio Ipitinga. Photo: MSH.

Figure 10. FLOTA Paru, looking south along the rio Paru. Photo: MSH.

Figure 11. ESEC Grão-Pará North, general outlook over the Acarai Mountains. Photo: TCSAP.

Figure 12. ESEC Grão-Pará Centre, trail 3, km 0.9, open rock outcrop and savanna vegetation. Habitat of *Gymnophthalmus* cf. *underwoodi*. Photo: MSH.

Figure 13. ESEC Grão-Pará Centre, pitfall 9, installed in savanna area of trail 3. Photo: MSH.

Figure 14. ESEC Grão-Pará Centre, trail 4, km 0.9, open, wet rock outcrops surrounded by savanna vegetation. Habitat Leptodactylus myersi. Photo: MSH.

Figure 15. Camp rio Curuá (Estanífera) of Rio Tinto mining company. The 'cerradão' vegetation where *Rana palmipes* and *Physalaemus ephippifer* were found in small poodles. Photo: MSH.

Figure 16. *Cochranella* sp. (CN2363), ESEC Grão-Pará Centre. Photo: MSH.

Figure 17. *Atelopus hoogmoedi*, male (CN2086), ESEC Grão-Pará Centre. Observe difference in pattern with male. Difference is not sex-related. Photo MSH.

Figure 18. *Atelopus hoogmoedi*, female (CN2102), ESEC Grão-Pará Centre. Photo: MSH.

Figure 19. *Bufo margaritifer*, female (CN421), FLOTA Trombetas. Photo: MSH.

Figure 20. *Bufo margaritifer*, male (CN426), FLOTA Trombetas. Photo: MSH.

Figure 21. *Epipedobates* cf. *guayanensis* (CN394), FLOTA Trombetas. Photo: MSH.

Figure 22. *Epipedobates hahneli* (N495), FLOTA Trombetas. Photo: MSH.

Figure 23. *Dendrobates tinctorius*, blue variety (September 12, 2008, not collected) ESEC Grão-Pará North, courtship behaviour. Photo: TCSAP.

Figure 24. *Hyla dentei* (CN 1492), REBIO Maicuru. Photo: MSH.

Figure 25. *Hyla gaucheri* (CN825), ESEC Grão-Pará South. Photo: MSH.

Figure 26. *Hyla punctata* (CN1994), FLOTA Paru. Photo: MSH.

Figure 27. *Phyllomedusa tomopterna* (CN2134), ESEC Grão-Pará Centre. Photo: TCSAP.

Figure 28. *Scinax garbei* (CN1629), REBIO Maicuru. Photo: TCSAP.

Figure 29. *Scinax proboscideus* (CN712), ESEC Grão-Pará South. Photo: MSH.

Figure 30. *Rana palmipes* (CN600-601), Estanífera (Acampamento Curuá). Photo: MSH.

Figure 31. *Adenomera andreae* (CN), REBIO Maicuru. Photo: MSH.

Figure 32. *Adenomera hylaedactyla* (CN2113), ESEC Grão-Pará Centre. Photo: MSH.

Figure 33. *Ceratophrys cornuta* (CN 799), ESEC Grão-Pará South. Note difference in colour with other specimen depicted. Photo: MSH.

Figure 34. *Ceratophrys cornuta* (CN 805), ESEC Grão-Pará South. Note difference in colour with other specimen depicted. Photo: MSH.

Figure 35. *Leptodactylus knudseni* (CN2195), ESEC Grão-Pará Centre. Photo: MSH.

Figure 36. *Leptodactylus longirostris* (CN2110), ESEC Grão-Pará Centre. Photo: MSH.

Figure 37. *Leptodactylus myersi* (April 26, 2008, not collected), FLOTA Trombetas. Photo: MSH.

Figure 38. *Leptodactylus pentadactylus* (CN920), ESEC Grão-Pará South. Photo: MSH.

Figure 39. *Lithodytes lineatus* (CN453), Flota Trombetas. Photo: MSH.

Figure 40. *Physalaemus ephippifer* (CN562), FLOTA Trombetas. Photo: MSH.

Figure 41. *Hamptophryne bolivianus* (CN796), ESEC Grão-Pará South. Photo: MSH.

Figure 42. *Otophryne pyburni* (CN1358), ESEC Grão-Pará North. Photo: TCSAP.

Figure 43. *Synapturanus mirandaribeiroi* (CN373), FLOTA Trombetas. Photo: MSH.

Figure 44. *Pipa snethlageae* (CN319), FLOTA Faro. Photo: W.A. Rocha.

Figure 45. *Caecilia tentaculata* (CN 2138), ESEC Grão-Pará Centre. Photo: MSH.

Figure 46. *Rhinatrema* sp. n. (CN1088), ESEC Grão-Pará North. Photo: TCSAP.

Figure 47. *Coleodactyulus amazonicus* (CN530), FLOTA Trombetas. Photo: MSH.

Figure 48. *Lepidoblepharis heyerorum*, male (CN248), FLOTA Faro. Photo: W.A. Rocha.

Figure 49. *Amapasaurus tetradactylus* (CN 362), FLOTA Trombetas. Photo: MSH.

Figure 50. *Bachia flavescens* (CN791), Grão-Pará South. Photo: MSH.

Figure 51. *Cercosaura ocellata*, male (CN2028), FLOTA Paru. Photo: MSH.

Figure 52. *Gymnophthalmus* cf. *underwoodi* (CN2225) ESEC Graõ-Pará Centre. Photo: MSH.

Figure 53. *Iphisa elegans* (CN1100), ESEC Grão-Pará North. Photo: TCSAP.

Figure 54. *Leposoma guianense*, male (CN1095), ESEC Grão-Pará North. Photo: TCSAP.

Figure 55. *Neusticurus rudis* (CN168), ESEC Grão-Pará North. Photo: TCSAP.

Figure 56. *Tretioscincus agilis* (CN1232), ESEC Grão-Pará North. Photo: TCSAP.

Figure 57. *Kentropyx striata* (CN1247), ESEC Grão-Pará Centre. Photo: MSH.

Figure 58. *Mabuya nigropunctata* (January 18, 2009, not collected), ESEC Grão-Pará, trail 1 km 0.65. Photo: MSH.

Figure 59. *Anolis auratus* (CN2973), ESEC Grão-Pará Centre. Photo: MSH.

Figure 60. *Anolis chrysolepis*, male (CN295), FLOTA Faro. Photo: W.A. Rocha.

Figure 62. *Amphisbaena vanzolinii* (CN639), ESEC Grão-Pará South. Photo: MSH.

Figure 61. *Uranoscodon superciliosus* (CN2300), ESEC Grão-Pará Centre. Photo: MSH.

Figure 63. *Mesobaena* sp.nov. (MPEG 24854, CN 7), FLOTA Faro. The animal was cut while digging during installing pitfalls. A small middle section could not be recovered. The colours are those just after death of the animal. Photo: MSH.

Figure 64. *Leptotyphlops albifrons* (CN2069), ESEC Grão-Pará Centre. Photo: Pedro L.V. Peloso.

Figure 65. *Corallus caninus* (CN973), ESEC Grão-Pará North. Photo: TCSAP.

Figure 66. *Apostolepis nigrolineatus* (CN 1317), ESEC Grão-Pará North. Photo: TCSAP.

Figure 67. *Atractus badius* (CN 804). ESEC Grão-Pará South. Photo: MSH.

Figure 68. *Chironius scurrulus* (CN1930), FLOTA Paru. Photo: MSH.

Figure 69. *Pseudoboa neuwiedii* (CN 2218), ESEC Grão-Pará Centre. Photo: MSH.

Figure 70. *Thalesius viridis* (CN 1292). ESEC Grão-Pará North. Photo: TCSAP.

Figure 71. *Micrurus averyi* (CN 1086). ESEC Grão-Pará North. Photo: TCSAP.

Figure 72. *Micrurus hemprichii* (CN2287), ESEC Grão-Pará Centre. Photo: MSH.

Figure 73. *Micrurus paraensis* (CN793), ESEC Grão-Pará South. Photo: MSH.

Figure 74. *Chelonoidis carbonaria*, juv. (CN622), ESEC Grão-Pará South. Photo: MSH.

Figure 75. *Chelonoidis denticulata*, male (,June 13, 2008, not collected), ESEC Grão-Pará South trail 2, km 0.7. Photo: MSH.

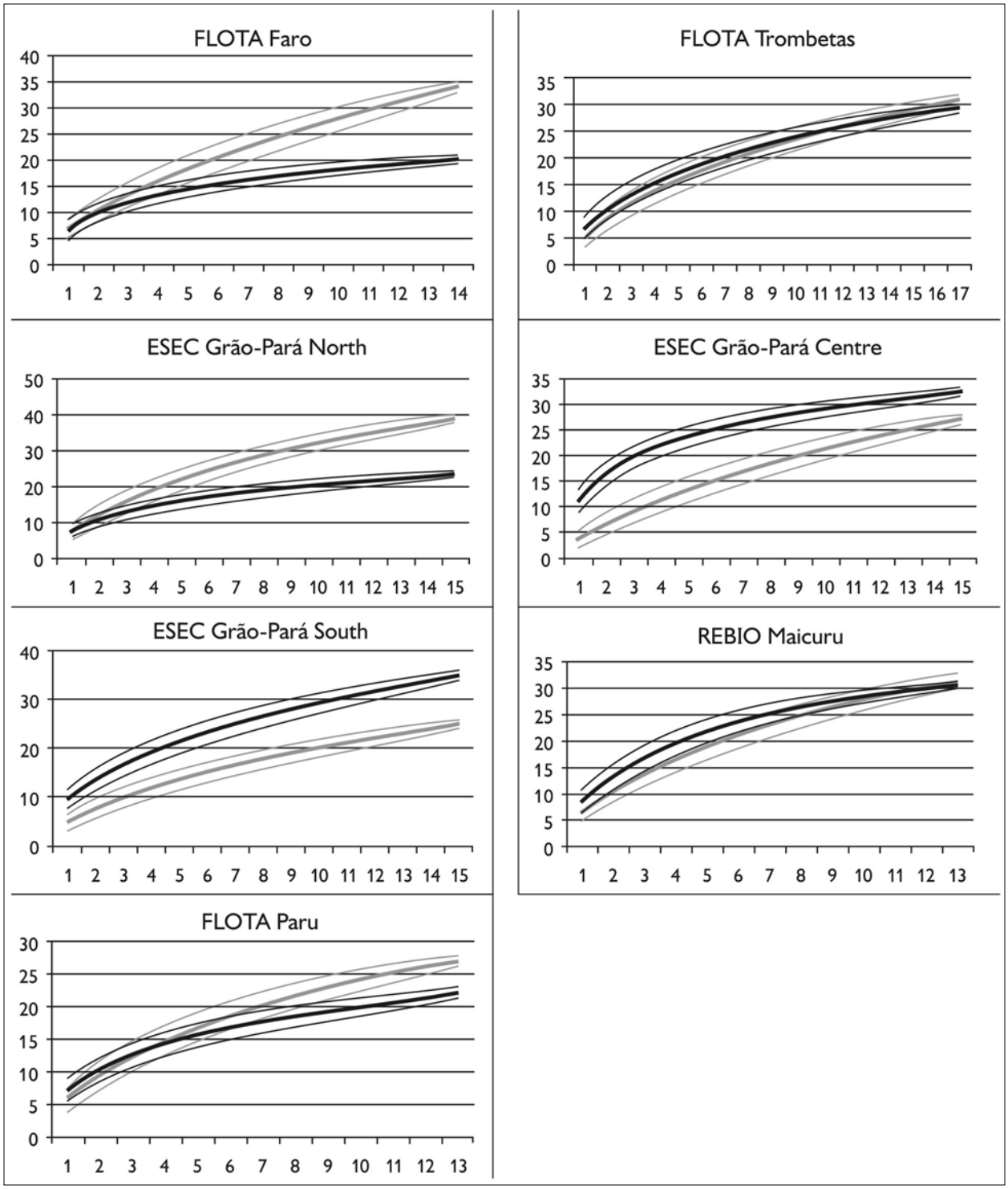


Figure 76. Rarefaction curves for each studied site calculated based on cumulative number of species in relation to the number of collecting days, showing the 95% confidence interval lines. Gray = reptiles, black = amphibians, X axis = number of samples (collecting days), Y axis = cumulative number of species.

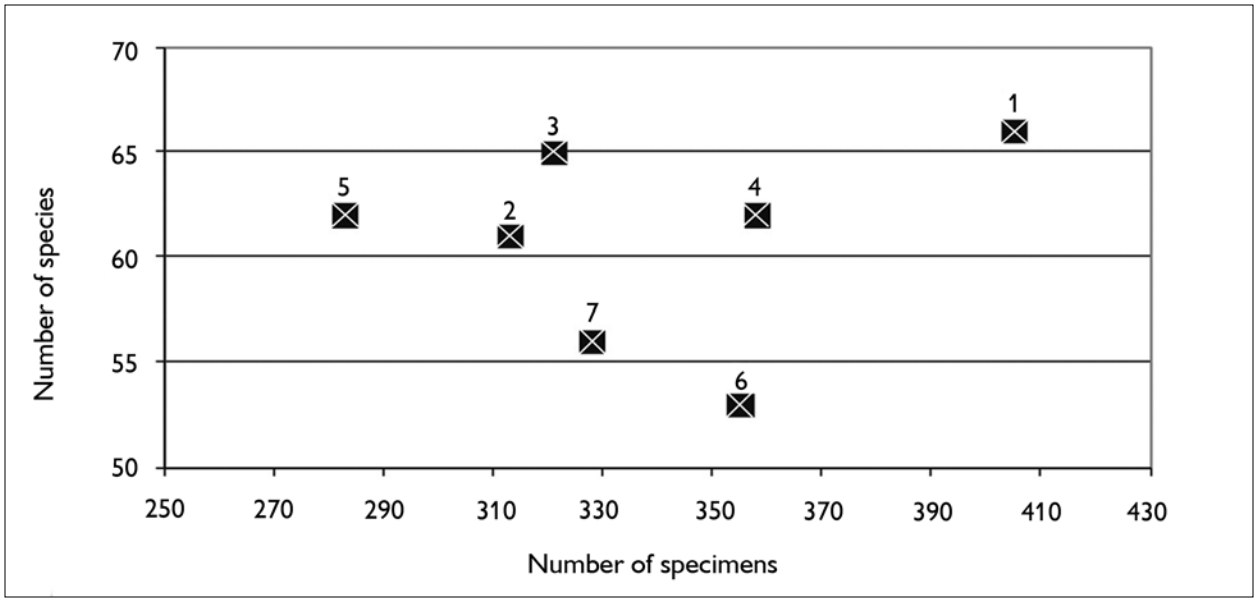


Figure 77. Relation between number of species registered during each expedition and number of specimens collected. Numbers above the squares refer to the studied sites as they apper in Fig. 2. 1 = ESEC Grão-Pará North, 2 = ESEC Grão-Pará Centre, 3 = REBIO Maicuru, 4 = ESEC Grão-Pará South, 5 = FLOTA Trombetas, 6 = FLOTA Paru, 7 = FLOTA Faro.

Table 3. Distribution of species (number and percentage) in relation to the number of studied sites in which they were found. Chelonians and caimans are included in the total numbers but are not shown separately.

Number of sites	Amphibians		Lizards and amphisbaenians		Snakes		Total	
	Number of species	%	Number of species	%	Number of species	%	Number of species	%
7	3	3.8	7	17.9	0	0	10	5.7
6	4	5.1	3	7.7	0	0	7	4.0
5	7	8.9	1	2.6	0	0	9	5.1
4	6	7.6	2	5.1	2	4.1	10	5.7
3	10	12.7	6	15.4	7	14.3	25	14.3
2	13	16.5	9	23.1	14	28.6	37	21.1
1	36	45.6	11	28.2	26	53.1	76	43.4

sites, and only 28% in only one site. Of amphibians, about 46% were found in only one site, and of snakes 53%. The maximum number of sites a species of snake occurred in was four, once more showing the haphazardness of finding these animals. The low number of amphibians common to all sites is partially linked to differences in habitats available and surveyed, as well as in period of the year. But certainly for all groups part of the differences is due to chance and should decrease as collecting effort increases. The same applies when we look at the Biogeographic Similarity Coefficient (BSC) (Table 4). This coefficient, that represents the proportion of species common to two areas, in relation

Table 4. Total number of species per site (in bold, diagonal line), number of species in common (above diagonal line), and Coefficient of Biological Similarity (below diagonal line) between each pair of sites.

	FLOTA Faro	FLOTA Trombetas	ESEC Grão-Pará North	ESEC Grão-Pará Centre	ESEC Grão-Pará South	REBIO Maicuru	FLOTA Paru
FLOTA Faro	**56**	28	26	22	24	26	22
FLOTA Trombetas	0.47	**62**	28	30	31	30	31
ESEC Grão-Pará North	0.43	0.44	**66**	23	25	29	27
ESEC Grão-Pará Centre	0.38	0.49	0.36	**61**	28	25	27
ESEC Grão-Pará South	0.41	0.50	0.39	0.46	**62**	29	29
REBIO Maicuru	0.43	0.47	0.44	0.40	0.46	**65**	34
FLOTA Paru	0.49	0.54	0.45	0.47	0.50	0.58	**53**

to the total number of species in both areas, is lowest (0.36) between ESEC Grão-Pará Centre and ESEC Grão-Pará North. While the northern part of this ESEC lies in the Acarai Mountains, covered by rainforest in an extremely hilly area, the site in the central part of this conservation unit presents a large isolated area of open vegetation (savanna) (with its specific fauna), with a patch of more or less isolated forest in its interior, which explains part of the difference found between these two areas. In addition, the northern sector was sampled in August-September, thus during the dry season, while sampling in the central sector occurred in January, in the early rainy season, which probably also accounts for part of the differences found. Going to the other extreme, FLOTA Paru and REBIO Maicuru were the most similar areas (BSC 0.58). These two areas were sampled within a period of three months and both have seasonally flooded areas (igapó) influenced by a river, which may explain their larger similarity. But again, the expectation is that these coefficients, between all these areas, will become larger (indicating more similar herpetofaunas) as a better representation of the herpetofauna, from all around the year, is obtained.

Some species however are restricted to special habitats, which may account for real differences between sites. Thus, for example, *Hyla wavrini*, a várzea and igapó species, was only collected in FLOTA Faro, whereas in other localities *Hyla boans*, a very similar species that occurs along creeks and rivers in terra-firme rainforest or in gallery forest (Hoogmoed, 1990a), was collected. It is possible that these two species are mutually exclusive. *Atelopus hoogmoedi* and the two species of Centrolenidae collected depend on the presence of (relatively) clear, running water with rapids in terra-firme forest, and only were recorded for ESEC Grão-Pará Centre (with unidentified Centrolenid tadpoles collected in ESEC Grão-Pará North and South). Although they are without doubt present in other areas of CNP, their distribution is limited to specific habitats. The same is true for *Leptodactylus myersi*, restricted to large, open rocky slabs, either surrounded by terra-firme forest (FLOTA Trombetas) or in savanna areas (ESEC

Grão-Pará Centre). Savanna enclaves, as encountered in ESEC Grão-Pará Centre, have a herpetofauna that is largely different from that of forested areas, among which *Adenomera hylaedactyla*, *Leptodactylus longirostris*, *Anolis auratus*, *Kentropyx striatus*, *Gymnophthalmus* cf. *underwoodi* and *Pseudoboa neuwiedii*. These species are restricted to these enclaves and, some of them, to river beaches along the Amazon River.

The caimans *Paleosuchus trigonatus* and *P. palpebrosus* (Cuvier, 1807) are small and live in creeks in the forest, while *Caiman crocodilus* occurs in rivers and larger creeks which are not completely roofed over by forest canopy. *Paleosuchus trigonatus* was found in creeks in FLOTA Trombetas and ESEC Grão-Pará North and Centre. *Paleosuchus palpebrosus* was not encountered during the expeditions, but it is known from Oriximiná, Trombetas River (Medem, 1983), and is probably present in other areas of CNP as well. *Caiman crocodilus* was found in FLOTA Faro and in REBIO Maicuru, and it is possible that it also occurs in the Jari, Paru and Trombetas rivers, but not far from the main course of these larger rivers.

Dendrobates tinctorius (blue variant) only was encountered in the Acarai Mountains near the border with Guyana, in the northern part of ESEC Grão-Pará, where it was quite numerous. However, there are also records of this species from Porto Trombetas (blue variant) (material in MPEG) and in Monte Dourado (variant with large dorsal yellow patch and lines) (material in MPEG), where they occur in some forest localities, but not in others. In this case, the distribution of the species seems to be patchy, but it is not clear which environmental parameters are important to decide in which parts of an area it occurs.

The southeastern portion of ESEC Grão-Pará, including the studied points in the centre and south of the reserve, presents patches of forest consisting of small, slender-stemmed, low trees with some larger trees interspersed, known as 'cerradão'. No amphibian or reptile species was found only in this type of vegetation, where at least some of the forest species are present.

COMPARISON WITH A SITE IN SOUTHERN GUYANA

As pointed out above, publications dealing with the fauna of northern Pará are scarce. However, there is one paper (Señaris *et al*., 2008) that deals with a site in southern Guyana that is only about 50 airline kilometers southwest of our collecting site ESEC Grão-Pará North. This is much nearer than ESEC Grão-Pará North is to any of the other six studied localities in CNP. It could be expected that the herpetofaunas of these two areas would be very similar. Although the methodology of Señaris *et al*. (2008) differs considerably from ours (they did not use pitfalls and driftfences, only opportunistic surveys and Visual Encounter Survey) it seems worthwhile to make some comparisons. Señaris *et al*. (2008) reported 26 species of amphibians (25 frogs, one Gymnophiona) and 34 species of reptiles (12 lizards, one amphisbaenian, 16 snakes, three chelonians, two caiman). The respective numbers for ESEC Grão-Pará North were 24 species of amphibians (23 frogs, one Gymnophiona) and 42 species of reptiles (24 lizards, 16 snakes, one chelonian, one caiman). Only five species of frogs, nine species of lizards, five species of snakes, one species of chelonian and one species of caiman were common to both localities. Especially the number of frogs in common was low. Another remarkable fact was that Senãris *et al*. (2008) only collected one Gymnophthalmid lizard (an aquatic one) and 13 species of Hylidae, whereas in contrast to these numbers, in ESEC Grão-Pará North we collected 11 species of Gymnophthalmids and only two species of Hylidae. Both expeditions took place in the dry season, so climate does not explain the differences found. Even though differences in habitats found in each area (e.g. presence of large rivers and Indian villages in the Guyana site, both absent in the Brazilian site) can explain part of the differences observed, they are arguably also due to the use of pitfalls in only one of the sites (Brazil) and to collector bias (collectors in the Guyana team predominantly work with frogs, those in the Brazilian Acarai team predominantly with reptiles). In our opinion this comparison reinforces

the results of the Biogeographic Similarity Coefficient, and shows the weakness of RAP's that usually only obtain a relatively small proportion of the herpetofauna available. However, combining the results of both expeditions we come to a total of 45 amphibians and 60 reptiles for this cross border area, a result closer to what could be expected than that obtained by either of the expeditions.

DATA FROM OTHER LOCALITIES IN CNP

As mentioned above several other studies took place in CNP, most of them not published. These studies yielded collections (in MPEG and RMNH) which provide further data for an inventory of CNP.

The studies in Jari (Monte Dourado) conducted by the University of East Anglia (Gardner *et al*., 2007; Ribeiro-Junior *et al*., 2008) were undertaken with a special purpose and focused on leaf litter frogs and lizards (Stokstad, 2008). Consequently, in those collections (deposited in MPEG) hardly any Hylids are present. From Jari a number of species (20) were reported that were not collected during our recent work in the CNP localities [*Bufo granulosus* Spix, 1824; *Hyla raniceps* Cope, 1862; *Scinax* sp. n. 2 (to be described by MSH shortly) [slides Enrico Bernard]; *Leptodactylus macrosternum* Miranda-Ribeiro, 1926; *Gonatodes* sp. n. (to be described shortly by Sturaro & Avila-Pires) [MPEG 23822-27; MPEG 27719]; *Cnemidophorus cryptus* Cole & Dessauer, 1993 (all female population); *Tupinambis teguixin* (Linnaeus, 1758); *Anilius scytale* (Linnaeus, 1758); *Epicrates cenchria* (Linnaeus, 1759); *Typhlops reticulata* (Linnaeus, 1766); *Atractus snethlagae* Cunha & Nascimento, 1983; *Oxybelis aeneus* (Wagler, 1824); *O. fulgidus* (Daudin, 1803); *Oxyrhopus melanogenys* (Tschudi, 1845); *Philodryas viridissimus* (Linnaeus, 1758); *Siphlophis cervinus* (Laurenti, 1768); *Spilotes pullatus* (Linnaeus, 1758); *Micrurus psyches* (Daudin, 1803); *Bothrops brazili* Hoge, 1953; *Rhinoclemmys punctularia* (Daudin, 1801)]. These species therefore can be added to the total list of species known from CNP.

Personnel of MPEG collected a further 12 species of snakes in Jari that were not collected during the project of the University of East Anglia and of which the following seven have not been collected elsewhere in CNP: *Eunectes deschauenseei* Dunn & Conant, 1936; *Helicops leopardinus* (Schlegel, 1837); *H. polylepis* Günther, 1861; *Hydrodynastes gigas* (Herrmann, 1804); *Liophis cobellus* (Linnaeus, 1758); *Liophis lineatus* (Linnaeus, 1758); *Mastigodryas bifossatus* (Raddi, 1820). Moreover they collected material of the caecilian *Microcaecila* sp. n. (to be described shortly by Maciel & Hoogmoed) [MPEG 14596-97].

Also some small collections were made in Monte Alegre that yielded some species of squamates not yet known from elsewhere in CNP. These are *Tropidurus hispidus* Spix 1825 [MPEG 24119-22, 24170-71]; *Leptotyphlops septemstriatus* (Schneider, 1801) [MPEG 21514-15]; *Epicrates maurus* Gray, 1849 [MPEG 21507-08] .

Ecological herpetological work on plateaus in Floresta Nacional Saracá-Taquera (J.F.M. Sarmento & U. Galatti, unpublished data) provided additional species (ten) that were not collected during the Calha Norte expeditions, in Jari or in Almeirim: *Hyla marmorata* (Laurenti, 1768); *Phrynohyas resinifictrix* (Goeldi, 1907); *Leptodactylus fuscus* (Schneider, 1799); *Hemidactylus mabouia* (Moreau de Jonnès, 1818); *Amphisbaena alba* (Linnaeus, 17858); *Chironius carinatus* (Linnaeus, 1758); *Dipsas variegata* (Duméril, Bibron & Duméril, 1854); *Drymarchon corais* (Boie, 1827); *Umbrivaga pygmaea* (Cope, 1868) [MPEG 20996] (this is the first record of this species for Pará); *Micrurus spixii* Wagler, 1824. The lizard *Hemidactylus mabouia*, however, is an introduced species, present only in human altered habitats and it will not be counted as part of the local herpetofauna.

Hoogmoed and Avila-Pires in 1988 collected reptiles and amphibians on the banks of rio Nhamundá (Sítio Céu Estrelado) and on the right bank of rio Trombetas (Cruz Alta). During this work they obtained several species not obtained elsewhere in CNP: *Typhlonectes compressicauda* (Duméril & Bibron, 1841); *Cnemidophorus lemniscatus*

(Linnaeus, 1758) (with males and females); *Uracentron azureum* (Linnaeus, 1758); *Helicops hagmanni* Roux, 1910; *Peltocephalus dumerilianus* (Schweigger, 1812); *Podocnemis expansa* (Schweigger, 1812); *Podocnemis unifilis* Troschel, 1848.

Morales (2002) described *Colostethus sumtuosus* from the Trombetas river. This species was not collected during our recent or any of the other expeditions.

Avila-Pires (1995) described *Tretioscincus oriximinensis* from the village of Oriximiná on the bank of the Amazon. This species was not collected during our recent or any of the other expeditions.

França *et al*. (2006) reported two species of snakes from Monte Alegre that had not been reported from CNP before: *Mastigodryas pleei* (Duméril, Bibron & Duméril, 1854) (also collected by MSH on the frontier between Brazil and Suriname (Sipaliwini savanna) [MSH 1970-68, material in RMNH] and *Phimophis guianensis* (Troschel, 1848).

A.O. Maciel & M.S. Hoogmoed, in a paper that has been submitted to Zootaxa, report *Potamotyphlus kaupii* (Berthold, 1859) from Cachoeira Porteira, Oriximiná, Pará.

Summarizing, at the moment we are aware of three species of caecilians, eight species of frogs, seven species of lizards, one species of amphisbaenid, 29 species of snakes, four species of turtles and one caiman (Medem, 1983) that have been collected in CNP, but were not collected or observed during our recent expeditions. Adding those species to our totals for CNP, we get the following totals per group: caecilians six species, anurans 85 species, lizards 43 species, amphisbaenians four species, snakes 78 species, chelonians nine species, and caiman three species. This gives a total of 90 amphibians and 137 reptiles. These numbers, which refer to all habitats present in the entire area, are getting close to what may be expected (see Introduction). However, our knowledge about the distribution of species within CNP is still very limited and mainly based on 11 localities (Figure 2) with different intensity of collecting effort.

DATA FROM SURINAME NEAR THE BRAZILIAN BORDER

Parker (1940) described *Ninia hudsoni* from the border between Suriname and Brazil.

Hoogmoed (1969b) described *Dendrobates azureus* from a locality in Suriname close to the Brazilian border. This species was synonimised with *D. tinctorius* by Wollenberg *et al*. (2006), but we are of the opinion that this synonymisation is not correct, and that possibly the authors have been confused by using terrarium animals with unreliable locality data and by the fact that there also is a blue variant of *D. tinctorius* (collected by us in ESEC Grão-Pará North) that is similar to, but different from *D. azureus* in pattern. The pattern of *D. azureus*, as described by Hoogmoed (1969b; Lötters *et al*., 2007: figure 708), consists of black spots haphazardly distributed on a blue background, without any reminiscence of the basic light linear pattern on the back of *D. tinctorius* (light head spot and two dorsolateral lines converging on the sacral area and continuing as a sacral line to the cloaca, [Lötters *et al*., 2007: figures 691-700, 701-706). This basic light pattern is still distinctly recognisable in the blue form of *D. tinctorius*, present in the western part of northern Pará (Lötters *et al*., 2007: figure 707).

Hoogmoed & Gorzula (1979) described *Ololygon trilineata* [= *Scinax trilineatus* (Hoogmoed & Gorzula, 1979)] based on material from Venezuela, Guyana and Suriname. The Suriname paratype (RMNH 18260) from the Sipaliwini savanna was collected within 7 km of the Brazilian border.

Heyer (1994) reported a specimen of *Leptodactylus pallidirostris* Lutz, 1930 from the Sipaliwini savanna, Suriname. This name now has been synonymised with *L. validus* Garman, 1887 by Yanek *et al*. (2009).

Nussbaum & Hoogmoed (1979) described *Microcaecilia taylori* Nussbaum & Hoogmoed, 1979, from a locality in Suriname (Sipaliwini) that is less than 7 km from the border with Brazil.

Hoogmoed (1977) reported *Leptotyphlops septemstriatus* (Schneider, 1801) in Suriname from two localities close to the Brazilian border.

During fieldwork in the Sipaliwini savanna in Suriname in 1968 and 1970, MSH collected *Hydrodynastes bicinctus* (Herrmann, 1804) from within 7 km of the border with Brazil [RMNH 15965 and fieldnumber MSH 1970-127, material in RMNH].

R. A. Mittermeier in 1976 collected a series of *Pseudopaludicola boliviana* Parker, 1927 on the Sipaliwini savanna in Suriname [Museum Comparative Zoology (MCZ 92418-25)]

The species mentioned above might be expected to occur in northern Pará as well, but to our knowledge have not yet been collected there. None of these species has been included in the species counts for northern Pará.

SPECIES ABUNDANCE

Faunal assemblages in different places may have similar composition but differ in species abundance. Comparison between areas and definition of conservation measurements therefore also should take into consideration this parameter. To obtain data on abundance, however, is quite difficult, especially in tropical rainforests where many species appear to have low densities. A coarse measure of relative abundance may be obtained by looking at numbers of registered individuals, even though these numbers tend to underrepresent the most common species (where not all individuals seen are registered) and species with seclusive habits or which occupy habitats not well surveyed. Amphibians that form breeding aggregations, some only during short times, present another difficulty in such comparisons, since their numbers are not correlated with total collecting effort. Anyway, comparing numbers of registered specimens gives an idea of the most observable species in each area, during the period of the expedition. Figures 78-79, 80-81 and 82-83 show the number of specimens per species collected at each site and for all sites together, for respectively amphibians, lizards and snakes (except for snakes from FLOTA Faro and ESEC Grão-Pará Centre, where but for one species only one specimen per species was registered). Even when only the five most common species in each area are compared, no two sites were the same. No species, in any of the groups, appear between the five most abundant in all sites. Among amphibians, *Bufo margaritifer*, *Adenomera andreae*, *Bufo* sp. n., *Anomaloglossus baeobatrachus*, and *Leptodactylus mystaceus* are the most numerous in all areas together. Considering these five species, *A. andreae* was among the five most abundant species in five of the seven sites, *B. margaritifer* in four of the sites, and *Bufo* sp. n., *Anomaloglossus baeobatrachus* and *L. mystaceus* in only two sites. Some of the most common species in one site, like *Atelopus hoogmoedi* and *Dendrobates tinctorius*, were found in no other site at all. The five most abundant lizards were *Kentropyx calcarata*, *Leposoma guianense*, *Coleodactylus amazonicus*, *Anolis chrysolepis* and *Arthrosaura reticulata*. *Leposoma guianense* was among the five most abundant species in five sites, and was the most abundant species in two of them. *Coleodactylus amazonicus* was the most abundant lizard species in three sites, and the third most abundant in a fourth site. *Kentropyx calcarata* and *Anolis chrysolepis* appeared each in three sites among the most abundant species, while *Arthrosaura reticulata* was abundant in only one site, FLOTA Faro. The five most abundant species of snakes were *Bothrops atrox*, *Liophis reginae*, *Liophis typhlus*, *Dendrophidion dendrophis* and *Leptotyphlops albifrons*. *Bothrops atrox*, the most abundant species, was represented by 13 specimens, while of the last two species of this list only five specimens were found. As pointed out before, no species was found in more than four of the sites, and only *D. dendrophis* was sampled in four sites; the other four species were registered in three sites. Differences in the most abundant species are less likely to result from sampling bias or by chance, and are more likely to reflect real differences. However, especially for amphibians part of the differences may be due to different periods of the year, but another part reflects probably differences in the available habitats – even though for most species we do not know exactly which conditions favor them.

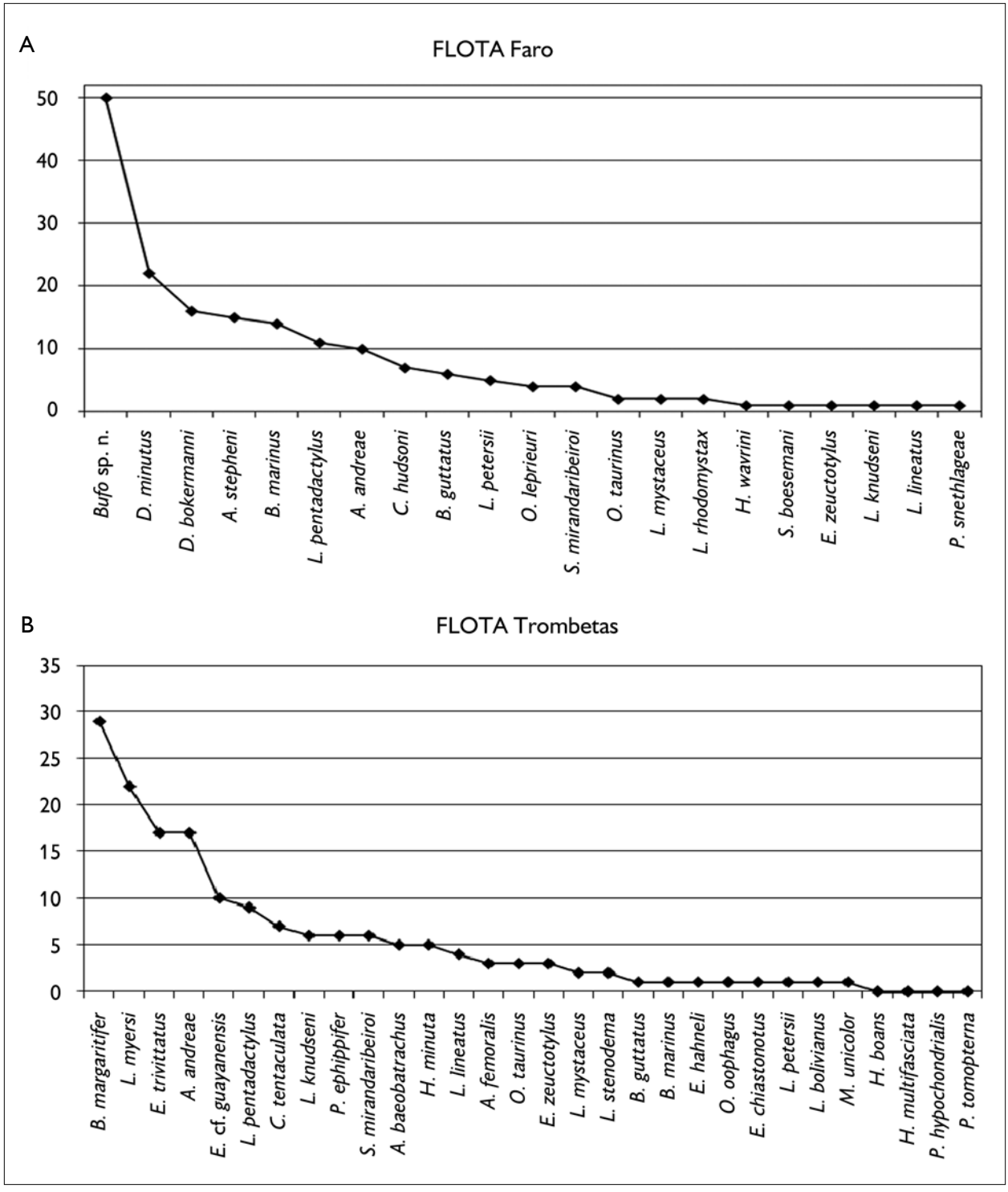
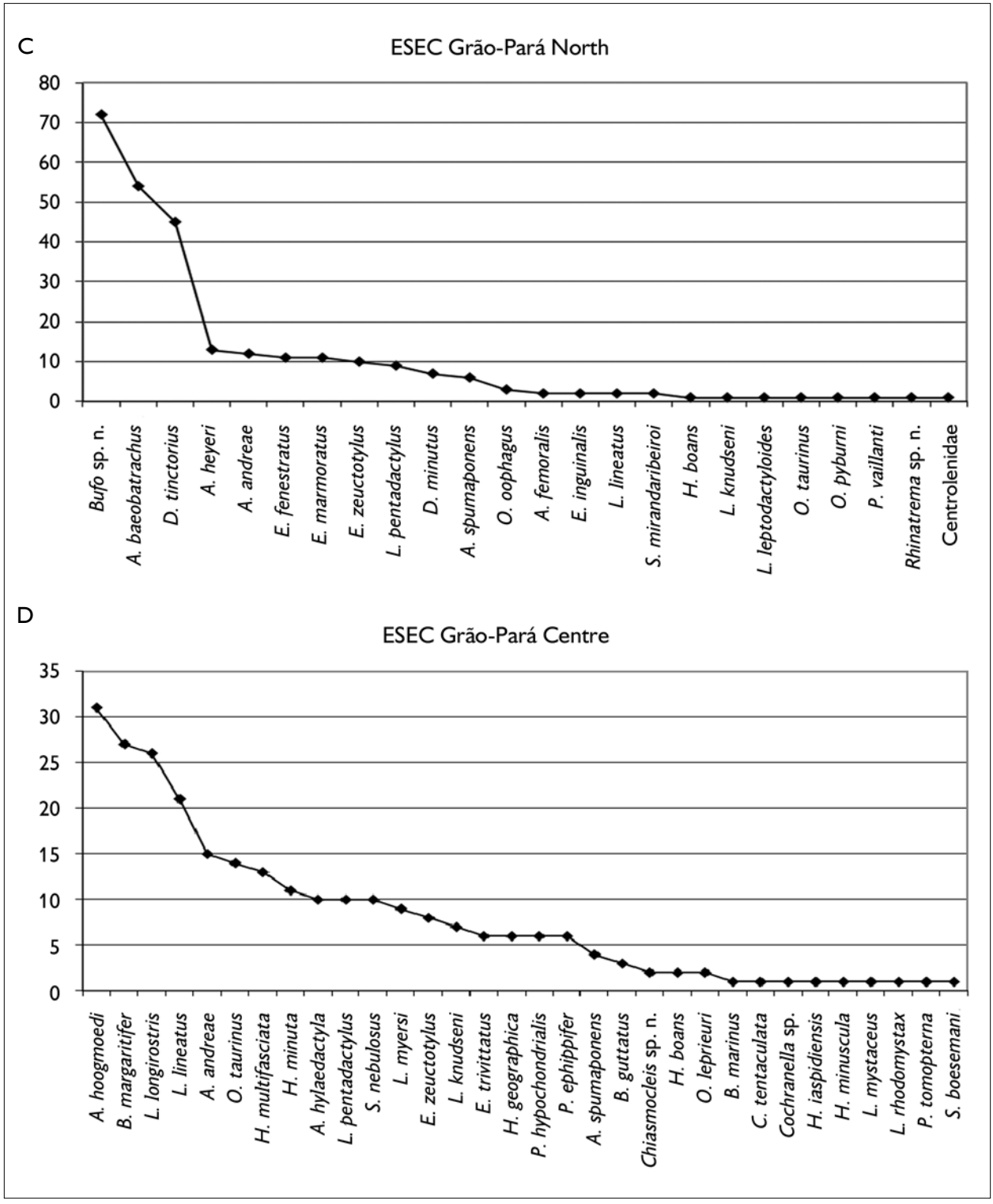


Figure 78. Relative abundance of amphibians at each site, represented by registered number of individuals of each species. For complete species names see Appendix 1.

(Continued)



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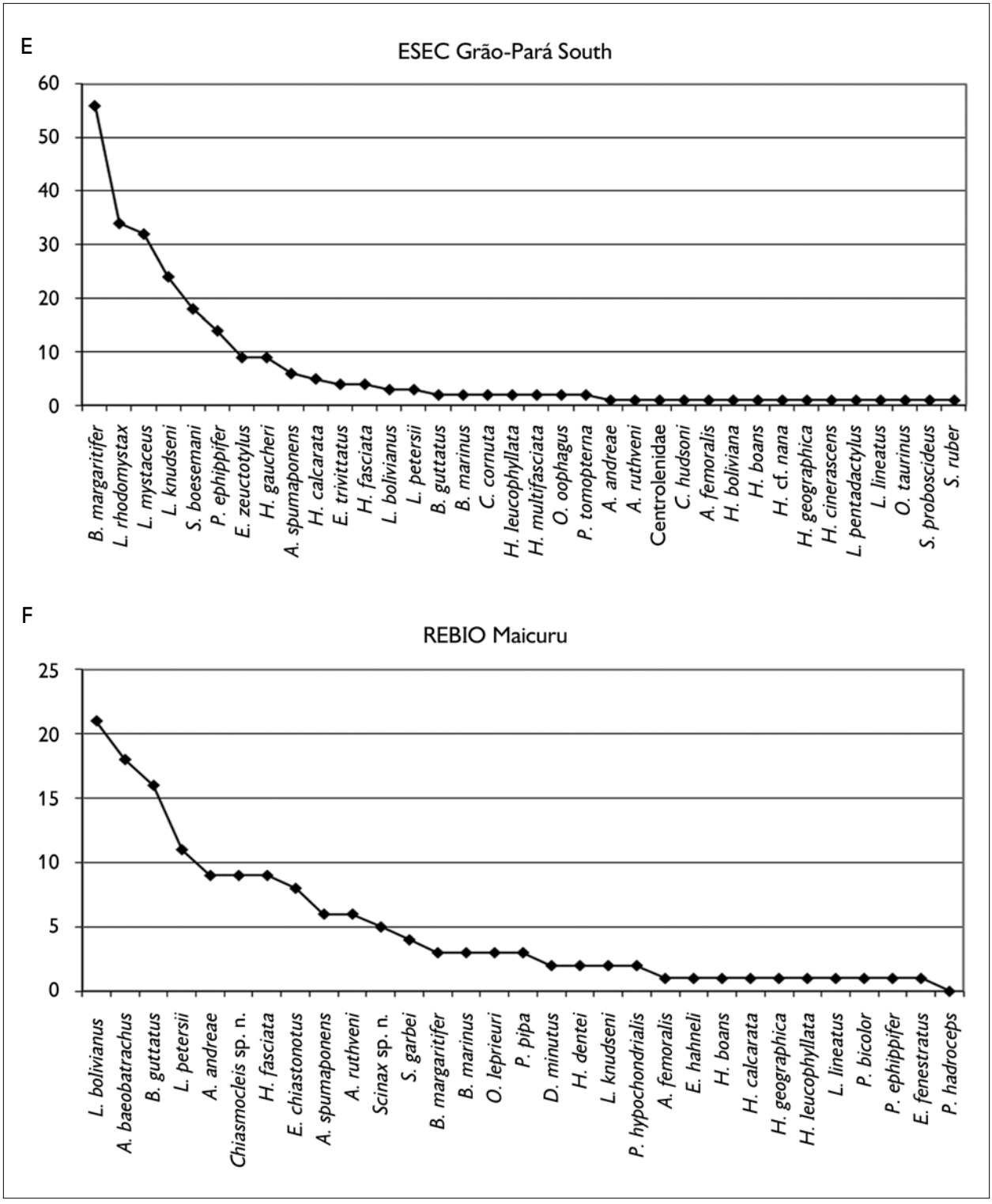

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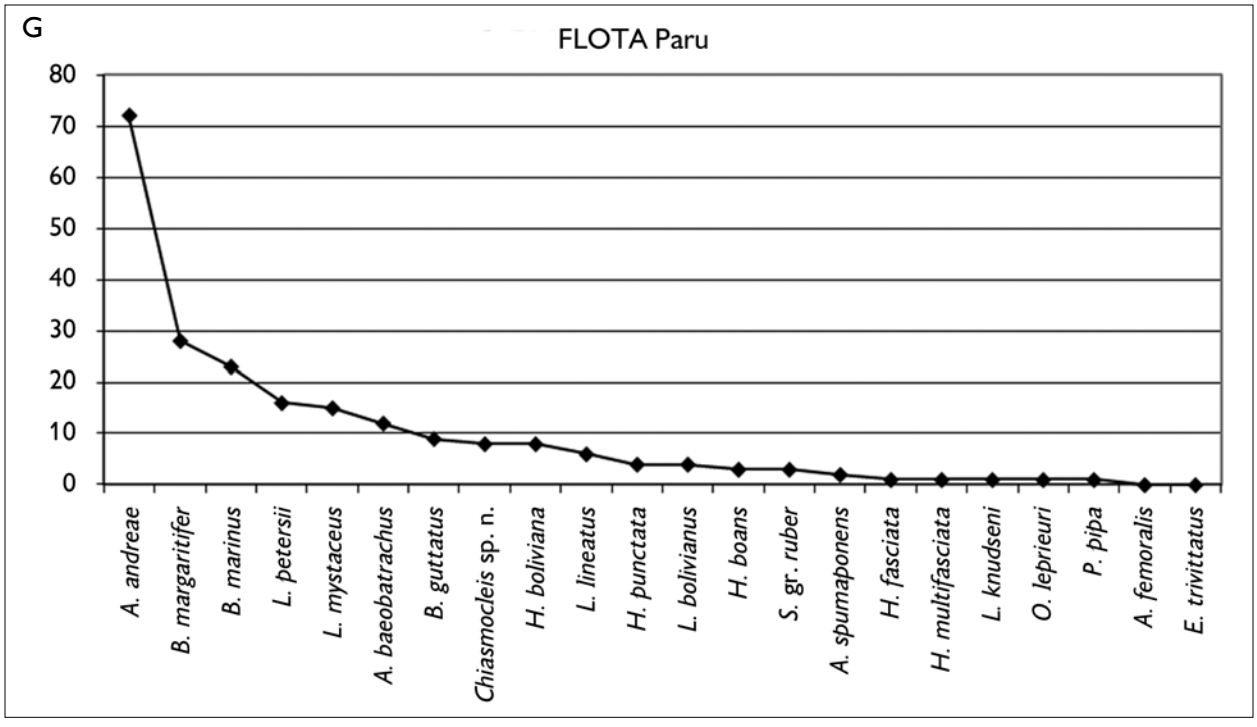


Figure 78. (Conclusion)

OBSERVATIONS ABOUT SOME SPECIES

Amphibians

Atelopus hoogmoedi is a colourfull small toad that until recently was known as *Atelopus spumarius* or *A. spumarius hoogmoedi* (Frost, 2009). The distribution of *A. spumarius* was supposed to reach from the Andes to the Guianas, with a gap in between those two extremes in western Amazonia. Lötters *et al*. (2002) were of the opinion that this was a species complex and that for the Guiana population the name *A. hoogmoedi* would be available. Lötters *et al*. (2005) used the name *A. hoogmoedi* for the Guiana population. *Atelopus hoogmoedi* was described from French Guiana and is known to occur throughout the three Guianas and adjacent Brazil (Noonan & Gaucher, 2005). In Pará the species was known from one small area in Monte Dourado and from a rather undefined locality "Brazil, 30 km S of the Suriname border" (material in RMNH), with outlying populations in Tucuruí, Serra de Carajás, Itaituba and near Santarém, all four localities in Pará south of the Amazon River. The species is also known from several localities in Amapá (Lima, 2008) and from the surroundings of Manaus, Amazonas (Lima *et al*., 2006). The Brazilian populations mentioned here are rather uniform in dorsal pattern (dark brown with vermiculate yellow to pale greenish lines on the back), but in Amapá the colour may become dark purple, with lighter purple vermiculations in some populations. The ventral colour is variable, from bright yellow everywhere, to bright yellow with bright or faint red palms, soles and seat patch, or entirely bright purple in Amapá in some populations. The genus *Atelopus* is known for the fact that many species (all from the high Andes) are threatened by extinction (a few already are extinct) probably as a result of infection with the chytrid fungus *Batrachochytrium dendrobatidis* (=Bd), which can cause the populations to collapse in a short time. Luger *et al*. (2008) checked on the viability of populations of *A. hoogmoedi* in Suriname (Brownsberg) and in Guyana (Mabura Hill Forest Reserve) and found healthy populations

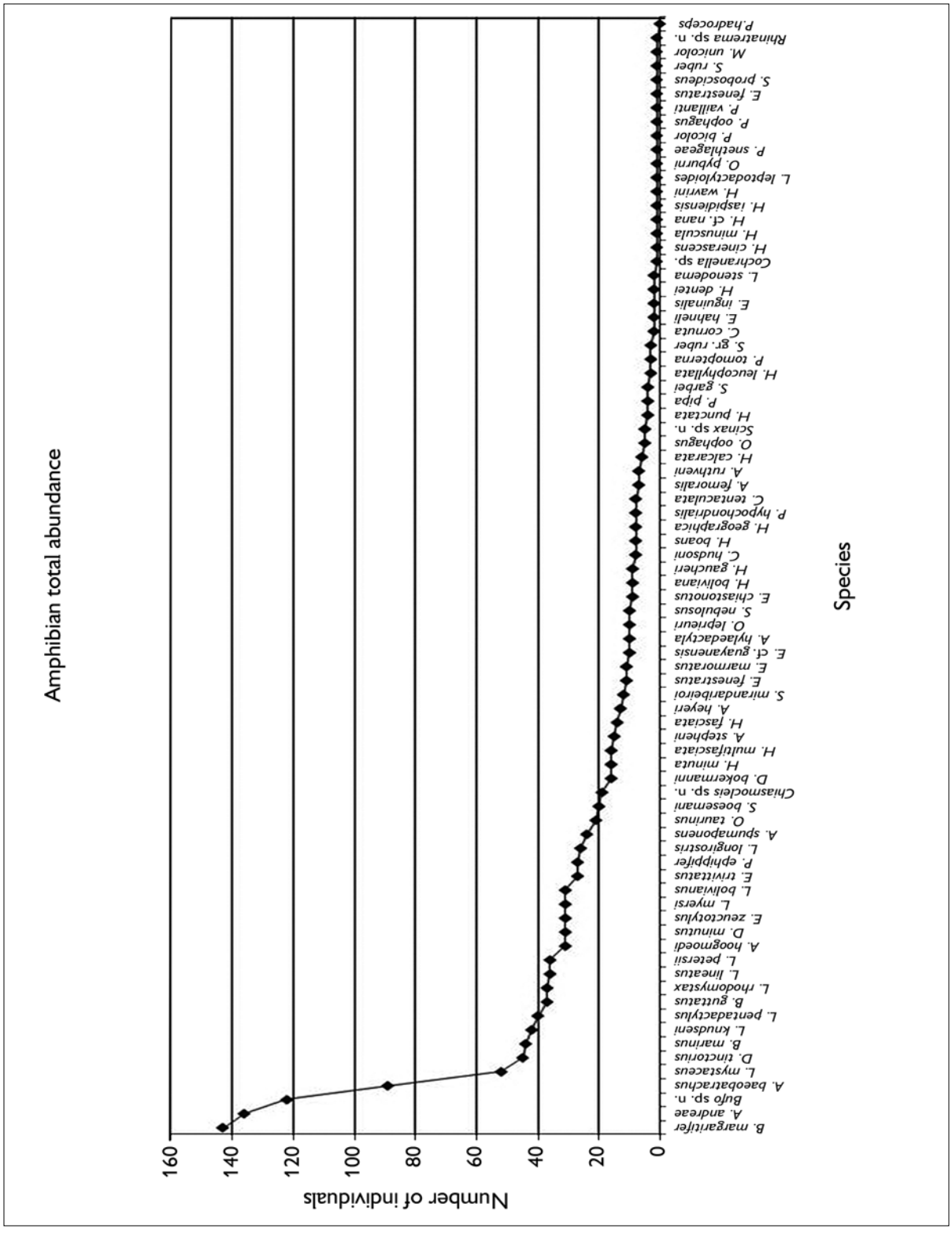


Figure 79. Relative abundance of amphibians in the seven studied sites together. For complete species names see Appendix 1.

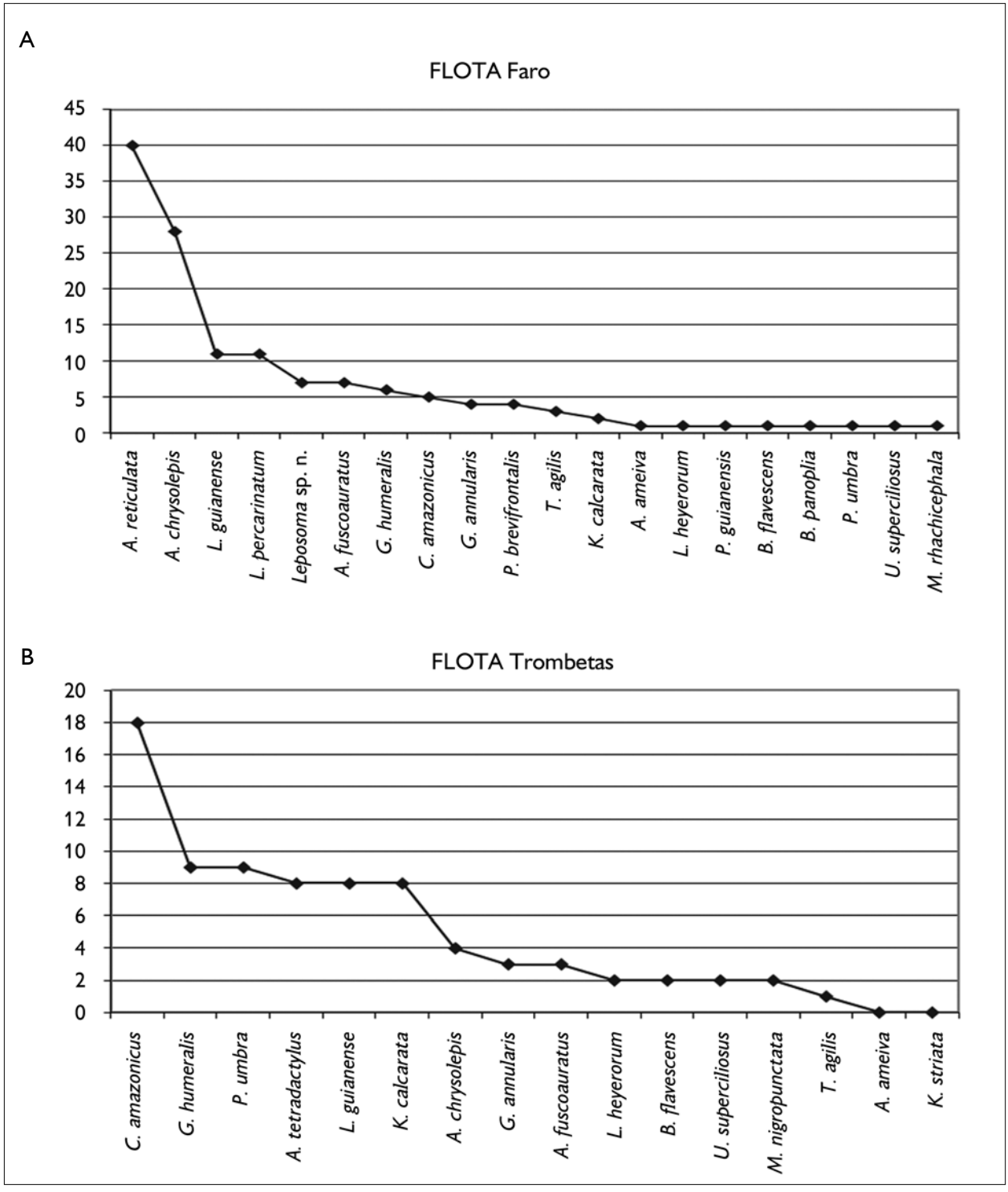


Figure 80. Relative abundance of lizards and amphisbaenians at each site, represented by registered number of individuals of each species. For complete species names see Appendix 1.

(Continued)

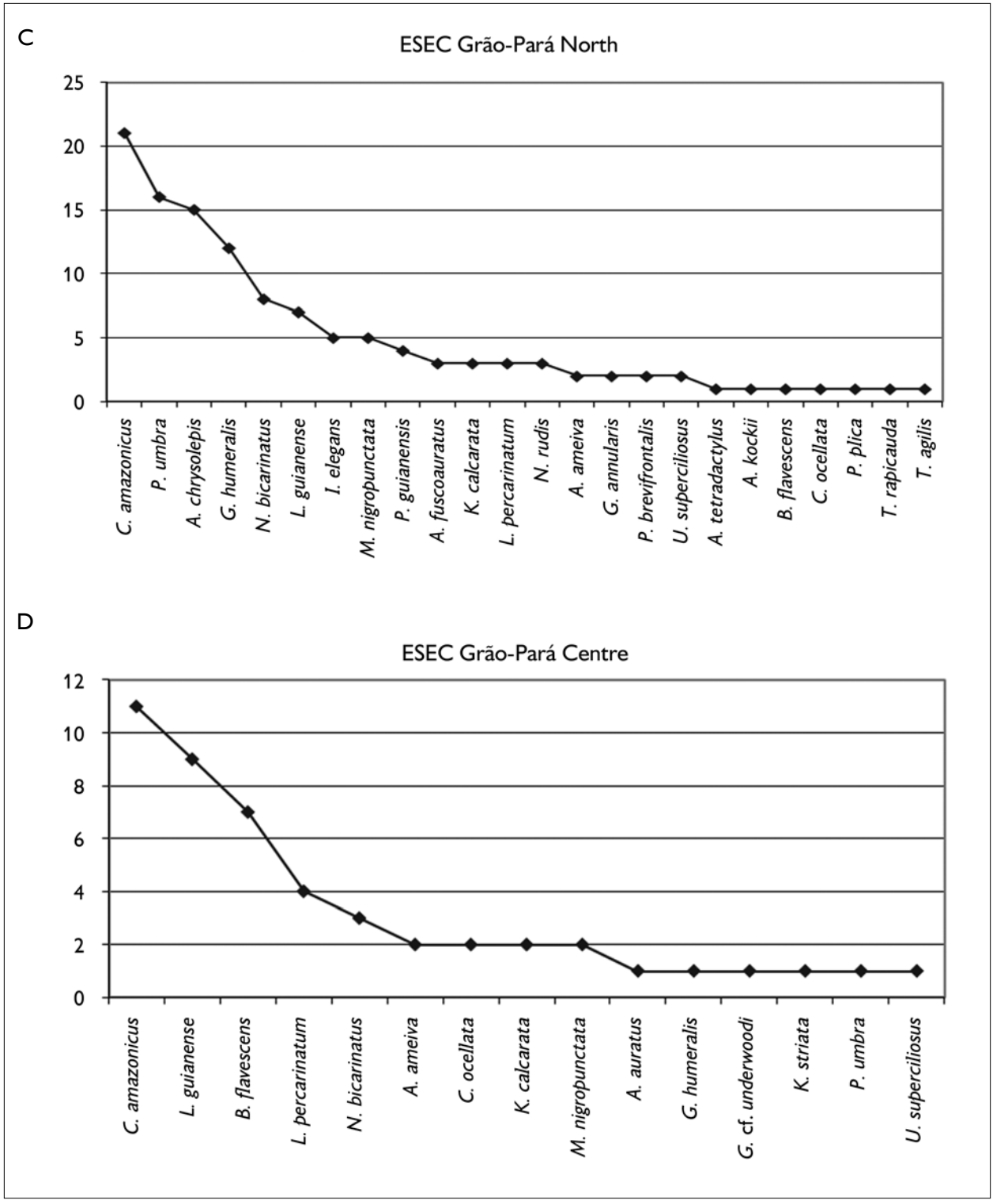
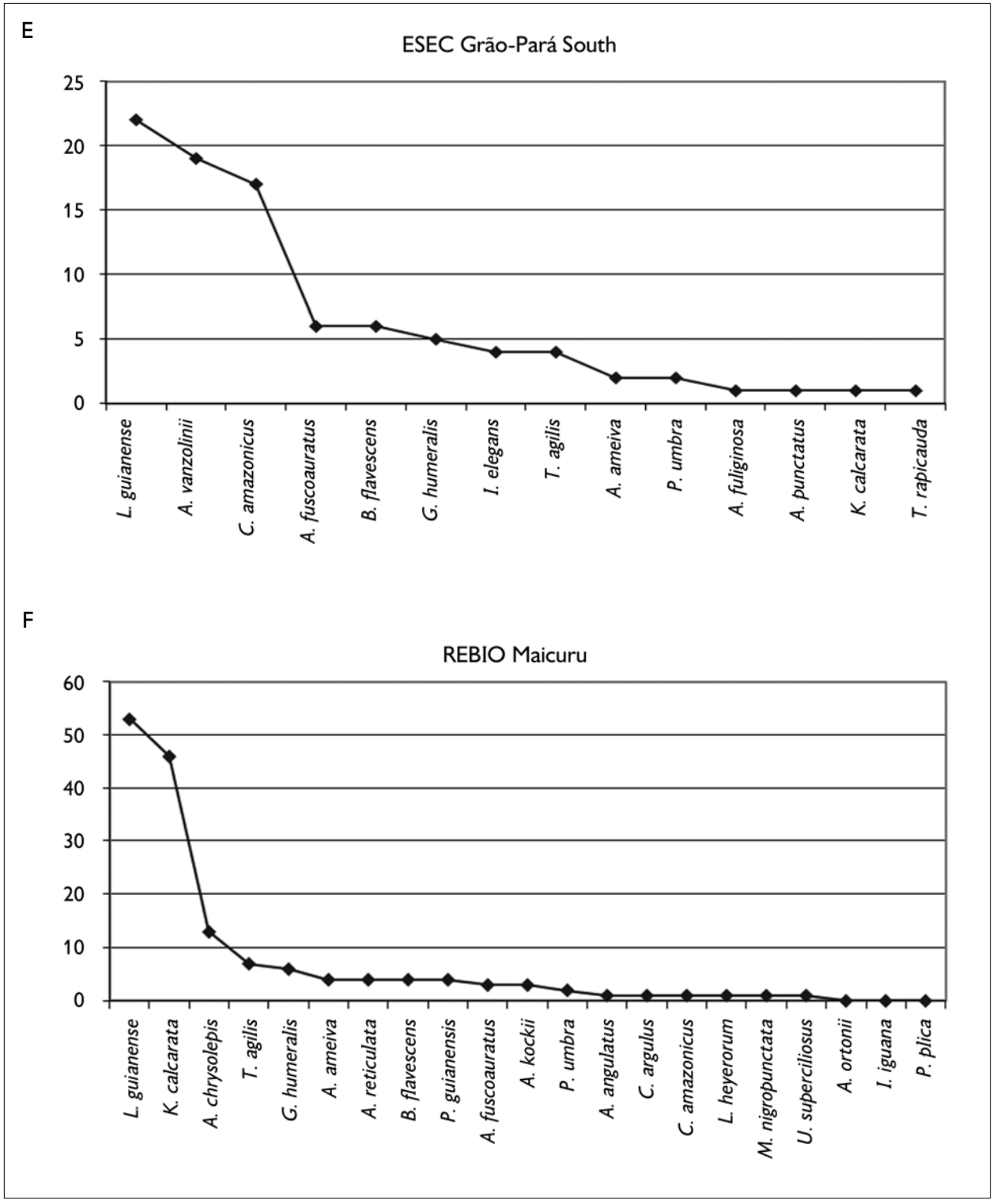


Figure 80. (Continued)



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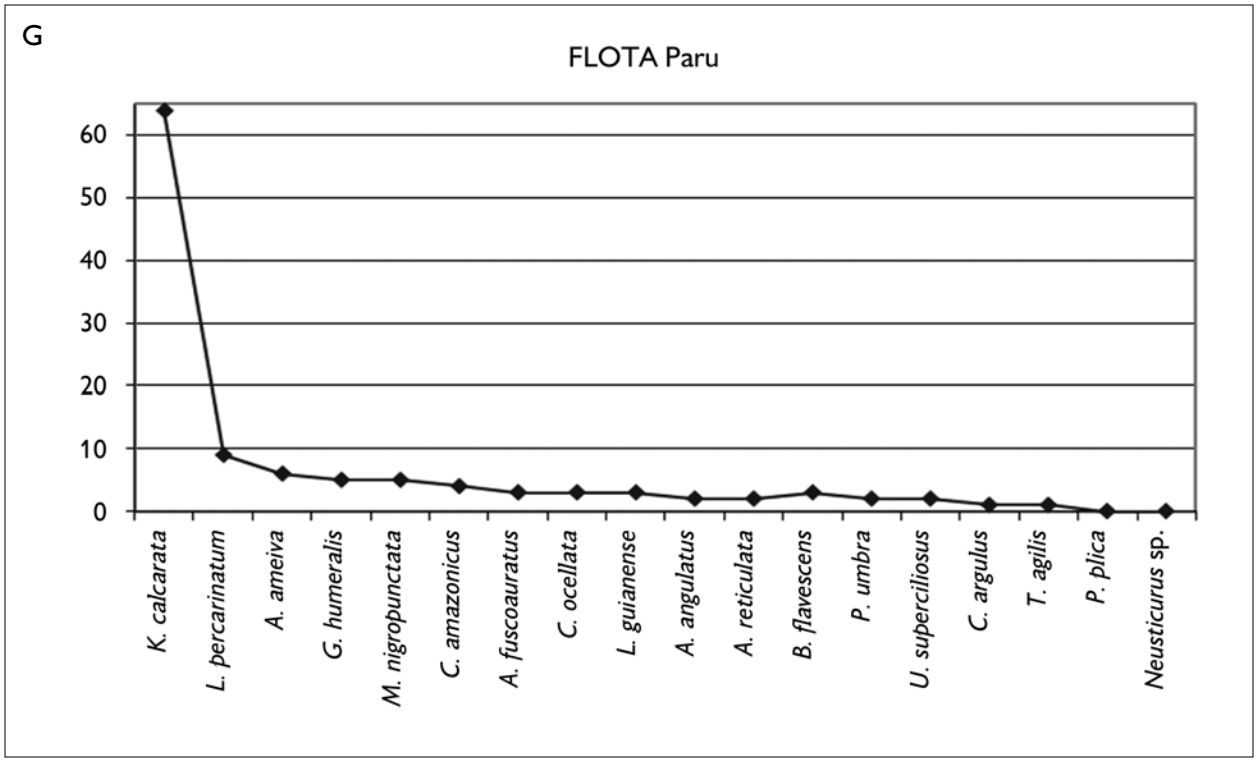

Figure 80. (Conclusion)

in numbers that are comparable with "those recorded for other *Atelopus* species before catastrophic declines". During our stay in ESEC Grão-Pará Centre we encountered a large population of *A. hoogmoedi*. We collected 31 adult individuals, both males (most) and females (no juveniles) in 15 days, all during active searching, none were found in pitfalls. In daytime males were regularly heard calling. During this field period we spent 74 person-hours collecting in forest in daytime and 40 person-hours at night, a total of 114 person-hours. *Atelopus hoogmoedi* were collected both at day (most) and at night in two relatively small areas where trails crossed a creek in terra-firme forest. The species does not occur in savanna areas. Thus our collecting rate was 31/114 = 0.272 *A. hoogmoedi* per person-hour spent in the field, but it should be noted that only a small part of our field time was spent in *A. hoogmoedi* habitat near creeks, although this cannot be quantified. Our research was not exclusively directed at *A. hoogmoedi*, but to an inventory of the herpetofauna in general. Thus, the value of 0.272 calculated above should be considered as a minimum value and the real population size may be considerably larger than suggested by this number. Although not directly comparable to the data from Suriname (57 specimens in 37 days) and Guyana (202 specimens, during 393.5 transect hours [0.513 individuals per transect hour]) it is our impression that the population we encountered was comparable to, or larger than, those in Suriname and Guyana and thus appears healthy. At ESEC Grão-Pará Centre we have the special situation of a large forest island in the middle of a savanna area that probably to a large extent is isolated from the terra-firme forest surrounding the savanna. Apparently there is some gallery forest along creeks that connects it in some places to the surrounding terra-firme forest. *Atelopus hoogmoedi* is restricted to that terra-firme forest island and does not occur in savanna. Whether the species occurs in the terra-firme forest surrounding our research area or in the gallery

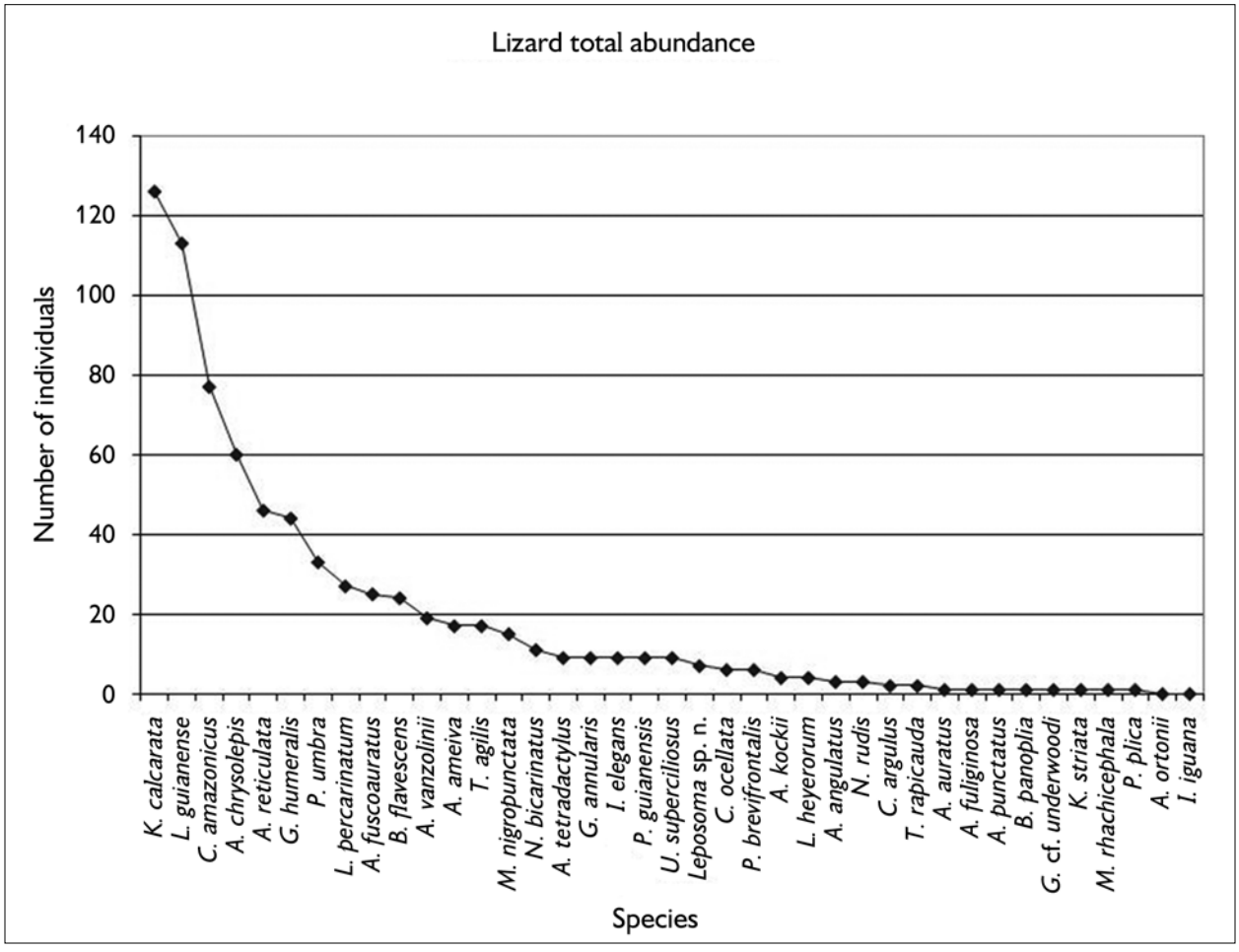

Figure 81. Relative abundance of lizards and amphisbaenians in the seven studied sites together. For complete species names see Appendix 1.

forests is not known as we were not able to collect there, but it seems likely. The large forest island in the savanna may form a natural refuge for *A. hoogmoedi*, isolating it to a certain degree from surrounding populations in continuous terra-firme forest. In the case of a Bd infection in the terra-firme forest surrounding the savanna, the population of *A. hoogmoedi* at collecting station ESEC Grão-Pará Centre might be naturally protected against infection, just by this isolation. Considering the increasing spread of Bd (fortunately not yet found in Amazonia) this area merits special attention for conservation purposes. In contrast to most other species of *Atelopus* (except those in Suriname, French Guiana and Amapá that have the same altitudinal range as *A. hoogmoedi*), *A. hoogmoedi* occurs only at low elevations, from 20 m at Monte Dourado, Pará, to at the most 600 m in Carajás, Pará and 700 m on the Lely Mountains in Suriname (MSH, unpublished data). According to Ron (2005) the presence of Bd at lower elevations at the moment is not very likely because medium temperatures seem to be too high for Bd infections. Thus, we might conclude that the fact that this species occurs at low altitudes provides a certain protection against Bd infection. However, this can not be considered a safeguard against Bd infection, as the way of infection and transport of the pathogen is not yet completely known.

Bufo margaritifer is a large species of toad (SVL females 87 mm, SVL males 66 mm [Hoogmoed, 1986],

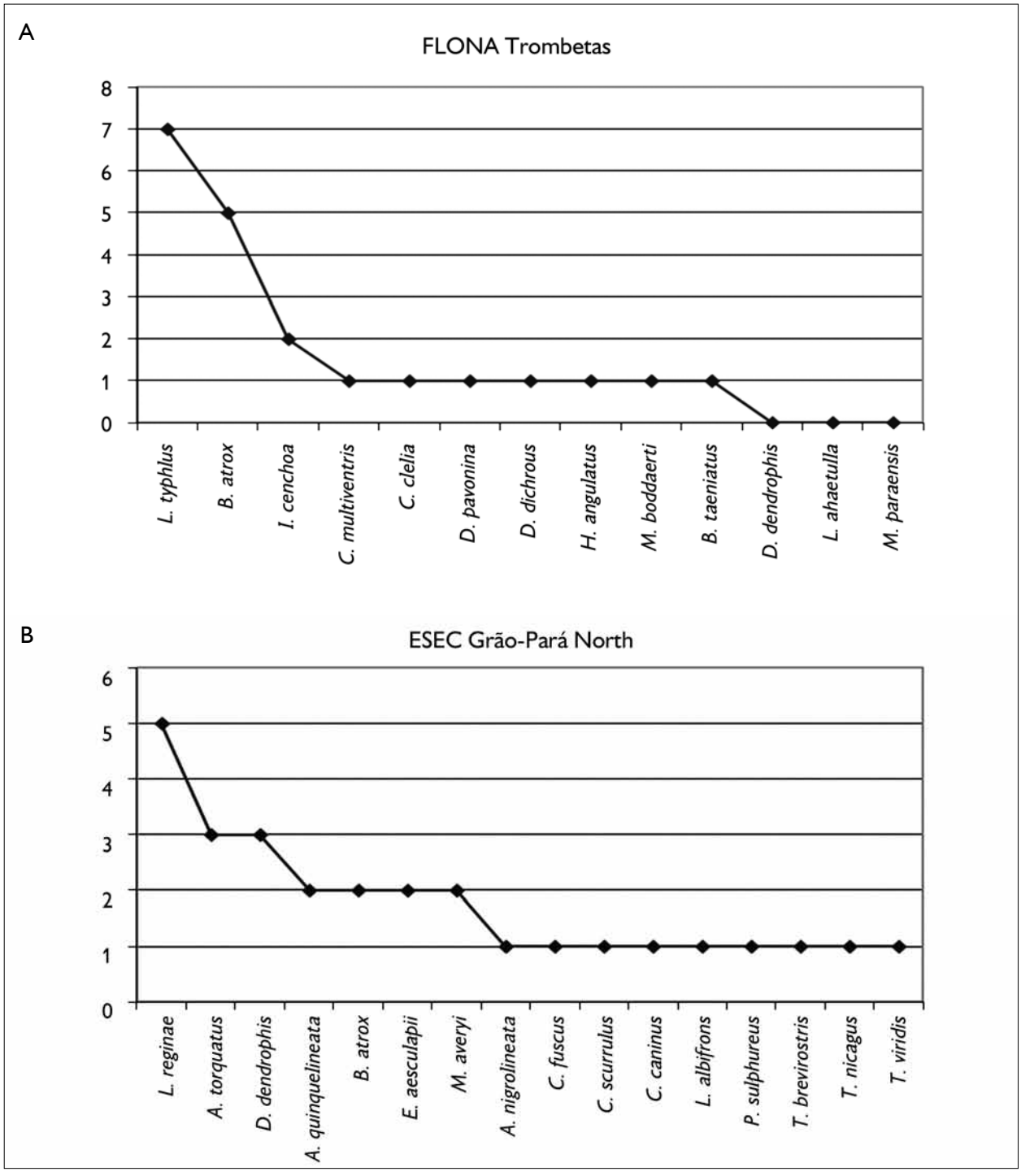

Figure 82. Relative abundance of snakes at each site, represented by registered number of individuals of each species. No graphs are presented for FLOTA Faro, where only *Corallus hortulanus* was represented by two specimens, all other species by one specimen each, and ESEC Grão-Pará Centre, where *Leptotyphlops albifrons* was represented by three specimens, all other species by one specimen each. For complete species names see Appendix 1.

(Continued)

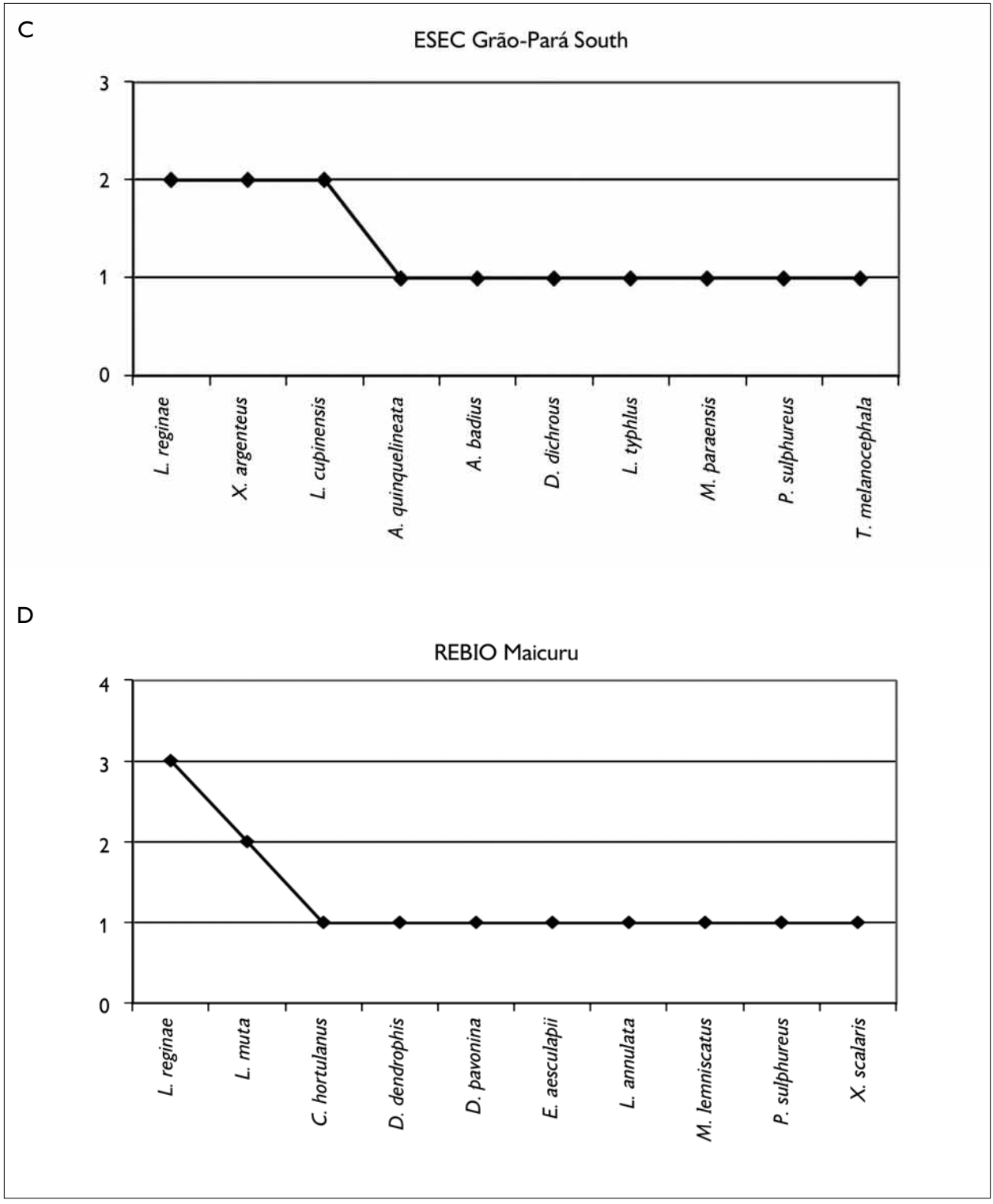

Figure 82. (Continued)

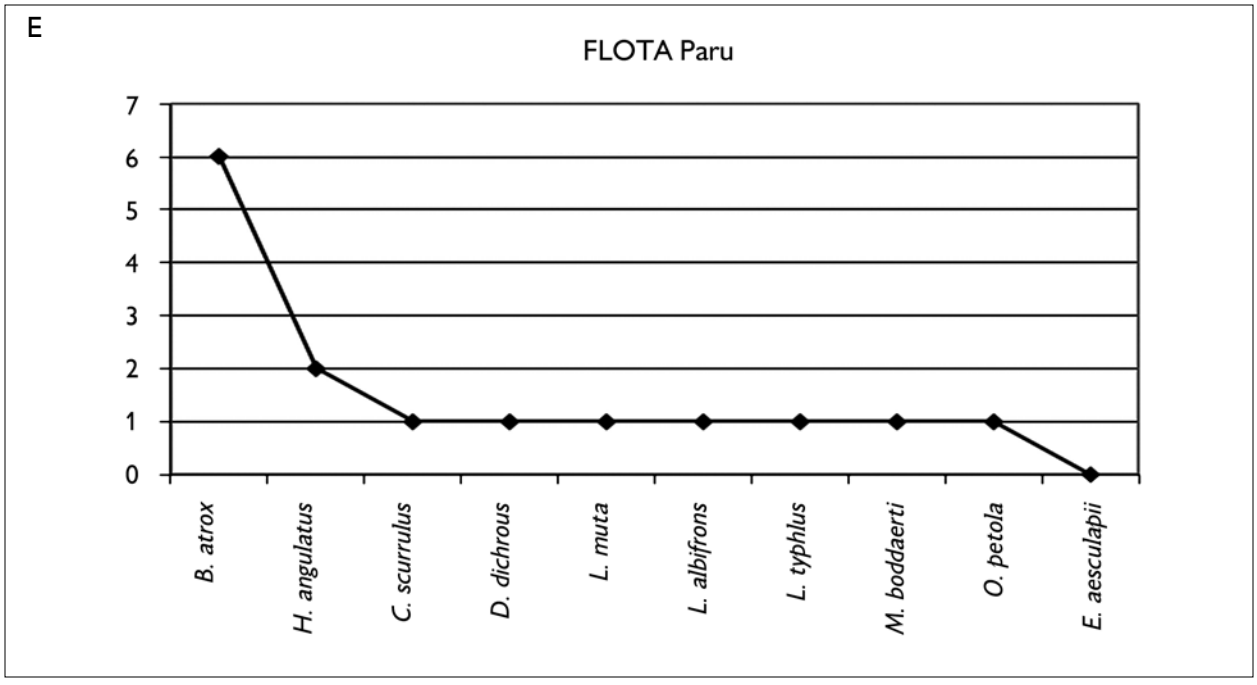

Figure 82. (Conclusion)

but in our CNP material resp. 95 mm [CN515] and 77.5 mm [CN496]) with well developed bony cranial crests, especially in the supratympanic region, which may extend vertically or horizontally, and with neural vertebral spines protruding through the dorsal skin in females, whereas males have low cranial crests and no protruding vertebral spines. In our material from FLOTA Paru, however, there is one male (CN 1726, SVL 67 mm) that has a testis, vocal slits and copulatory warts, but externally very much resembles a female by having high cranial crests, a large jaw knob and protruding neural spines. Both sexes have a distict bony knob on the corner of the mouth (generally smaller in males) and an oblique row of tubercles from the parotoid gland to the groin (Hoogmoed, 1986). Fouquet *et al*. (2007a), thinking they were describing a new species, actually redescribed *B. margaritifera* under the name *Rhinella martyi,* as a result of not being acquainted with the species of the *B. margaritifer* group, putting too much emphasis on molecular data, working with few specimens from a restricted area and not knowing how exactly *B. margaritifer* should be defined. Neither did they bother to check whether one of the many synonyms available could be used for their "new" species. Laurenti (1768, p. 30) in his description of *Rana margaritifera* refers to two drawings in Seba (1734; pl. 71, figures 6 and 7) and for his "Var. β" he refers to Seba (1734: pl. 71 figure 8, which shows an aberrant specimen with five fingers on the left hand, the right hand not being visible). Thus, the two specimens represented in the drawings (Seba, 1734 pl. 71 figures 6 and 7 being a dorsal and ventral view of one specimen) thus can be considered the type series of *Rana margaritifera* Laurenti, 1768. The type locality is given as Brazil ("Habitat in Brasilia"), probably based on the names used in the text in Seba (1734). Because of the problematic situation concerning this group of toads, as demonstrated by Fouquet *et al*. (2007a) and by Haas (2004) who considered a female of *B. margaritifer* with well developed crests as a male, and a male of *B. margaritifer* with low crests as a female of another species, it seems useful to indicate the specimen depicted in Seba (1734 pl. 71, figures 6 and 7) as

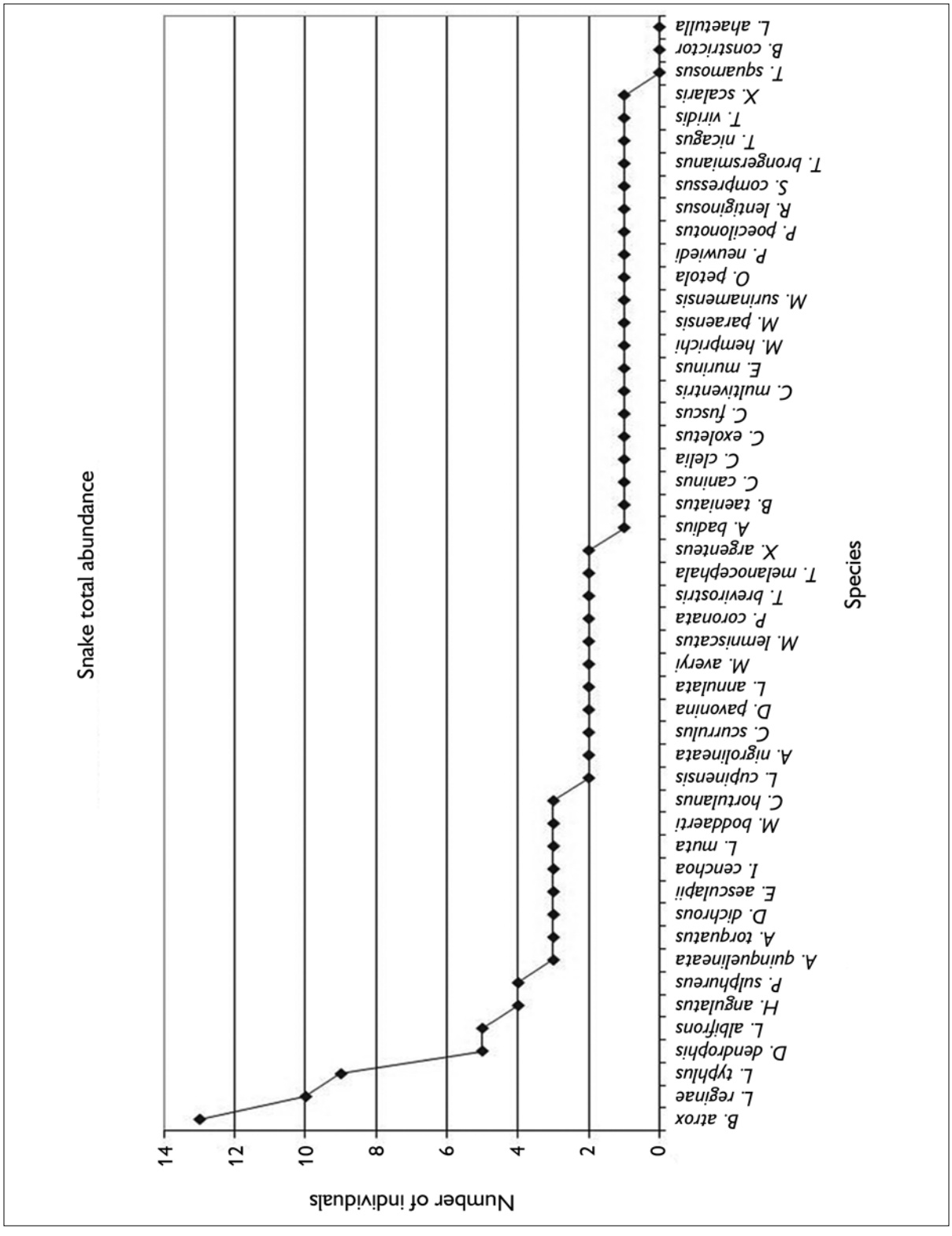

Figure 83. Relative abundance of snakes in the seven studied sites together. For complete species names see Appendix 1.

the lectotype of *Rana margaritifera* Laurenti, 1768, in order to avoid further confusion. The specimen depicted in Seba (1734 pl. 71, figure 8) becomes the paralectotype of *Rana margaritifera* Laurenti, 1768. This species, mentioned by Hoogmoed (1979b) as *B. typhonius*, has a distribution that at least covers Guyana, Suriname, French Guiana and, in Brazil, Amapá and Pará north and south of the Amazon. Thus, this is not a Guiana endemic. The description of *Rhinella martyi* completely agrees with the data available for the lectotype of *B. margaritifer* and the artifical distribution provided for it, due to lack of material, completely falls within the known distribution of *B. margaritifer*. Therefore, we here synonymise *R. martyi* with *B. margaritifer.* This species generally inhabits rainforest and is an explosive breeder in temporary pools and inundated areas, where large numbers may assemble. Although this species is active in daytime on the forest floor, males form choruses and call at night sitting in shallow water or on objects floating in the water (Hoogmoed, 1990b). The other species described by Fouquet *et al*. (2007a), *Rhinella lescurei*, is a good species that was already recognised by Hoogmoed (1979b) as *Bufo* sp. "B", with an altitudinal distribution of 0-300 m, and occurring in Guyana, Suriname and French Guiana (many localities [MSH, unpublished data]). Thus it is not restricted to French Guiana as suggested by Fouquet *et al*., 2007a). During our recent surveys in CNP we did not collect this species. This small species is easily distinguished from *B. margaritifer* by its greenish iris (golden in *B. margaritifer*), a character not mentioned by Fouquet *et al*. (2007a), by several morphological characters described by Fouquet *et al*. (2007a), and by its ecology. This is a species that is active in daytime, and of which the males call singly, separated several meters from each other, from elevated posts 50 – 300 cm above the ground (rocks, leaves, palm-fronds, lianas), always near creeks in the rainforest, during daytime. They lay their eggs in small bodies of standing water near creeks (Hoogmoed, 1990b).

Bufo sp. n., collected in FLOTA Faro and ESEC Grão-Pará North, is a small species of the *Bufo margaritifer* group, with green iris and no cranial crests. The species is also known from French Guiana (Hoogmoed & Avila-Pires, 1991b), Jari (Monte Dourado, Pará) and Amapá, and wil be described as a new species in a forthcoming paper by MSH. It was mentioned by Hoogmoed (1979b) as *Bufo* sp. "A".

Cochranella sp. It has not yet been possible to identify this species with certainty. The taxonomy of Centrolenidae in the Guianan Region is still in flux and several species from other areas in eastern Amazonia, both in the Guianan Region and south of the Amazon river, still await identification. The presence of this taxon constitutes a new record for Pará. Generally Centrolenidae are considered absent from south of the Amazon River in eastern Amazonia, but several species (still to be identified) have been collected in localities in Pará like Caxiuanã, Gunma, lower rio Xingu etc., thus changing the general idea of the distribution of this family (Señaris & Ayarzagüena, 2005).

Hyalinobatrachium iaspidiense was collected in ESEC Grão-Pará Centre, together with *Cochranella* sp., above a creek in a large area of terra-firme forest surrounded by savanna. Yánez-Muñoz *et al*. (2009) synonymised *H. nouraguensis* with *H. iaspidiense* and discussed some new localities for the species in Peru and Ecuador. Moreover, they mentioned localities in Venezuela, Guyana, Suriname (collected by MSH) and French Guiana and two localities in Brazil: Presidente Figueiredo, in the Guianan part of the state of Amazonas, and the lower Cristalino River in northern Mato Grosso. The present record is the first for the state of Pará.

Centrolenid larvae were collected in all three localities in ESEC Grão-Pará, but no connection could be established between them and the two species of which adults were collected in ESEC Grão-Pará Centre. In this last area an egg mass was discoverd hanging from the tip of a leaf of a bush over a creek, close to the calling stations of the males of *H. iaspidiense* and *Cochranella* sp. collected there. From MSH's experience in Suriname it is clear that the eggmass does not belong to *H. iaspidiense*, which lays its clutches on the upper surface of leaves, not at the tips. Thus, the eggmass probably belongs to *Cochranella* sp. found closeby, but there

is no certainty for that. We were not succesful in raising the tadpoles much beyond hatching from the eggs.

Allobates spumaponens was described from Guyana by Kok & Ernst (2007) and is here reported for the first time from Brazil. It was collected in all three localities in the ESEC Grão-Pará, in REBIO Maicuru and FLOTA Paru. Thus its distribution is much wider than was known up till now and it may turn out to occur throughout the western part of the Guianan Region. Identification was made by comparison with the original description (Kok & Ernst, 2007).

Dendrobates tinctorius (blue variant, not to be confused with *D. azureus* from Suriname) only was collected by us in ESEC Grão-Pará North, where it was very abundant throughout the area. It is a blue and black, or a black and blue, frog in which the basic *tinctorius* pattern of a light head patch and two dorsolateral stripes converging on the sacrum and continued from there as a sacral line to the cloaca, is reflected in the blue elements. The blue may be restricted to some narrow lines, often interconnected, on a black background, or it may expand to form the background color with the black reduced to a number of larger and smaller spots, still leaving the basic pattern visible. During our visit there was much courtship activity, with specimens following each other and pressing each other to the ground. *D. tinctorius* (blue variant) at present is known from ESEC Grão-Pará North, FLONA Saracá-Taquera in CNP and from the Konashen area in southern Guyana (Señaris *et al*., 2008). All these localities are west of the Trombetas River, and this distribution is similar to that of *Leposoma* sp. n. and *Bachia panoplia*. *D. tinctorius* from eastern CNP (Jari) are black with the basic yellow pattern known for this species.

Epipedobates cf. *guayanensis* and *E. hahneli.* Haddad & Martins (1994) reviewed the species of the *E. pictus* group, concentrating on Brazil, and came to the conclusion that only one species, *E. hahneli*, occurred along the Amazon and its main southern tributaries. At FLOTA Trombetas we collected syntopically two small species of *Epipedobates* of similar size (25 mm svl, both with larvae and calling males – apparently in full breeding season in mid-May, like all other Dendrobatids in the area). They differed in call, in body shape, and in pattern and colour of lipstripe, lateral stripe, dorsolateral stripes, belly, colour and shape of spots in the axilla, in the inguinal region, on the thighs and on the tibia. We have identified the specimens with yellow axil, inguinal and tibia spots, a white lipstripe that starts a short distance in front of the eye, no lateral white stripe and narrow white dorsolateral stripes as *E. hahneli*, a species that also occurs in Amapá (Mazagão [MPEG 810, 6936], Oiapoque [MPEG 20381-82]), Amazonas (Balbina [MPEG5966-67], Mamirauá [MPEG 7281-83, 7286-7289, 7310-7318], Urucu [MPEG 5155], Benjamin Constant [MPEG 5394-95, 5489-90, 5505-5507, 561817668]), Pará (Paraupebas [MPEG 25076-83], Belo Monte [MPEG 22008], São Felix do Xingu [MPEG 9347-48]), southern Suriname (Sipaliwini airstrip, south bank of Coeroeni River [Posts Tigrie and Gonini]) (Hoogmoed, 1971a, b as *Dendrobates pictus*) and French Guiana (Azevedo-Ramos *et al*., 2004; Lescure & Marty, 2000; Lima, 2008; Silverstone, 1976 [part of his *Phyllobates pictus*]). The other taxon, with red spots in axil, inguina and back of thigh (the last two spots connected by a narrow orangish stripe across the dorsal surface of the thigh), a large red spot on the back of the tibia, a white lip stripe that commences close to the tip of the snout, an irregular white lateral stripe and relatively broad golden to orange dorsolateral stripes, we provisionally have identified as *E.* cf. *guayanensis*, a taxon that was described as *Dendrobates pictus guayanensis* from northern Venezuelan Guiana (Heatwole *et al*., 1965), and with whose description our specimens agree well. This taxon was not considered by Haddad & Martins (1994) in their revision of the *pictus*-group, although their description of *E. pictus* from Bolivia and SW Brazil resembles our material of *E.* cf. *guayanensis* very much. But the distance between the localities of *E. pictus* and *E.* cf. *guayanensis* seems too large to consider them as one species. Lötters *et al*. (2007) reporting *E.* cf. *guayanensis* (as *Ameerega pictus guayanensis*) from Venezuela and

Guyana, reached the same conclusions as we do, and suggested that this may be a good species. We can not yet eliminate the possibility we are dealing with a new species here, and further study is needed to provide a decisive answer. We have located more material of *Epipedobates* cf. *guayanensis* in the collection of MPEG: from Mazagão, Amapá [MPEG 6935], from Jari (Monte Dourado), Pará [MPEG 17495-505], and from Monte Alegre, Pará [MPEG 19747-52 , 20192, 20197-20203]. Only in Mazagão, Amapá, both species were also registered syntopically. *E.* cf. *guayanensis* was much more abundant (ten specimens) in FLOTA Trombetas than *E. hahneli*, of which we only collected a single specimen in a rather open area of terra-firme forest. In REBIO Maicuru we only collected one specimen of *E. hahneli* and no *E.* cf. *guayanensis*. Unfortunately no calls could be recorded. Based on the material we examined, *E.* cf. *guayanensis* does not occur south of the Amazon River, and *E. hahneli* seems to be rare north of the Amazon, although present from Amapá west through Pará to Balbina, in Amazonas. *E. hahneli* is known from south of the Amazon, from Belo Monte (Pará) in the east to Benjamin Constant (Amazonas) in the west. The eastern end of its distribution area in Brazil falls largely outside the "predicted niche" for this species computed by Twomey & Brown (2008), showing that such models should be considered with much care.

Hyla dentei, described from Amapá, was reported from French Guiana by Lescure & Marty (2000) and from additional localities in Amapá by Lima (2008). The species was only collected at REBIO Maicuru and is a new record for Pará.

Hyla gaucheri was described from coastal French Guiana and also is known from coastal and isolated savanna areas in interior Suriname (MSH, unpublished data). The species was collected near some pools and a lake in ESEC Grão-Pará South and is here reported for the first time from Brazil. The presence of pools and the lake in this locality caused the number of Hylid frog species to be considerably higher here than in any of the other localities sampled, despite the relatively advanced season (end of rainy season).

Phrynohyas hadroceps was described from southern Guyana (Duellman & Hoogmoed, 1992) and since has been reported from French Guiana (Lescure & Marty, 2000). Its characteristic call is a loud, regular, "woody" sound, like a metronome, that is repeated hours at an end. This call was heard (but not recorded) in REBIO Maicuru, but no specimen could be observed or collected. On the basis of the call, we report this species as new for Brazil.

Scinax garbei is known from Ecuador, western Brazil, adjacent Peru, Bolivia, Colombia and Venezuela (Duellman, 1972; Frost, 2009; La Marca *et al*., 2004). Its easternmost known locality in Brazil was Manaus, Amazonas (Lima *et al*., 2006). The record from REBIO Maicuru extends the eastern border of distribution well into Pará, for which this is a new record.

Scinax proboscidea was described from Suriname and since has been reported from several other localities in the Guianas (Duellman, 1972; Lescure & Marty, 2000; MSH, unpublished data) and Amapá (Lima, 2008). The record from ESEC Grão-Pará South is the first record for Pará.

Scinax sp. n. is a small species of *Scinax* that was only collected in REBIO Maicuru. It does not agree with any of the known species from the area and will be described as new in a separate paper.

Scinax gr. *ruber* is a large species related to *S. ruber*, but certainly different from it and from *S. x-signatus* (Spix, 1824). Its correct identification still has to be checked.

Adenomera heyeri was recently described from French Guiana (Boistel *et al*., 2006; Angulo *et al*., 2006) and has not yet been reported from outside that country, although MSH (unpublished data, material in RMNH) has collected it in several places in Suriname (Lely Mountains, Patamaca, Brownsberg, Kabalebo, Mozes Creek, Van Ams Creek, 20 km N. Lucie River, Oelemari, Loë Creek, Airstrip Tafelberg) and French Guiana (Mont Mahury, Mont La Gabrielle, Dégrad des Cannes) as well. The record for ESEC Grão-Pará North is the first record for Brazil.

Eleutherodactylus chiastonotus was known from Suriname, French Guiana and Amapá, and its presence

in northern Pará was to be expected. The records from FLOTA Trombetas and REBIO Maicuru are the first for Pará.

Eleutherodactylus fenestratus is generally considered a species from south of the Amazon River, but reaching Manaus and southern Guyana (Lima *et al*., 2006). We have collected it in ESEC Grão-Pará North, which is the first record from Pará north of the Amazon.

Eleutherodactylus inguinalis was described from the border of Suriname and Brazil, but had not yet been reported from northern Pará, where it was to be expected, as it was already known from several localities in Suriname (MSH unpublished data, material in RMNH), French Guiana (Lescure & Marty, 2000) and Amapá (Lima, 2008). Our records from ESEC Grão-Pará North and REBIO Maicuru are the first for Pará.

Eleutherodactylus marmoratus is known from the three Guianas and Amapá (MacCulloch *et al*., 2004; Lima, 2008) and its presence in northern Pará was to be expected. The record from ESEC Grão-Pará North is the first for Pará

Leptodactylus bolivianus has a distribution from southern Central America to Bolivia and the Guianas, but had not yet been reported from northern Pará where it was expected to occur. It is here reported from FLOTA Trombetas, ESEC Grão-Pará South, REBIO Maicuru and FLOTA Paru. The species also has been collected in Jari (Monte Dourado), Pará.

Leptodactylus myersi was described from Roraima (Brazil), Suriname and French Guiana, from isolated rock outcrops and granitic inselbergs in savannas and in rainforest (Heyer, 1995). The species was collected in FLOTA Trombetas in an isolated open area with flat granitic rock outcrops and boulders and a low open vegetation, surrounded by terra-firme forest, and in ESEC Grão-Pará Centre on rock outcrops (lajedos) in a savanna and in cerradão (transitional) forest bordering the savanna. However, it should be noted that in FLOTA Trombetas two specimens of this species were collected well inside the forest, in areas with large rocks, about 100 m and 300 m respectively from the open rock area. This indicates that the species does enter forest, apparently in association with rocks, at least for some distance. Heyer (2005) reported the species from the campos de Ariramba, near Monte Alegre. The present records nicely fill the gap between the Suriname/French Guiana localities, the southern CNP locality and the Roraima localities.

Chiasmocleis hudsoni, a minute fossorial species, was described from southern Guyana, close to the border with Brazil. It was reported from the neighbourhood of Manaus, Amazonas, by Lima *et al*. (2006) and is also known from southern Suriname close to the Brazilian border (MSH, unpublished data). It could be expected to occur in Pará, but had not yet been reported from there and our records are the first for the state.

Chiasmocleis sp. n. is a small fossorial species of a genus from which recently a number of new species have been described, but all from south of the Amazon (Caramaschi & Cruz, 2001; Peloso & Sturaro, 2008) or from the Atlantic forest. The species here referred to does not agree with any of those newly described species (*C. jimi* Caramaschi & Cruz, 2001; *C. avilapiresae* Peloso & Sturaro, 2008), or with *C. shudikarensis* Dunn, 1949, known from Guyana, Suriname, French Guiana and Amazonas, Brazil (Dunn, 1949; Lescure & Marty, 2000; Lima *et al*. 2006; MSH, unpublished data). The distribution given by Rodrigues *et al*. (2004) for *C. shudikarensis* seems to be too extensive and to include distribution areas of other species as well.

Otophryne pyburni was known from eastern Colombia close to the Brazilian border, southern Venezuela, Suriname (Campbell & Clarke, 1998 [no locality]; MSH, unpublished data: Tepoe [RMNH MSH fieldnumber 4017] and Kwamalasemoetoe [Slide J. de Bruin]), French Guiana and Amapá (Campbell & Clarke, 1998; Lescure & Marty, 2000). Carvalho *et al*. (2007) reported it from Parque Nacional Pico de Neblina, Amazonas State, Brazil, and MacCulloch *et al*. (2008b) mentioned it from Pará, without further specification, and without indicating it in their map. We recorded it from ESEC Grão-Pará North and we also collected it at Monte Dourado, Pará [MPEG 17605]. These are the first specific localities from Pará. Señaris & Acosta-Galvis (2004), in their distribution map

(which differs from the distribution as given in the text), show a narrow band through northern Pará connecting the known distribution areas of French Guiana/Amapá with the localities in Venezuela and E. Colombia. We interprete this map as not being based on material from Pará, but as just an interpretation of a possible distribution. In fact, based on our collecting data the species most likely occurs throughout much of northern Pará and in southern Suriname (Kwamalasemoetoe and Tepoe, MSH, unpublished data). In Guyana it is known from Kartabo, in the northern part of the country (Campbell & Clarke, 1998). A distinctive character of the species is the presence of a solid, black, heart-shaped spot around the cloaca. It is visible in Figure 4 of the description by Campbell & Clarke (1998), but they did not specifically mention it. In the ESEC Grão-Pará North a large series of tadpoles was collected, including metamorphosing specimens, which will be described elsewhere.

Synapturanus mirandaribeiroi is a medium-sized fossorial species living just under the mat of superficial roots in rain forest, which makes it difficult to collect without using pitfalls. It was described from southern Guyana and is known from Guyana, Suriname, French Guiana, southern Venezuela, and eastern Colombia; it was reported moreover from the neighbourhood of Manaus, Amazonas (Lima *et al*., 2006) and from Amapá (Lima, 2008), in Brazil. The records from FLOTA Faro, FLOTA Trombetas and ESEC Grão-Pará North are the first ones for Pará.

Pipa snethlageae was described from Belém, Pará, in 1914 and since has only rarely been collected. Trueb & Cannatella (1986) reported 13 specimens from six localities in the Amazon basin: four in Brazil, and one each in Colombia and Peru. Recently the species was reported from French Guiana by Massemin *et al*. (2003, 2007). This species is neither new for the fauna of Brazil nor for that of Pará, but it never has been reported from northern Pará. Our specimen [CN 319] was collected with a fishing net in inundated igapó forest on the bank of rio Nhamundá, in FLOTA Faro. MSH in 2006 collected a juvenile in the rio Mutum, Amazonas (Reserva de Desenvolvimento Sustentável Cujubim) [MSH 10111 in MPEG], also in inundated forest. Another specimen [MPEG 16939] was collected in Juruti, Pará, on the south bank of the Amazon River. This seems to be a species restricted to large rivers and lakes of the Amazonian lowlands, that just enters the Guianan Region in its southern part along large rivers and in the east (French Guiana) via the coastal marshes of Amapá, as happens with other amphibians and reptiles. Its distribution area completely falls within that of *Pipa pipa*. The species is easily separated from the other species of *Pipa* by not having a skin appendage under the snout, like *Pipa pipa*, by having only a simple tubercle-like appendage at the corners of the mouth, by having a wide and short head and by having the tips of the fingers forming a square, flat surface perpendicular to the longitudinal axis of the fingers, with a pointed tubercle sticking out of each of the tips of the square.

Rana palmipes has a wide distribution in Amazonia and also is present in a small isolated area in northeastern coastal Brazil (northern end of the Atlantic forest). Generally the species is associated with large bodies of water like ponds and creeks. In the study area the species strangely enough only was encountered on top of the plateau where Rio Tinto's basecamp Rio Curuá (Estanífera) is established, near small pools on the road, in 'cerradão' forest (consisting of very thin small trees, standing very close together) close to the airstrip, with the nearest larger water body (rio Curuá) being hundreds of meters away at a lower elevation as well. This is the first record of this species in Pará north of the Amazon.

Microcaecilia unicolor was only known with certainty from French Guiana (A. O. Maciel & M.S. Hoogmoed, unpublished data), but its occurrence in this part of the Guianan Region (FLOTA Trombetas) does not come as a surprise because, like many other Gymnophiona, this species is difficult to collect and only known from relatively few specimens and localities. Earlier reports of this species from Brazil were based on mis-identified material.

Rhinatrema sp. n. was found in ESEC Grão-Pará North and in Porto Trombetas (also in northern Pará). It differs from *R. bivittatum* (Guérin de Méneville, 1838) in several morphological and colour characters and shortly will be described by A.O. Maciel & M.S. Hoogmoed [type-material in MPEG].

Reptiles

Amapasaurus tetradactylus was collected in FLOTA Trombetas and in ESEC Grão-Pará North (Acarai Mountains). Since its description in 1970 it had not been found again until it was collected during the 2004-2006 Tumucumaque Expeditions of Conservation International, in northwestern Amapá (Lima, 2008), close to the border with Pará. The new localities here reported for Pará suggest that the species is widely distributed in northern Pará, but it is not yet possible to say whether this is a continuous distribution, or which environmental parameters define its occurrence. In the Acarai Mountains the species was collected at a short distance from the border with Guyana, so this species may turn up in southern Guyana as well.

Bachia panoplia, which was only known from the surroundings of Manaus, Amazonas, and from Oriximiná, Pará, was collected in FLOTA Faro, which may indicate its distribution is limited to the southwestern part of the Guianan Region, west of the Trombetas River.

Leposoma sp. n. still has to be described, but already was known from the surroundings of Manaus, Amazonas (Vitt *et al*., 2008), and seems to extend its distribution at least to the western part of northern Pará, like *B. panoplia*. It was only collected in FLOTA Faro, whereas *Leposoma guianense* occurred in all studied sites and *Leposoma percarinatum*, a parthenogenetic species, in five of the seven sites. In FLOTA Faro all three species were collected, and it would be interesting to know if and how they interact.

Gymnophthalmus cf. *underwoodi* is a savanna inhabitant probably with a relatively large distribution in its specific habitat in southern Guiana and possibly beyond, in Alter-do-Chão, Santarém, south of the Amazon River. Our only specimen is a female and was captured in ESEC Grão-Pará Centre under a rock on a rock slab in savanna. Whether males are present in this taxon is unknown. Most likely this is the species that was reported by Carvalho (1997) from Campos de Ariramba and Alter-do-Chão as "*Gymnophthalmus* com cauda vermelha" [= *Gymnophthalmus* with red tail], and, fleetingly, by Vanzolini & Carvalho (1991) from "northern Pará". It differs from *Gymnophthalmus vanzoi* Carvalho, 1997 by lacking a light upper lip, having two white bands bordered by black on the mentals, indistinct dorsolateral stripes, black flanks, and by having a reddish tail. It is similar to *G. underwoodi* in pattern, but differs from it by its reddish tail and by having all scales of the tail, from base to tip smooth, whereas in *G. underwoodi* the scales towards the tip of the tail have low keels, forming ten longitudinal ridges. We need to compare this specimen more extensively with material from other species/populations.

In FLOTA Paru a single specimen of *Neusticurus* was observed swimming in a creek in rain forest close to a waterfall. The specimen could not be captured, and specific identification was not possible because of light conditions. Considering what is known about the distribution of this genus in Guiana (Avila-Pires, 1995; Hoogmoed, 1973) it probably was either *N. bicarinatus* or *N. rudis*. Both species were collected in the same creek in ESEC Grão-Pará North.

Ptychoglossus brevifrontalis was considered a western Amazonian species, until one specimen was reported from the border of Suriname and Brazil by Hoogmoed (1973). In recent years however the species has been found in many localities in eastern and central Amazonia (Pinto & Quatman, 2005; Peloso & Avila-Pires, in press). The material from FLOTA Faro and ESEC Grão-Pará North has been incorporated in the paper by Peloso & Avila-Pires (in press) and is the first reported from Pará, but we are aware of material from several other localities in Pará south of the Amazon as well.

The small amphisbaenian *Mesobaena rhachicephalus* Hoogmoed, Pinto Rocha & Pereira, 2009, with conical, pointed snout, belongs to a genus that was only known

from southwestern Venezuela and adjacent eastern Colombia, at the edge of the Guianan Region (Gans, 1971). Its occurrence in FLOTA Faro (with two additinal specimens from Porto Trombetas, Pará) (Hoogmoed *et al*., 2009) came as a surprise. Being a fossorial animal its collecting is highly dependent on chance, but it is quite possible that its distribution is restricted to part of the Guianan Region. A number of small amphisbaenians in Amazonia show relatively small distributions (Hoogmoed & Avila-Pires, 1991a), although a closer study of them may show some of them to be synonymous with others (e.g. Hoogmoed & Mott, 2003). We can state here already that the large sample of small amphisbaenids in ESEC Grão-Pará South (19 specimens) has enabled us to establish that *Amphisbaena tragorrhectes* Vanzolini, 1971, described from this area, is a junior synonym of *Amphisbaena vanzolinii*. Further arguments for this synonymisation will be provided in a forthcoming paper.

We use the name *Leptotyphlops albifrons* (Wagler, 1824) for the species that by some authors is still named *L. tenella* or *tenellus* Klauber, 1939. We consider this species to occur from Trinidad to the Guianas, but not south of the Amazon.We do not agree with the reasoning of Franco & Pinto (2009) that the name *Stenostoma albifrons* Wagler, 1824 would be a nomen dubium because of a lot of wrong identifications (which is true). In our opinion the drawing presented by Wagler (1824) clearly shows what later was described as *L. tenella* (large eyes, dark body with light zigzag lines and yellow spots on snout and tip of tail), in which we also concur with Franco & Pinto (2009). However, we think these authors are too much fixed on the type-locality given by Wagler (1824) (environs of Belém), where the species never again has been found in nearly 200 years. Spix's localities are not always reliable, and the type specimen may have been collected on the Guiana side of the Amazon. Thus there is no reason to declare *S. albifrons* Wagler a nomen dubium, but instead it becomes a senior synonym of *L. tenella* Klauber. Other material from south of the Amazon apparently has been erroneously identified.

Leptotyphlops cupinensis CN902A, from Grão-Pará South, was regurgitated by a half-grown *Apostolepis quinquelineatus* after it had been collected. It only concerned the posterior part of the body and tail. CN767 was collected while digging in black earth at the edge of a lake. It was inadvertently cut in several pieces, one of which was the posterior part of the body and tail, but the head could not be recovered. When dug up it was patternless bright orange. Comparison of both specimens shows them to belong to the same species – same number of scales under the tail (16), 14 scales around the middle of the tail and around the posterior part of the body, the spine at end of tail not very distinct, but present, and same body colour (no pattern), although that of CN902A was largely faded. We compared the remains of our specimens with specimens of several species of *Leptotyphlops*, *Typhlophis squamosus* and *Liotyphlops ternetzii* in the MPEG collection. *T. squamosus* has a blackish dorsal region and for that reason does not qualify. *Lioptyphlops ternetzii* has a high number of scales around the posterior end of the body (Dixon & Kofron, 1983), and therefore does not fit our specimens. The species of *Leptotyphlops* examined or known to us from previous studies (Hoogmoed, 1977), either have a blackish body with light zigzag stripes and a white spot on tip of tail (*L. albirostris*), a brown body with a white spot on the postanal scales (*L. collaris* Hoogmoed, 1977), a brown back and white belly (*L. dimidiatus* (Jan, 1861)), dorsal scales with brown spots (*L. macrolepis* (Peters, 1857)) or a distinct pattern of longitudinal lines (*L. septemstriatus*). Moreover, they all have either ten or 12 scales around the middle of the tail. *Leptotyphlops cupinensis* is the only *Leptotyphlops* known from the Guianan Region that is patternless and light and has 14 scales around the middle of the tail. The number of subcaudals of our two specimens falls well within the variation known for *L. cupinensis* (14-17) (Bailey & Carvalho, 1946; Orejas Miranda, 1967; Hoogmoed, 1977). We therefore came to the conclusion that the remains we have fit well with the same parts of *Leptotyphlops cupinensis* of which the colour was described by Bailey & Carvalho (1946) as "pale flesh, in alcohol creamy white, with no trace of a pigmented pattern" and by Hoogmoed

(1977), from a specimen in alcohol, as "pale yellowish brown without apparent pattern". Two slides of a live specimen of *L. cupinensis* from the rio Teles Pires, Mato Grosso, Brazil, show a similar colour as CN767 when it was dug up. It seems that *Leptotyphlops cupinensis* is the only species of *Leptotyphlops* known from the Guiana Shield that in life might be patternless bright orange. Thus, by a process of elimination and on the basis of colour, scales around posterior body, scales around the middle of the tail and number of subcaudals, we deduce that the remains we have belong to *L. cupinensis*. We realize there is margin for error, but nevertheless we are rather confident about this identification. This is the first mention of this species from Pará. From the Guianan Region it has been reported from Serra do Navio, Amapá, Brasil, and Lely Mountains, Suriname (Hoogmoed, 1977). It is not known from French Guiana.

Typhlophis squamosus was known from Venezuela, Guyana, Suriname and French Guiana (Kok & Rivas Fuenmayor, 2008). Cunha & Nascimento (1978) reported the species from eastern Pará, but not from north of the Amazon River. We collected a specimen in ESEC Grão-Pará Centre, but unfortunately it escaped before it could be photographed or preserved. Its identification does not pose a problem, it had the typically dark body and the light pink head known for this species (see Starace, 1998 for a picture). It is a new record for northern Pará.

Corallus caninus was considered a species with a wide Amazonian distribution. Recently Henderson *et al*. (2009) demonstrated that two species occurred in the Amazon area, viz. *Corallus caninus* in the Guianan region and *C. batesii* (Gray, 1860) in the rest of Amazonia. According to these authors *C. batesii* also could be a species complex. In Appendix 1 we indicate *C. caninus* therefore as a Guianan endemic.

Apostolepis nigrolineata generally is considered a species from south of the Amazon, where it is widely distributed (Lema & Renner, 1998; Lema, 2001). We collected it in ESEC Grão-Pará North and Centre. In the ESEC Grão-Pará North it was sympatric with *A. quinquelineata*.

Atractus badius. This species has been cited for a large area in Amazonia, but Hoogmoed (1980) pointed out that it was restricted to the Guianan Region and that specimens examined from outside that region belonged to different species. He reported a specimen from Serrra do Navio, Amapá. One specimen was collected in ESEC Grão-Pará South, which constitutes the first record for Pará.

Taeniophallus nicagus was resurrected as a valid species by Myers & Cadle (1994) and at that time was only known from Suriname. Martins & Oliveira (1998) reported it from the surroundings of Manaus. Hoogmoed and M. A. Ribeiro-Junior in 2006 collected a specimen in southern Amapá, near Mazagão, in terra-firme forest [MPEG 23312]. We collected it in ESEC Grão-Pará North and this constitutes the first record for Pará. In this locality the species was collected sympatrically with *T. brevirostris*.

Thalesius viridis was known only from Suriname and French Guiana (Hoogmoed, 1985; Ferreira-Yuki, 1993) until it was reported (as *Xenodon werneri* Eiselt, 1963) by Lima (2008) from the Tumucumaque Mountains, in Amapá. One specimen was collected in ESEC Grão-Pará North, and this constitutes the first record for Pará. Again, as it was collected close to the border with Guyana, it may turn up in the southern part of that country as well.

Micrurus averyi was described from the border of Suriname and Brazil and was already known from Manaus, Amazonas, but the record from ESEC Grão-Pará North is the first record of this species from Pará.

CONCLUSIONS

The goal of the expeditions to northern Pará was to obtain a good impression of the herpetofauna present in the area. With a total of 80 amphibians and 95 reptiles collected or observed out of an expected total of 109 amphibians and 164 reptiles, we may conclude that the results of the expeditions were satisfactory. Taking into account material collected in other areas of northern Pará, reported in literature or present in the collection of MPEG, we even get a better result: 89 amphibians and 138 reptiles. We collected six species new to science (three frogs [*Bufo* sp. n., *Scinax* sp. n., *Chiasmocleis* sp. n.], one caecilian [*Rhinatrema* sp. n.], one

lizard [*Leposoma* sp. n., already reported in the literature], and one amphisbaenian [*Mesobaena rhachicephala*]); one species of lizard possibly new to science [*Gymnophthalmus* cf. *underwoodi*, possibly already reported in the literature]; six new records for Brazil (five frogs [*Allobates spumaponens, Epipedobates* cf. *guayanensis, Hyla gaucheri, Phrynohyas hadroceps, Adenomera heyeri*], one caecilian [*Microcaecilia unicolor*]) and 23 new records for (northern) Pará (13 frogs [*Cochranella* sp., *Hyalinobatrachium iaspidiense*, *Hyla dentei*, *Scinax garbei*, *Scinax proboscideus*, *Eleutherodactylus chiastonotus*, *E. fenestratus*, *E. inguinalis*, *E. marmoratus*, *Leptodactylus bolivianus*, *Chiasmocleis hudsoni*, *Synapturanus mirandaribeiroi*, *Rana palmipes*], four lizards [*Amapasaurus tetradactylus*, *Bachia panoplia*, *Leposoma* sp. n., *Ptychoglossus brevifrontalis*], six snakes [*Leptotyphlops cupinensis*, *Apostolepis nigrolineatus*, *Atractus badius*, *Taeniophallus nicagus*, *Thalesius viridis*, *Micrurus averyi*]). These data show that our knowledge of the herpetofauna of northern Pará has increased considerably, and has come to a level comparable to our knowledge about the herpetofauna of the two neighbouring countries Suriname and French Guiana.

It will be clear that these results are just a first step towards a better knowledge of the herpetofauna of northern Pará. We still have to learn a lot about geographic distribution within the area, and about ecological and topographic factors determining that distribution. It is hoped that the establishment of the protected areas in northern Pará will lead to a further intensification of research in that area, in order to be able to better protect the herpetofauna that still has many novelties to offer.

FINAL REMARKS

This study of seven sites in the state of Pará, Brazil, north of the Amazon, as part of a large project aiming to establish management plans for a number of state conservation units, has allowed us to greatly improve our knowledge of this region, until now only poorly studied. These data will certainly give a better basis for establishing conservation policies for the area. However, it is important to keep in mind that for such a large area the results obtained are just partial, and that faunistic studies in conservation units should not be limited to those that are necessary for elaborating initial management plans. It is important that long term inventories are planned and executed in conservation units, in order to effectively know their biodiversity and monitor it, and if necessary to adapt management plans to new data. Even though the use of some statistical tests, as estimators of richness (e.g., Chao 1, 2, Jackknife 1, 2, Bootstrap) may help in some analyses, it should be realized that these statistical tests are just that and they only can provide an estimate based on the data assembled, frequently over a short period. These tests do not take into account important biological (and other) factors that are of utmost importance to the organisms studied and that directly influence any estimation based on numbers collected. At best these tests can give some estimate based on the data available, just for the short period and for the speciefic area when and where they were obtained, and they should not be used to extrapolate data for larger areas. In the case of the herpetofauna, future studies should consider the effects of seasonality, since not all species are active throughout the year, or their apparent abundance in different periods of the year may vary. Moreover, our study indicates that many species are not evenly distributed in the whole region, but in most cases we do not know which environmental parameters are important for their distribution. Finally, not all microhabitats can be sampled adequately, and thus a number of habitat specialists (canopy, fossorial, aquatic) usually remains underrepresented. Only long term, careful studies can effectively lead to a thorough knowledge of the environment, giving better support for their conservation.

A positive development is that the northern part of Pará, together with Amapá and the neighbouring Guianan countries (Figure 1), at present form a carefully planned corridor of protected areas, following a landscape-scale approach to conservation – a core of Indian territories and more restrictive conservation units ('Estação Ecológica',

'Reserva Biológica', 'Parque Nacional', according to the Brazilian system of conservation units), surrounded by areas where the use of biodiversity is regulated to guarantee its sustainable use ('Floresta Estadual', 'Floresta Nacional', 'Reserva de Desenvolvimento Sustentável'). This gives hope that the fauna and flora of this region may escape from the threat of extinction, if indeed economic greed does not override our efforts of truly searching for a sustainable world.

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APPENDIX 1. Species of amphibians and reptiles found in the seven studied sites plus Estanífera (Rio Tinto basecamp, where only ocasional collections were made) in northern Pará, Brasil, with data on reproduction, diet and habitat based on personal observations and literature. Species indicated with an asterisk are new for the herpetofauna of Brazil, those indicated with a '+' are new for the State of Pará.

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Amphibia														
Anura														
Allophrynidae														
Allophryne ruthveni Gaige, 1926					x		x				eggs on leaves	rain forest	arboreal	insects
Bufonidae														
Atelopus hoogmoedi Lescure, 1974				x					Guiana south to Tucuruí, Carajás, Santarém		eggs in creeks	rain forest near creeks	terrestrial	insects
Bufo guttatus Schneider, 1799	x	x		x	x		x	x			eggs in pools	rain forest	terrestrial	insects
* *Bufo* sp. n.	x		x						x		eggs in pools	rain forest	terrestrial	insects
Bufo margaritifer Laurenti, 1768		x		x	x	O	x	x			eggs in pools	rain forest	terrestrial	insects
Bufo marinus Linnaeus, 1758	x	x		x	x		x	x			eggs in pools	generalist	terrestrial	insects, small vertebrates
Dendrophryniscus bokermanni Izecksohn, 1994	x										terrestrial eggs, edge of pools	rain forest	terrestrial	insects

Bol. Mus. Para. Emílio Goeldi. Cienc. Nat., Belém, v. 5, n. 1, p. 13-112, jan.- abr. 2010

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Dendrophryniscus minutus (Melin, 1941)	×		×				×				terrestrial eggs, edge of pools	rain forest	terrestrial	insects
Centrolenidae														
+*Cochranella* sp.				×					×		eggs on leaves above creeks	rain forest near creeks with running water and rapids	arboreal	insects
+*Hyalinobatrachium iaspidiense* Ayarzaguena, 1992				×							eggs on leaves above creeks	rain forest near creeks with running water and rapids	arboreal	insects
Unidentified tadpoles			×	×	×							rain forest near creeks with running water and rapids		
Dendrobatidae														
Allobates femoralis (Boulenger, 1884)		×	×		×		×	A		×	terrestrial eggs, tadpoles on back adult transported to pools	rain forest edge of openings	terrestrial	insects
**Allobates spumaponens* Kok & Ernst, 2007			×	×	×		×	×	×		eggs in leptodactylid foamnests	rain forest	terrestrial	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Anomaloglossus baeobatrachus (Boistel & Massary, 1999)		×	×				×	×	×		terrestrial eggs, tadpoles on back adult transported to pools	rain forest	terrestrial	insects
Anomaloglossus stepheni (Martins, 1989)	×								×		terrestrial eggs, tadpoles in nest leaves until metamorphosis	rain forest edge of openings	terrestrial	insects
Dendrobates tinctorius (Cuvier, 1797)			×						×	×	terrestrial eggs, one or two tadpoles on back adult transported to pools	rain forest	terrestrial	insects
* *Epipedobates* cf. *guayanensis* Heatwole, Solano & Heatwole, 1965		×							×	×	terrestrial eggs, tadpoles on back adult transported to pools	rain forest	terrestrial	insects
Epipedobates hahneli (Boulenger, 1884)		×					×			×	terrestrial eggs, tadpoles on back adult transported to pools	rain forest	terrestrial	insects
Epipedobates trivittatus (Spix, 1824)		×		×	×			A		×	terrestrial eggs, tadpoles on back adult transported to pools	rain forest	terrestrial	insects

(Continued)

Species name		FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Hylidae															
Hyla boans (Linnaeus, 1758)			A	×	×	A		×	×			nests at edge of rivers, creeks and pools	rain forest, galery forest	arboreal	insects
Hyla calcarata Troschel, 1848						×		×				eggs in water	creeks, flooded areas, forest and edge	arboreal	insects
Hyla cinerascens Spix, 1824						×						eggs in lentic water	rain forest, savanna forest, close to creeks, flooded areas	arboreal	insects
+*Hyla dentei* Bokermann, 1967								×		×		?	rain forest	arboreal	insects
Hyla fasciata (Günther, 1858)						×		×	×			eggs in water	rain forest and edge	arboreal	insects
**Hyla gaucheri* Lescure & Marty, 2000						×				×		?	pools in rain forest and open areas	arboreal	insects
Hyla geographica Spix, 1824					×	×		×				eggs in lentic or lotic water	savanna, open areas, rain forest	arboreal	insects
Hyla leucophyllata (Beireis, 1783)						×		×				eggs on leaves above pool	open areas, savanna, rain forest and edge	arboreal	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Hyla minuscula Rivero, 1971				×							eggs in water	rain forest, savanna, open areas	arboreal	insects
Hyla minuta Peters, 1872		×		×							eggs on leaves above pool	generalist (open areas)	arboreal	insects
Hyla multifasciata Gunther, 1859		A		×	×			×			eggs above or in pools (?)	generalist (open areas)	arboreal	insects
Hyla cf. *nana* Boulenger, 1889					×						eggs on leaves above lentic water	savanna, open areas, rain forest	arboreal	insects
Hyla punctata (Schneider, 1799)								×			eggs in water	open areas / antropic, savanna, swamps	arboreal	insects
Hyla wavrini Parker, 1936	×										eggs in nest at edge of water	flooded riverine forest (várzea)	arboreal	insects
Osteocephalus leprieuri (Duméril & Bribron, 1841)	×			×			×	×			eggs in water	savanna, swamps, rain forest	arboreal	insects
Osteocephalus oophagus Jungfer & Schiesari, 1995		×	×		×						eggs in Bromeliaceae with parental care	rain forest	arboreal	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Osteocephalus taurinus Steindachner, 1862	×	×	×	×	×			A			eggs in temporary pools	rain forest	arboreal	insects
Phyllomedusa bicolor (Boddaert, 1772)							×				nest between leaves above water	savanna, rain forest, várzea	arboreal	insects
Phyllomedusa hypochondrialis (Daudin, 1803)		A		×			×				nest between leaves above water	generalist (open areas)	arboreal	insects
Phyllomedusa tomopterna (Cope, 1868)		A		×	A						nest between leaves above water	rain forest	arboreal	insects
Phyllomedusa vaillanti Boulenger, 1882			×								nest between leaves above water	rain forest	arboreal	insects
**Phrynohyas hadroceps* (Duellman & Hoogmoed, 1992)							A		×		eggs in cavities in trees, above the ground	rain forest	arboreal	insects
Phrynohyas sp.								A					arboreal	
Scinax boesemani Goin, 1966	×			×	×						eggs in lentic water	savanna, open areas, rain forest in open areas, várzea	arboreal	insects
+*Scinax garbei* (Miranda-Ribeiro, 1926)							×				eggs in lentic water	rain forest	arboreal	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Scinax nebulosus (Spix, 1824)				×							eggs in lentic water	open areas, savanna	arboreal	insects
+*Scinax proboscideus* (Brongersma, 1933)					×				×		eggs in lentic water	rain forest	arboreal	insects
Scinax ruber (Laurenti, 1768)					×						eggs in lentic water	periantropic, savanna	arboreal	insects
**Scinax* sp. nov.							×				eggs in lentic water	rain forest	arboreal	insects
Scinax gr. *ruber* (Laurenti, 1768)								×			eggs in lentic water	rain forest	arboreal	insects
Leptodactylidae														
Adenomera andreae (Müller, 1923)	×	×	×	×	×		×	×			nest in ground	rain forest	terrestrial	insects
** Adenomera heyeri* Boistel, Massary & Angulo, 2006			×						×		nest in ground	rain forest	terrestrial	insects
Adenomera hylaedactyla (Cope, 1868)				×							nest in ground	savanna	terrestrial	insects
Ceratophrys cornuta (Linnaeus, 1758)					×						eggs in lentic water	rain forest	semifossorial	insects, small vertebrates
+Eleutherodactylus chiastonotus Lynch & Hoogmoed, 1977		×					×		×		terrestrial eggs, direct development	rain forest	arboreal	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
+*Eleutherodactylus fenestratus* (Steindachner, 1864)			×				?				terrestrial eggs, direct development	rain forest	arboreal	insects
+*Eleutherodactylus inguinalis* Parker, 1940			×				×		×		terrestrial eggs, direct development	rain forest	arboreal	insects
+*Eleutherodactylus marmoratus* (Boulenger, 1900)			×						×		terrestrial eggs, direct development	rain forest	arboreal	insects
Eleutherodactylus zeuctotylus Lynch & Hoogmoed, 1977	×	×	×	×	×						terrestrial eggs, direct development	rain forest	arboreal	insects
+*Leptodactylus bolivianus* Boulenger, 1898		×			×		×	×			foamnest	rain forest	terrestrial	insects, small vertebrates
Leptodactylus knudseni Heyer, 1972	×	×	×	×	×		×	×			terrestrial foamnest	rain forest	terrestrial	insects, small vertebrates
Leptodactylus leptodactyloides (Andersson, 1945)			×								terrestrial foamnest	rain forest	terrestrial	insects
Leptodactylus longirostris Boulenger, 1882				×					nearly		terrestrial foamnest in tunnel	savanna	terrestrial	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Leptodactylus myersi Heyer, 1995		×		×					×		terrestrial foamnest under stones	open rockslates in savanna and rain forest	terrestrial	insects
Leptodactylus mystaceus (Spix, 1824)	×	×		×	×			×			terrestrial foamnest	rain forest	terrestrial	insects
Leptodactylus pentadactylus (Laurenti, 1768)	×	×	×	×	×						terrestrial foamnest	rain forest	terrestrial	insects, small vertebrates
Leptodactylus petersii (Steindachner, 1864)	×	×			×		×	×			foamnest at edge water	generalist (open areas)	terrestrial	insects
Leptodactylus rhodomystax Boulenger, 1884	×			×	×						foamnest at edge water	rain forest	terrestrial	insects
Leptodactylus stenodema Jimenez de la Espada, 1875		×									terrestrial foamnest	rain forest	terrestrial	insects
Lithodytes lineatus (Schneider, 1799)	×	×	×	×	×		×	×			foamnest in *Atta* ants nest	rain forest	terrestrial	insects
Physalaemus ephippifer (Steindachner, 1864)		×		×	×	×	×		Guiana + Belém		foamnest floating on water	rain forest	terrestrial	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Microhylidae														
+ *Chiasmocleis hudsoni* Parker, 1940	×				×				×		terrestrial eggs, tadpoles in lentic water	rain forest	fossorial	insects
**Chiasmocleis* sp. nov.				×			×	×			?	rain forest	fossorial	insects
Hamptophryne boliviana (Parker, 1927)					×			×			eggs in lentic water	rain forest	fossorial	insects
Otophryne pyburni Campbell & Clarke, 1998			×						×		eggs in lotic water, tadpoles in substrate	rain forest, near creeks	fossorial	insects
+ *Synapturanus mirandaribeiroi* Nelson & Lescure, 1975	×	×	×						Guiana + eastern Colombia		Eggs subterraneous, direct development	rain forest, under layer of roots	fossorial	insects
Pipidae														
Pipa pipa (Linnaeus, 1758)							×	×			eggs in back mother, direct development	in pools, creeks, rivers, swamps, periantropic	aquatic	aquatic invertebrates and small fish
Pipa snethlageae Müller, 1914	×										eggs in back mother, tadpoles direct development	in pools and creeks in rain forest	aquatic	aquatic invertebrates

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Ranidae														
+*Rana palmipes* Spix, 1824						×					eggs in water	rain forest near creeks, savanna forest near pools	terrestrial	insects
GYMNOPHIONA														
Caeciliidae														
Caecilia tentaculata (Linnaeus, 1758)		×		×							juveniles aquatic	rain forest	fossorial	?
**Microcaecilia unicolor* (Duméril, 1863)		×							×		?	rain forest	fossorial	?
Rhinatrematidae														
**Rhinatrema* sp. nov.			×						×		?	rain forest	fossorial	?
REPTILIA														
SQUAMATA														
LIZARDS														
Gekkonidae														
Coleodactylus amazonicus (Andersson, 1918)	×	×	×	×	×		×	×			eggs (one at a time)	rain forest, leaf litter sunny areas	leaf litter	insects
Gonatodes annularis Boulenger, 1887	×	×	×						×		eggs (two at a time)	rain forest, base of trees, rocks	arboreal	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Gonatodes humeralis (Guichenot, 1855)	×	×	×	O	×		×	×			eggs (two at a time)	rainforest, on small trees and branches	arboreal	insects
Lepidoblepharis heyerorum Vanzolini, 1978	×	×					×				eggs (one at a time)	rain forest, leaf litter near moist areas	leaf litter	insects
Pseudogonatodes guianensis Parker, 1935	×		×				×				eggs (one at a time)	rainforest, leaf litter	leaf litter	insects
Thecadactylus rapicauda (Houttuyn, 1782)			×		×						eggs (two at a time)	rain forest on tree trunks	arboreal, nocturnal	insects
Gymnophthalmidae														
Alopoglossus angulatus (Linnaeus, 1758)							×	×			eggs	rain forest	leaf litter	insects
+*Amapasaurus tetradactylus* Cunha, 1970		×	×						×		eggs	rain forest	leaf litter	insects
Arthrosaura kockii (Lidth de Jeude, 1904)			×				×		Guiana, Belém, Xingu,		eggs	rain forest	leaf litter	insects
Arthrosaura reticulata (O'Shaugnessy, 1881)	×						×	×			eggs	rain forest	leaf litter	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Bachia flavescens (Bonnaterre, 1789)	×	×	×	×	×		×	×			eggs	rain forest	leaf litter	insects
+ *Bachia panoplia* Thomas, 1969	×								×		eggs	rain forest	leaf litter	insects
Cercosaura argulus Peters, 1863							×	×			eggs	rain forest	leaf litter	insects
Cercosaura ocellata Wagler, 1830			×	×				×			eggs	rain forest	leaf litter	insects
Gymnophthalmus cf. *underwoodi* Grant, 1958				×					×		eggs	savanna	terrestrial, under rocks	insects
Iphisa elegans Gray, 1851			×		×						eggs	rain forest	leaf litter	insects
Leposoma guianense Ruibal, 1952	×	×	×	×	×		×	×	Guiana, Belém		eggs	rain forest	leaf litter	insects
Leposoma percarinatum Muller, 1923)	×		×	×				×			eggs	rain forest	leaf litter	insects
Leposoma sp. nov.	×										eggs	rain forest	leaf litter	insects
Neusticurus bicarinatus (Linnaeus, 1758)			×	×					Guiana, Belém, Xingu		eggs	rain forest, creeks	semi-aquatic	insects
Neusticurus rudis Boulenger, 1900			×						×		eggs	rain forest, creeks	semi-aquatic	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Neusticurus indet.								○			eggs	rain forest, creeks	semi-aquatic	insects
+ *Ptychoglossus brevifrontalis* Boulenger, 1912	×		×								eggs	rain forest	leaf litter	insects
Tretioscincus agilis (Ruthven, 1916)	×	×	×		×		×	○	Guiana, Belém, Xingu		eggs	rain forest, lianas, rotten trees	terrestrial and, arboreal	insects
Iguanidae														
Iguana iguana (Linnaeus, 1758)							○			×	eggs	forest and open areas, on ground or on vegetation, usually near water	arboreal	leaves, flowers, fruits
Polychrotidae														
Anolis auratus Daudin, 1802				×							eggs	savanna, herbaceous vegetation	arboreal	insects
Anolis chrysolepis Duméril & Bibron, 1837	×	×	×				×		×		eggs	rain forest, leaf litter	arboreal	insects
Anolis fuscoauratus d'Orbigny, 1837	×	×	×		×		×	×			eggs	rain forest and edge, on vegetation	arboreal	insects
Anolis ortonii Cope, 1868							○				eggs	rain forest and edge on vegetation	arboreal	insects

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Anolis punctatus Daudin, 1802					×						eggs	rain forest on tree trunks	arboreal	insects
Tropiduridae														
Plica plica (Linnaeus, 1758)			×				P	O			eggs	rain forest on large tree trunks	arboreal	insects mainly ants
Plica umbra (Linnaeus, 1758)	×	×	×	P	×		×	×			eggs	rain forest, secondary forest on small trees	arboreal	insects mainly ants
Uranoscodon superciliosus (Linnaeus, 1758)	×	×	×	×			×	×			eggs	rain forest along margins creeks and várzea along rivers	arboreal	insects
Scincidae														
Mabuya nigropunctata (Spix, 1825)		×	×	P			×	×			viviparous	open areas in rain forest	terrestrial and arboreal	insects
Teiidae														

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Ameiva ameiva (Linnaeus, 1758)	×	P	O	×	×	P	×	×			eggs	generalist, open areas, savanna, periantropic, in rain forest in open areas	terrestrial	insects, small vertebrates
Kentropyx calcarata Spix, 1825	×	×	O	×	O		×	×			eggs	rain forest, secondary forest, in open areas	terrestrial and on low vegetation	insects, small vertebrates
Kentropyx striata (Daudin, 1802)		O		×					Guiana+ NW South America		eggs	savanna, floating mats of vegetation	terrestrial and on low vegetation	insects
AMPHISBAENIA														
Amphisbaenidae														
Amphisbaena fuliginosa Linnaeus, 1758					×						eggs	rain forest and open vegetation	fossorial	invertebrates and small veterbrates
Amphisbaena vanzolinii Gans, 1963					×				×		eggs	rain forest	fossorial	invertebrates
**Mesobaena rhachicephala* Hoogmoed, Pinto, Rocha & Pereira, 2009	×								×		eggs	rain forest	fossorial	invertebrates

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
SERPENTES														
Anomalepididae														
Typhlophis squamosus (Schlegel, 1839)				○					Guiana, Trinidad, Belém		eggs	rain forest	fossorial	ants, termites
Leptotyphlopidae														
Leptotyphlops albifrons (Wagler, 1824)			×	×				×	×		eggs	rain forest	fossorial	termites, ants
+Leptotyphlops cupinensis Bailey & Carvalho, 1946					×						eggs	rain forest	fossorial	ants, termites
Typhlopidae														
Typhlops brongersmianus Vanzolini, 1976	×										eggs	rain forest	fossorial	insects
Boidae														
Boa constrictor Linnaeus, 1758	○									×	viviparous	rain forest, savanna, periantropic	terrestrial	vertebrates
Corallus caninus (Linnaeus, 1758)			×						×	×	viviparous	rain forest	arboreal	vertebrates
Corallus hortulanus (Linnaeus, 1758)	×						×			×	viviparous	along rivers and creeks in rain forest and savanna	arboreal	small vertebrates

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Eunectes murinus (Linnaeus, 1758)				×						×	viviparous	in rivers and creeks in rain forest, savanna, swamps, periantropic	aquatic	vertebrates
Colubridae														
+ *Apostolepis nigrolineata* (Peters, 1869)			×	×							eggs	rain forest	fossorial	?
Apostolepis quinquelineata Boulenger, 1896			×		×						eggs	rain forest	fossorial	?
+ *Atractus badius* (F.Boie, 1827)					×						eggs	rain forest	fossorial	probably earthworms
Atractus torquatus (Duméril, Bibron & Duméril, 1854)			×								eggs	rain forest	fossorial	
Chironius exoletus (Linnaeus, 1758)	×										eggs	rain forest	terrestrial	small vertebrates
Chironius fuscus (Linnaeus, 1758)			×								eggs	rain forest, savanna, periantropic	terrestrial	small vertebrates

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Chironius multiventris cochranae Hoge & Romano, 1969		×									eggs	rain forest	terrestrial	small vertebrates
Chironius scurrulus (Wagler, 1824)			×					×			eggs	rain forest, open areas	terrestrial	amphibians and reptiles
Clelia clelia (Daudin, 1803)		×								×	eggs	rain forest	terrestrial	snakes
Dendrophidion dendrophis (Schlegel, 1837)	×	○	×				×				eggs	rain forest	terrestrial	small anurans
Dipsas catesbyi (Sentzen, 1796)		×					×				eggs	rain forest	arboreal	mollusks
Drymoluber dichrous (Peters, 1863)		×			○			×			eggs	rain forest	terrestrial	lizards
Erythrolamprus aesculapii (Linnaeus, 1766)			×				×	○			eggs	rain forest	terrestrial	snakes
Helicops angulatus (Linnaeus, 1758)	×	×						×			viviparous	creeks, pools, aquatic generalist	aquatic	fishes, amphibians
Imantodes cenchoa (Linnaeus, 1758)	×	×									eggs	rain forest	arboreal	lizards, treefrogs
Leptodeira annulata (Linnaeus, 1758)				×			×				eggs	rain forest, savanna, open areas, periantropic	arboreal	anurans and eggs of anurans

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Leptophis ahaetulla (Linnaeus, 1758)		P									eggs	rain forest, savanna, open areas, periantropic	arboreal	small vertebrates
Liophis reginae (Linnaeus, 1758)			×		×		×				eggs	rain forest, periantropic near water	terrestrial	anurans
Liophis typhlus (Linnaeus, 1758)		×			P			×			eggs	rain forest	terrestrial	anurans
Mastigodryas boddaerti (Sentzen, 1796)		×				×		×			eggs	generalist	terrestrial	small vertebrates
Oxyrhopus petola (Linnaeus, 1758)								×			eggs	rain forest and secondary forest, savanna	terrestrial	small mammals
Pseudoboa coronata Schneider, 1801	×			×							eggs	rain forest and secondary forest, periantropic	terrestrial	small mammals reptiles, birds
Pseudoboa neuwiedii (Duméril, Bibron & Duméril, 1854)				×							eggs	savanna	terrestrial	reptiles, small mammals
Pseustes poecilonotus Günther, 1858				×							eggs	rain forest and secondary forest, periantropic	terrestrial	mammals, birds, lizards

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Pseustes sulphureus (Wagler, 1824)			×	×	×						eggs	rain forest and secondary forest, periantropic	terrestrial	mammmals, birds, lizards
Rhinobothryum lentiginosum (Scopoli, 1785)				×							eggs	rain forest	terrestrial	birds, mammals
Siphlophis compressus (Daudin, 1803)				×							eggs	rain forest	arboreal	anurans, lizards, mammals
Tantilla melanocephala (Linnaeus, 1758)	×				×						eggs	rain forest	fossorial	scolopenders
Taeniophallus brevirostris (Peters, 1863)	×		×								eggs	rain forest and secondary forest, periantropic	terrestrial	small lizards
+ *Taeniophallus nicagus* (Cope, 1863)			×						×		eggs	rain forest	terrestrial	small frogs
+ *Thalesius viridis* (Werner, 1924)			×						×		eggs	rainforest near creeks	terrestrial	anurans
Xenopholis scalaris (Wucherer, 1861)							×				eggs	rain forest and secondary forest	terrestrial	anurans and tadpoles

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Xenoxybelis argenteus (Daudin, 1803)					×						eggs	rain forest and secondary forest	arboreal	lizards, anurans, birds
Elapidae														
+Micrurus averyi Schmidt, 1939			×						×		eggs	rain forest	terrestrial	?
Micrurus hemprichii (Jan, 1858)				×							eggs	rain forest	terrestrial	Onychophora
Micrurus lemniscatus (Linnaeus, 1758)	×						×				eggs	savanna, rain forest	terrestrial	fishes, aquatic snakes
Micrurus paraensis Cunha & Nascimento, 1973		O			×				×		eggs	rain forest	terrestrial	small snakes
Micrurus surinamensis (Cuvier, 1817)	×										eggs	in open areas, rain forest	aquatic	fishes
Viperidae														
Bothriopsis taeniata (Wagler, 1824)		×									viviparous	rain forest	arboreal	small vertebrates
Bothrops atrox (Linnaeus, 1758)		×	×					×			viviparous	rain forest and secondary forest	terrestrial	small vertebrates

(Continued)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Lachesis muta (Linnaeus, 1766)							x	x			eggs	rain forest	terrestrial	small vertebrates
CHELONIA[1]														
Testudinidae														
Chelonoidis carbonaria (Spix, 1824)	x	P			x					x	eggs	savannas and rain forest	terrestrial	herbivorous, coprophagous
Chelonoidis denticulata (Linnaeus, 1766)			x	P	x		x	P		x	eggs on forest floor	forest, sometimes in savanna	terrestrial	omnivorous
Chelidae														
Mesoclemmys gibba (Schweigger, 1812)							x				eggs	creeks in rain forest	aquatic	fishes, tadpoles, aquatic invertebrates, vegetable matter
Platemys platycephala (Schneider, 1792)		x									eggs	creeks and pools in rain forest	aquatic	fishes, tadpoles, aquatic invertebrates

[1] While this article was in the proof stage, we received some pictures from Luciano F.A. Montag from which it is clear that *Podocnemis unifilis* and *Chelonoidis denticulata* also were observed (P) in FLOTA Faro. We have not included these species in Appendix 1 or in any of the tables, graphs or computations. The number of species of reptiles observed in FLOTA Faro consequently increases with two and the total number of species of reptiles collected/observed during the Calha Norte expeditions increases with one. The total number of species of reptiles known for northern Pará does not change because both species had been reported from other localities in the area already.

(Conclusion)

Species name	FLOTA Faro	FLOTA Trombetas	Grão-Pará North	Grão-Pará Centre	Grão-Pará South	Grão-Pará (Estanífera)	REBIO Maicuru	FLOTA Paru	Endemic of Guiana Shield	CITES	Reproductive mode	Habitat	Microhabitat	Diet
Podocnemididae														
Podocnemis erythrocephala (Spix, 1824)	O								Guiana+ Imeri	×	eggs in sandbanks	rivers	aquatic	herbivorous
CROCODYLIA														
Alligatoridae														
Caiman crocodilus (Linnaeus, 1758)	×						O			×	eggs in nest vegetable matter	rivers, creeks, flooded areas, swamps, open areas, savanna, rain forest	aquatic	vertebrates and invertebrates
Paleosuchus trigonatus (Schneider, 1801)		P	×	×						×	eggs in nest vegetable matter base termitenests near creeks	creeks in rain forest	aquatic	vertebrates and invertebrates

A = Audio record; P = Photographic record; O = Visual observation.
FLOTA = Floresta Estadual (State forest)
REBIO = Reserva Biológica (Biological Reserve)

APPENDIX 2. Specimens collected during the expeditions to CNP and deposited in the herpetological collection of MPEG (CN = field numbers). ESEC = Estação Ecológica (Ecological Station).

AMPHIBIA. Anura. **Allophrynidae.** *Allophryne ruthveni* - ESEC Grão-Pará South: CN850. REBIO Maicuru: CN1381, CN1603, CN1604, CN1630, CN1658, CN1671. **Bufonidae.** *Atelopus hoogmoedi* - ESEC Grão-Pará Centre: CN2088, CN2097-2102, CN2130-2132, CN2153-2166, CN2237-2239, CN2277, CN2297, CN2299, 2370. *Bufo guttatus* - FLOTA Faro: CN55, CN115, CN207, CN234, CN299, CN312. FLOTA Trombetas: CN 410. ESEC Grão-Pará South: CN831. REBIO Maicuru: CN1397, CN1412, CN1429, CN1440, CN1470-1475, CN1592, CN1617, CN1620, CN1636, CN1637, CN1693. FLOTA Paru: CN1842, CN1854, CN1931, CN1939, CN1998-2000, CN2045, CN2046. ESEC Grão-Pará Centre: CN2188, CN2262, CN2365. *Bufo* sp. n.- FLOTA Faro: CN23, CN24, CN26, CN32, CN33, CN38, CN40, CN41, CN44, CN46, CN48, CN50, CN51, CN56, CN58, CN61, CN67, CN70, CN71-75, CN77, CN93, CN99, CN104, CN119, CN125, CN133, CN134, CN136, CN138, CN144-146, CN156, CN169, CN182, CN184, CN187, CN196, CN199, CN226-229, CN236, CN301, CN304. ESEC Grão-Pará North: CN982, CN984, CN995-997, CN1015, CN1016, CN1019, CN1024, CN1035, CN1044, CN1074, CN1081, CN1087, CN1097-1099, CN1115, CN1118, CN1125-1127, CN1141-1143, CN1154, CN1163, CN1167, CN1173-1175, CN1180, CN1181, CN1186, CN1188, CN1191, CN1192, CN1197, CN1210, CN1211-1214, CN1217, CN1219, CN1220, CN1231, CN1257, CN1264, CN1267, CN1270, CN1271, CN1273, CN1276, CN1278, CN1289, CN1290, CN1293, CN1297, CN1303-1305, CN1310, CN1316, CN1320, CN1321, CN1323, CN1324, CN1342, CN1343, CN1353, CN1357. *Bufo margaritifer* - FLOTA Trombetas: CN333, CN339, CN359, CN360, CN418-421, CN426, CN433, CN434, CN474, CN475, CN490-492, CN496, CN515-521, CN539, CN541, CN542, CN559, CN594. ESEC Grão-Pará South: CN617, CN636, CN637, CN640-642, CN645, CN649, CN672, CN690, CN700, CN703-708, CN722, CN729, CN733, CN736, CN737, CN742, CN743, CN765, CN766, CN770, CN781, CN784, CN789, CN794, CN800, CN807, CN809, CN828, CN829, CN849, CN868, CN869, CN870, CN871, CN880, CN882-884, CN899, CN906, CN909, CN921, CN922, CN939, CN942-944, CN965, CN967, CN968; tadpoles CN769, CN838. REBIO Maicuru: CN1396, CN1444, CN1494. FLOTA Paru: CN1703, CN1709, CN1717, CN1724-1735, CN1742, CN1760, CN1796, CN1797, CN1843, CN1876, CN1885, CN1892, CN1893, CN1897, CN1910, CN1933, CN2041, CN2043. ESEC Grão-Pará Centre: CN2055, CN2058, CN2060, CN2061, CN2120-2123, CN2126, CN2142, CN2169, CN2171, CN2182, CN2198, CN2200, CN2201, CN2224, CN2240-2243, CN2248, CN2280, CN2281, CN2301, CN2302, CN2311. *Bufo marinus* - FLOTA Faro: CN47, CN53, CN68, CN92, CN94, CN102, CN103, CN116, CN175, CN246, CN285, CN289, CN290, CN314. FLOTA Trombetas: CN570. ESEC Grão-Pará South: CN620, CN643. REBIO Maicuru: CN1477, CN1607, CN1680. FLOTA Paru: CN1696, CN1700-1702, CN1708, CN1716, CN1720, CN1736, CN1758, CN1761, CN1763, CN1766, CN1779, CN1803, CN1818, CN1827, CN1867, CN1895, CN1937, CN1944, CN1973, CN2030, CN2044. ESEC Grão-Pará Centre: CN2141. *Dendrophryniscus bokermanni* - FLOTA Faro: CN8, CN10, CN20, CN21, CN28, CN29, CN37, CN45, CN65, CN66, CN95, CN98, CN141, CN202, CN203, CN308. *Dendrophryniscus minutus* - FLOTA Faro: CN9, CN11-19, CN43, CN63, CN91, CN96, CN97, CN100, CN105, CN106, CN140, CN186, CN200, CN201. ESEC Grão-Pará North: CN1033, CN1093, CN1112, CN1279, CN1243, CN1279, CN1335, CN1370. REBIO Maicuru: CN1501, CN1529. **Centrelenidae.** *Cochranella* sp.- ESEC Grão-Pará Centre: CN2363. *Hyalinobatrachium iaspidiense*

- ESEC Grão-Pará Centre: CN2362. Girinos indeterminados - ESEC Grão-Pará South: CN684A, CN725A. ESEC Grão-Pará North: CN1137. ESEC Grão-Pará Centre: CN2372. **Dendrobatidae.** *Allobates femoralis* - FLOTA Trombetas: CN367, CN395, CN480. ESEC Grão-Pará South: CN715. ESEC Grão-Pará North: CN1187, CN1319. REBIO Maicuru: CN1531. *Allobates spumaponens* - ESEC Grão-Pará South: CN628, CN776, CN867, CN935, CN949, CN952. ESEC Grão-Pará North: CN1114, CN1198, CN1237, CN1360, CN1372. REBIO Maicuru: CN1437, CN1560, CN1568, CN1569, CN1624, CN1648. FLOTA Paru: CN1846, 1941. ESEC Grão-Pará Centre: CN2192, CN2193, CN2232, CN2303. *Anomaloglossus baeobatrachus* - FLOTA Trombetas: CN364, CN378, CN449, CN476, CN549. ESEC Grão-Pará North: CN980, CN983, CN985, CN991, CN1004, CN1014, CN1020, CN1022, CN1052-1056, CN1059-1061, CN1066, CN1067-1071, CN1077, CN1078, CN1082-1084, CN1105, CN1106, CN1110, CN1144, CN1155, CN1164, CN1169, CN1195, CN1224, CN1225, CN1229, CN1233, CN1239, CN1244, CN1245, CN1281, CN1285, CN1286, CN1301, CN1312, CN1330, CN1331, CN1355, CN1356, CN1359, CN1371, CN1373. REBIO Maicuru: CN1497-1500, CN1515-1527, CN1530. FLOTA Paru: CN1948-1951, CN1955-1962. *Anomaloglossus stepheni* - FLOTA Faro: CN6, CN204, CN205, CN242, CN251, CN261, CN266, CN267, CN270, CN277, CN278, CN280, CN281, CN287, CN302. *Dendrobates tinctorius* - ESEC Grão-Pará North: CN974, CN975, CN978, CN981, CN986, CN987, CN990, CN1001-1003, CN1005-1010, CN1013, CN1018, CN1027-1029, CN1031, CN1032, CN1034, CN1038, CN1043, CN1046, CN1050, CN1057, CN1058, CN1063, CN1064, CN1085, CN1119-1123. *Epipedobates* cf. *guayanensis* - FLOTA Trombetas: CN350, CN376, CN390, CN394, CN412, CN425, CN511, CN527, CN533, CN571. *Epipedobates hahneli* - FLOTA Trombetas: CN495. REBIO Maicuru: CN1575. *Epipedobates trivittatus* -FLOTA Trombetas: CN348, CN354, CN361, CN366, CN384, CN403, CN411, CN414, CN415, CN455, CN479, CN488, CN504, CN522, CN546, CN548, CN587, CN596. ESEC Grão-Pará South: CN624, CN795, CN833, CN848. ESEC Grão-Pará Centre: CN2137, CN2190, CN2191, CN2292, CN2359. **Hylidae.** *Hyla boans* - ESEC Grão-Pará North: CN1345. REBIO Maicuru: CN1590. FLOTA Paru: CN1995-1997. ESEC Grão-Pará Centre: CN2081, CN2350. *Hyla calcarata* - ESEC Grão-Pará South: CN685, CN750, CN891-893. REBIO Maicuru: CN1589. *Hyla cinerascens* - ESEC Grão-Pará South: CN684D, CN758 (all tadpoles). *Hyla dentei* - REBIO Maicuru: CN1492, CN1581. *Hyla fasciata* - ESEC Grão-Pará South: CN888, CN889, CN894, CN895. REBIO Maicuru: CN1478, CN1479, CN1582-1588. FLOTA Paru: CN1954. *Hyla gaucheri* - ESEC Grão-Pará South: CN818, CN824-827, CN836, CN864-866. *Hyla geographica* - ESEC Grão-Pará South: CN727. REBIO Maicuru: CN1550. ESEC Grão-Pará Centre: CN2094, CN2135, CN2167, CN2199, CN2208, CN2310. *Hyla leucophyllata* - ESEC Grão-Pará South: CN821, CN855. REBIO Maicuru: CN1668. *Hyla minuscula* - ESEC Grão-Pará Centre: CN2194. *Hyla minuta* - FLOTA Trombetas: CN 564-568. ESEC Grão-Pará Centre: CN2329-2339. *Hyla multifasciata* - ESEC Grão-Pará South: CN887. FLOTA Paru: CN2001. ESEC Grão-Pará Centre: CN2180, CN2316-2327. *Hyla* cf. *nana* - ESEC Grão-Pará South: CN684B, CN725, CN734, CN740, CN756, CN788, CN876 (all tadpoles). *Hyla punctata* - FLOTA Paru: CN1991-1994. *Hyla wavrini* - FLOTA Faro: CN113. *Osteocephalus leprieuri* - FLOTA Faro: CN82, CN84, CN206, CN307. REBIO Maicuru: CN1502, CN1533, CN1681. FLOTA Paru: CN1832. ESEC Grão-Pará Centre: CN2150, CN2368. *Osteocephalus oophagus* - FLOTA Trombetas: CN430. ESEC Grão-Pará South: CN853, CN854. ESEC Grão-Pará North: CN1269, CN1340, CN1338. *Osteocephalus taurinus* - FLOTA Faro: CN81, CN112. FLOTA Trombetas: CN431, CN513. ESEC Grão-Pará South: CN873. ESEC Grão-Pará North: CN1130. ESEC Grão-Pará Centre: CN2053, CN2077-2080,

CN2107-2109, CN2170, CN2184, CN2260, CN2286, CN2289, CN2357. *Phyllomedusa bicolor* - REBIO Maicuru: CN1591. *Phyllomedusa hypochondrialis* - REBIO Maicuru: CN1552, CN1669. ESEC Grão-Pará Centre: CN2172, CN2173, CN2312-2315. *Phyllomedusa tomopterna* - ESEC Grão-Pará Centre: CN2134. *Phyllomedusa vaillanti* - ESEC Grão-Pará North: CN1151. *Scinax boesemani* - FLOTA Faro: CN85. ESEC Grão-Pará South: CN810-817, CN822, CN823, CN856-863. ESEC Grão-Pará Centre: 2328. *Scinax garbei* - REBIO Maicuru: CN1629, CN1633, CN1654, CN1656. *Scinax nebulosus* - ESEC Grão-Pará Centre: CN2340-2348, CN2351. *Scinax proboscideus* - ESEC Grão-Pará South: CN712. *Scinax ruber* - ESEC Grão-Pará South: CN820. *Scinax* sp. n. - REBIO Maicuru: CN1628, CN1655, CN1684, CN1685, CN1689. *Scinax* gr. *ruber* - FLOTA Paru: CN1762, CN1834, CN2022. **Leptodactylidae.** *Adenomera andreae* - FLOTA Faro: CN35, CN60, CN101, CN135, CN220, CN221, CN269, CN283, CN325. FLOTA Trombetas: CN345, CN347, CN349, CN363, CN368, CN393, CN400, CN409, CN417, CN446, CN447, CN450, CN451, CN454, CN507, CN508, CN552. ESEC Grão-Pará South: CN627. ESEC Grão-Pará North: CN1051, CN1103, CN1107, CN1165, CN1166, CN1179, CN1182, CN1203, CN1206, CN1208, CN1221, CN1235, CN1277, CN1298, CN1298, CN1308, CN1309, CN1329, CN1352, CN1354, CN1361, CN1367. REBIO Maicuru: CN1408, CN1413, CN1454, CN1463, CN1491, CN1566, CN1567, CN1609. FLOTA Paru: CN1699, CN1704-1707, CN1711, CN1712, CN1714, CN1715, CN1721, CN1722, CN1737-1741, CN1743, CN1755, CN1759, CN1764, CN1765, CN1772-1775, CN1792, CN1793, CN1800, CN1804, CN1807, CN1808, CN1812-1814, CN1816, CN1817, CN1840, CN1841, CN1847-1849, CN1853, CN1860, CN1863, CN1864, CN1872-1875, CN1882, CN1883, CN1888, CN1890, CN1894, CN1909, CN1922, CN1924, CN1946, CN1947, CN1967, CN1986, CN1987, CN2005, CN2006, CN2016-2018, CN2029, CN2033, CN2035, CN2038, CN2048. ESEC Grão-Pará Centre: CN2064, CN2066, CN2082, CN2087, CN2124, CN2129, CN2140, CN2144, CN2145, CN2203, CN2233, CN2250, CN2258, CN2270, CN2296. *Adenomera heyeri* - ESEC Grão-Pará North: CN1226, CN1236, CN1275. *Adenomera hylaedactyla* - ESEC Grão-Pará Centre: CN2074, CN2113, CN2183, CN2196, CN2197, CN2253, CN2254, CN2291, CN2305, CN2306. *Ceratophrys cornuta* - ESEC Grão-Pará South: CN799, CN805. *Eleutherodactylus chiastonotus* - FLOTA Trombetas: CN391. REBIO Maicuru: CN1378, CN1379, CN1461, CN1556, CN1573, CN1635, CN1662, CN1670. *Eleutherodactylus fenestratus* - ESEC Grão-Pará North: CN988, CN989, CN1116, CN1117, CN1222, CN1234, CN1249, CN1299, CN1300, CN1315, CN1364. REBIO Maicuru: CN1663. *Eleutherodactylus inguinalis* - ESEC Grão-Pará North: CN1339, CN1346. REBIO Maicuru: CN1683. *Eleutherodactylus marmoratus* - ESEC Grão-Pará North: CN1075, CN1076, CN1079, CN1080, CN1089, CN1090, CN1111, CN1204, CN1265, CN1280, CN1283. *Eleutherodactylus zeuctotylus* - FLOTA Faro: CN25. FLOTA Trombetas: CN404, CN528, CN582. ESEC Grão-Pará South: CN621, CN670, CN693, CN714, CN768, CN783, CN928, CN931, CN954. ESEC Grão-Pará North: CN992, CN1000, CN1073, CN1134, CN1136, CN1242, CN1266, CN1291, CN1347, CN1350. ESEC Grão-Pará Centre: CN2103-2106, CN2234-2236, CN2371. *Leptodactylus bolivianus* - FLOTA Trombetas: CN543. ESEC Grão-Pará South: CN771, CN819, CN872. REBIO Maicuru: CN1375-1377, CN1402, CN1476, CN1480, CN1481, CN1514, CN1551, CN1554, CN1555, CN1565, CN1593-1595, CN1608, CN1627, CN1647, CN1666, CN1667, CN1682, CN1691. FLOTA Paru: CN2002-2004, 2023. *Leptodactylus knudseni* - FLOTA Faro: CN216. FLOTA Trombetas: CN392, CN401, CN428, CN432, CN472, CN509, CN532, CN540, CN561, CN569, CN595. ESEC Grão-Pará South: CN623, CN648, CN652, CN653, CN665, CN666, CN678, CN689, CN744, CN749, CN755, CN761, CN773, CN797, CN798, CN801, CN830, CN832,

CN834, CN837, CN890, CN915, CN917, CN940. ESEC Grão-Pará North: CN1223. REBIO Maicuru: CN1659, 1661. FLOTA Paru: CN1710. ESEC Grão-Pará Centre: CN2168, CN2195, CN2285, CN2353-2356. *Leptodactylus leptodactyloides* - ESEC Grão-Pará North: CN1199. *Leptodactylus longirostris* - ESEC Grão-Pará Centre: CN2072, CN2075, CN2110, CN2151, CN2174-2177, CN2209-CN2217, CN2221, CN2244, CN2251, CN2265, CN2283, CN2288, CN2290, CN2304, CN2352. *Leptodactylus myersi* - FLOTA Trombetas: CN458-471, CN514, CN536-538, CN580, CN581, CN584, CN598. ESEC Grão-Pará Centre: CN2146, CN2179, CN2245, CN2246, CN2284, CN2307, CN2369, CN2375. *Leptodactylus mystaceus* - FLOTA Faro: CN69, CN89. FLOTA Trombetas: CN437, CN529. ESEC Grão-Pará South: CN625, CN633, CN644, CN650, CN654, CN674, CN677, CN683, CN691, CN696, CN701, CN702, CN718, CN730, CN732, CN759, CN760, CN802, CN806, CN835, CN881, CN897, CN907, CN910-914, CN916, CN934, CN941, CN964. FLOTA Paru: CN1698, CN1754, CN1771, CN1795, CN1831, CN1839, CN1879, CN1880, CN1886, CN1899, CN1938, CN1940, CN1943, CN2037, CN2042. ESEC Grão-Pará Centre: CN2063. *Leptodactylus pentadactylus* - FLOTA Faro: CN57, CN59, CN114, CN120, CN137, CN139, CN143, CN163, CN194, CN235, CN326. FLOTA Trombetas: CN377, CN435, CN436, CN573. ESEC Grão-Pará South: CN920. ESEC Grão-Pará North: CN1128, CN1146-1150, CN1334, CN1337, CN1344. ESEC Grão-Pará Centre: CN2090-2093, CN2148, CN2228, CN2264, CN2364, CN2366, CN2367. *Leptodactylus petersii* - FLOTA Faro: CN90, CN118, CN208, CN211, CN215. FLOTA Trombetas: CN578. ESEC Grão-Pará South: CN762, CN886, CN896. REBIO Maicuru: CN1425, CN1596-1600, CN1632, CN1638, CN1664, CN1665, CN1688. FLOTA Paru: CN1794, CN1798, CN1799, CN1801, CN1802, CN1805, CN1850-1852, CN1896, CN1898, CN1901, CN1925, CN1926, CN1942, CN1945.

Leptodactylus rhodomystax Boulenger, 1884 - FLOTA Faro: CN188, CN217. ESEC Grão-Pará South: CN631, CN632, CN646, CN647, CN681, CN686-688, CN694, CN695, CN697, CN745-748, CN777, CN787, CN803, CN847, CN852, CN903, CN904, CN908, CN923, CN924, CN926, CN956-963. ESEC Grão-Pará Centre: CN2111. *Leptodactylus stenodema* - FLOTA Trombetas: CN402, CN501. *Lithodytes lineatus* - FLOTA Faro: CN311. FLOTA Trombetas: CN337, CN453, CN499, CN586. ESEC Grão-Pará South: CN763. ESEC Grão-Pará North: CN994, CN1096. REBIO Maicuru: CN1447. FLOTA Paru: CN1697, CN1719, CN1780, CN1810, CN1868, CN1908. ESEC Grão-Pará Centre: CN2068, CN2114-2119, CN2127, CN2139, CN2143, CN2252, CN2255, CN2261, CN2267, CN2274-2276, CN2293, CN2298, CN2373, CN2374. *Physalaemus ephippifer* - FLOTA Trombetas: CN338, CN429, CN484, CN503, CN562, CN597. ESEC Grão-Pará, Estanífera: CN602-610. ESEC Grão-Pará South: CN634, CN692, CN699, CN709, CN710, CN716, CN764, CN779, CN782, CN846, CN929, CN936, CN938, CN953. REBIO Maicuru: CN1384, CN1618. ESEC Grão-Pará Centre: CN2086, CN2186, CN2223, CN2259, CN2266, CN2294. **Microhylidae.** *Chiasmocleis hudsoni* - FLOTA Faro: CN42, CN80, CN210, CN212-214, CN268. ESEC Grão-Pará South: CN711. *Chiasmocleis* sp. n.- REBIO Maicuru: CN1411, CN1446, CN1484, CN1487, CN1537, CN1641, CN1642, CN1645, CN1657. FLOTA Paru: CN1767-1769, CN1869-1871, CN1881, CN1887. ESEC Grão-Pará Centre: CN2112, 2185. *Hamptophryne boliviana* - ESEC Grão-Pará South: CN796. FLOTA Paru: CN1778, CN1784-1786, CN1844, CN1845, CN2019, CN2036. *Otophryne pyburni* - ESEC Grão-Pará North: CN1358 (adult); CN1049, CN1258-1262 (tadpoles). *Synapturanus mirandaribeiroi* - FLOTA Faro: CN64, CN87, CN230, CN279. FLOTA Trombetas: CN370, CN373, CN386, CN416, CN523, CN590. ESEC Grão-Pará North: CN1025, CN1311. **Pipidae.** *Pipa snethlageae* - FLOTA Faro: CN319. *Pipa pipa* - REBIO Maicuru: CN1631,

CN1686, CN1687. FLOTA Paru: CN1855. **Ranidae.** *Rana palmipes* - ESEC Grão-Pará, Estanífera: CN600, CN601. Gymnophiona. **Caeciliidae.** *Caecilia tentaculata* - FLOTA Trombetas: CN355, CN372, CN375, CN381, CN485, CN500, CN574. ESEC Grão-Pará Centre: CN2138. *Microcaecilia unicolor* - FLOTA Trombetas: CN502. **Rhinatrematidae.** *Rhinatrema* sp. n.- ESEC Grão-Pará North: CN1088.

REPTILIA. Squamata. Lizards. **Gekkonidae.** *Coleodactylus amazonicus* - FLOTA Faro: CN3, CN36, CN164, CN171, CN190. FLOTA Trombetas: CN331, CN342, CN352, CN371, CN383, CN422, CN438-443, CN456, CN530, CN531, CN551, CN577, CN588, CN589. ESEC Grão-Pará South: CN629, CN630, CN660-663, CN668, CN669, CN671, CN680, CN717 CN721, CN843, CN844, CN925, CN927, CN969. ESEC Grão-Pará North: CN979, CN999, CN1037, CN1140, CN1047, CN1048, CN1172, CN1178, CN1183, CN1185, CN1194, CN1196, CN1202, CN1209, CN1246, CN1313, CN1341, CN1363. REBIO Maicuru: CN1577. FLOTA Paru: CN1915-1917, CN1923. ESEC Grão-Pará Centre: CN2069, CN2085, CN2128, CN2202, CN2205-2207, CN2249, CN2256, CN2279, CN2358. *Gonatodes annularis* - FLOTA Faro: CN129, CN254, CN298, CN327. FLOTA Trombetas: CN413, CN427. ESEC Grão-Pará North: CN998, CN1157. *Gonatodes humeralis* - FLOTA Faro: CN31, CN78, CN130, CN160, CN165, CN318. FLOTA Trombetas: CN335, CN341, CN346, CN380, CN398, CN448, CN481, CN489, CN550, CN585. ESEC Grão-Pará South: CN720, CN738, CN753, CN754, CN808. ESEC Grão-Pará North: CN1072, CN1135, CN1156, CN1184, CN1189, CN1207, CN1247, CN1327, CN1328. REBIO Maicuru: CN1423, CN1464, CN1483, CN1545, CN1546, CN1653. FLOTA Paru: CN1829, CN1833, CN1891, CN1914, CN1975. *Lepidoblepharis heyerorum* - FLOTA Faro: CN248. FLOTA Trombetas: CN351, CN387. REBIO Maicuru: CN1677. *Pseudogonatodes guianensis* - FLOTA Faro: CN5. ESEC Grão-Pará North: CN1036, 1045, 1171, CN1302. REBIO Maicuru: CN1536, CN1610, CN1639, CN1676. *Thecadactylus rapicauda* - ESEC Grão-Pará South: CN719. ESEC Grão-Pará North: CN1248. **Gymnophthalmidae.** *Alopoglossus angulatus* - REBIO Maicuru: CN1563. FLOTA Paru: CN1865, CN1911. *Amapasaurus tetradactylus* - FLOTA Trombetas: CN332, CN356, CN362, CN369, CN388, CN408, CN424, CN445. ESEC Grão-Pará North: CN1228. *Arthrosaura kockii* - ESEC Grão-Pará North: CN1108. REBIO Maicuru: CN1383, CN1486, CN1496. *Arthrosaura reticulata* - FLOTA Faro: CN30, CN49, CN54, CN62, CN76, CN111, CN117, CN122, CN123, CN158, CN159, CN161, CN166, CN191, CN192, CN198, CN218, CN222, CN225, CN232, CN238-241, CN257, CN259, CN260, CN262, CN271-274, CN288, CN294, CN300, CN303, CN309, CN313, CN315, CN316. REBIO Maicuru: CN1395, CN1490, CN1535, CN1673. FLOTA Paru: CN1861, CN1912. *Bachia flavescens* - FLOTA Faro: CN297. FLOTA Trombetas: CN358, CN524. ESEC Grão-Pará South: CN613, CN675, CN791, CN792, CN918, CN919. ESEC Grão-Pará North: CN1102. REBIO Maicuru: CN1418, CN1451, CN1482, CN1694. FLOTA Paru: CN1718, CN1877, CN1983. ESEC Grão-Pará Centre: CN2056, CN2057, CN2125, CN2136, CN2189, CN2226, CN2271. *Bachia panoplia* - FLOTA Faro: CN167. *Cercosaura argulus* - REBIO Maicuru: CN1504. FLOTA Paru: CN1811. *Cercosaura ocellata* - ESEC Grão-Pará North: CN1318. FLOTA Paru: CN1862, CN1889, CN2028. ESEC Grão-Pará Centre: CN2071, CN2181. *Gymnophthalmus* cf. *underwoodi* - ESEC Grão-Pará Centre: CN2225. *Iphisa elegans* - ESEC Grão-Pará South: CN655, CN752, CN845, CN966. ESEC Grão-Pará North: CN1100, CN1101, CN1253, CN1254, CN1307. *Leposoma guianense* - FLOTA Faro: CN27, CN148, CN149, CN150, CN157, CN178, CN197, CN223, CN253, CN256, CN291. FLOTA Trombetas: CN344, CN407, CN423, CN444, CN452, CN493, CN592, CN599. ESEC Grão-Pará South: CN656-659, CN667, CN673, CN679, CN698, CN713, CN728,

CN731, CN741, CN772, CN778, CN780, CN786, CN851, CN900, CN905, CN930, CN955. ESEC Grão-Pará North: CN1095, CN1139, CN1159, CN1218, CN1263, CN1272, CN1296. REBIO Maicuru: CN1385, CN1386, CN1388-1391, CN1398-1401, CN1403, CN1404-1407, CN1414, CN1415, CN1420-1422, CN1428, CN1430, CN1432, CN1438, CN1439, CN1445, CN1453, CN1455, CN1457, CN1459, CN1462, CN1488, CN1489, CN1495, CN1506, CN1528, CN1542-1544, CN1547, CN1571, CN1606, CN1611, CN1612, CN1614, CN1625, CN1643, CN1644, CN1646, CN1649, CN1674, CN1675, CN1692. FLOTA Paru: CN1713, CN1981, CN2026. ESEC Grão-Pará Centre: CN2059, CN2065, CN2089, CN2227, CN2229, CN2230, CN2257, CN2268, CN2269. *Leposoma percarinatum* - FLOTA Faro: CN153, CN155, CN172-174, CN180, CN193, CN233, CN244, CN258, CN296. ESEC Grão-Pará North: CN1161, CN1252, CN1325. FLOTA Paru: CN1749, CN1770, CN1790, CN1866, CN1980, CN1985, CN1988, CN2032, CN2047. ESEC Grão-Pará Centre: CN2067, CN2084, CN2149, CN2278. *Leposoma* sp. n. - FLOTA Faro: CN147, CN151, CN152, CN154, CN179, CN209, CN249. *Neusticurus bicarinatus* - ESEC Grão-Pará North: CN1017, CN1109, CN1124, CN1238, CN1332, CN1333, CN1348, CN1369. ESEC Grão-Pará Centre: CN2231, CN2309. *Neusticurus rudis* - ESEC Grão-Pará North: CN1168, CN1284, CN1374. *Ptychoglossus brevifrontalis* - FLOTA Faro: CN124, CN224, CN263, CN245. ESEC Grão-Pará North: CN1092, CN1162. *Tretioscincus agilis* - FLOTA Faro: CN264, CN265, CN292. FLOTA Trombetas: CN389. ESEC Grão-Pará South: CN638, CN651, CN775. ESEC Grão-Pará North: CN1232. REBIO Maicuru: CN1433, CN1512, CN1538, CN1562, CN1579, CN1652, CN1672. **Polychrotidae.** *Anolis auratus* - ESEC Grão-Pará Centre: CN2073. *Anolis fuscoauratus* - FLOTA Faro: CN22, CN34, CN39, CN88, CN250, CN255, CN286. FLOTA Trombetas: CN525, CN558, CN576. ESEC Grão-Pará South: CN682, CN751, CN774, CN785, CN842, CN932. ESEC Grão-Pará North: CN1021, CN1042, CN1133. REBIO Maicuru: CN1424, CN1616, CN1660. FLOTA Paru: CN1835, CN2021. *Anolis chrysolepis* - FLOTA Faro: CN1, CN2, CN4, CN107-110, CN126-128, CN131, CN132, CN142, CN162, CN176, CN177, CN181, CN183, CN185, CN195, CN231, CN237, CN293, CN295, CN310, CN317, CN323, CN324. FLOTA Trombetas: CN406, CN494, CN547, CN591. ESEC Grão-Pará North: CN1011, CN1094, CN1104, CN1113, CN1152, CN1205, CN1230, CN1241, CN1256, CN1274, CN1282, CN1306, CN1322, CN1351, CN1362. REBIO Maicuru: CN1419, CN1431, CN1442, CN1448, CN1449, CN1468, CN1503, CN1541, CN1574, CN1576, CN1605, CN1621, CN1622. *Anolis punctatus* - ESEC Grão-Pará South: CN618. **Tropiduridae.** *Plica plica* - ESEC Grão-Pará North: CN1132. *Plica umbra* - FLOTA Faro: CN83. FLOTA Trombetas: CN374, CN382, CN497, CN498, CN505, CN544, CN545, CN560, CN572. ESEC Grão-Pará South: CN879. ESEC Grão-Pará North: CN972, CN976, CN1026, CN1030, CN1039-1041, CN1091, CN1131, CN1153, CN1193, CN1200, CN1326, CN1336, CN1349. REBIO Maicuru: CN1534, CN1619. FLOTA Paru: CN1748, CN1934. *Uranoscodon superciliosus* - FLOTA Faro: CN52. FLOTA Trombetas: CN477, CN478. ESEC Grão-Pará North: CN1190, CN1288. REBIO Maicuru: CN1601. FLOTA Paru: CN1900, CN1927. ESEC Grão-Pará Centre: CN2300. **Scincidae.** *Mabuya nigropunctata* - FLOTA Trombetas: CN473, CN526. ESEC Grão-Pará North: CN1065, CN1215, CN1216. REBIO Maicuru: CN1505. FLOTA Paru: CN1789, CN1806, CN1971, CN2007, CN2027. **Teiidae.** *Ameiva ameiva* - FLOTA Faro: CN189. ESEC Grão-Pará South: CN790. REBIO Maicuru: CN1465, CN1561, CN1651, CN1695. FLOTA Paru: CN1753, CN1776, CN1783, CN1935, CN1979, CN1982, CN2049. ESEC Grão-Pará Centre: CN2083, CN2360. *Kentropyx calcarata* - FLOTA Faro: CN219, CN247. FLOTA Trombetas: CN334, CN336, CN396, CN397, CN405, CN482, CN483, CN553. REBIO Maicuru: CN1380, CN1387, CN1392-1394, CN1409,

CN1410, CN1416, CN1417, CN1426, CN1427, CN1434-1436, CN1441, CN1456, CN1458, CN1466, CN1485, CN1507-1510, CN1513, CN1539, CN1558, CN1559, CN1564, CN1570, CN1572, CN1613, CN1615, CN1623, CN1640, CN1650, CN1678. FLOTA Paru: CN1723, CN1744-1747, CN1750-1752, CN1757, CN1781, CN1782, CN1787, CN1788, CN1791, CN1815, CN1819-1826, CN1828, CN1836-1838, CN1856, CN1857, CN1884, CN1904-1907, CN1913, CN1918-1921, CN1928, CN1929, CN1965, CN1966, CN1968-1970, CN1972, CN1974, CN1976, CN1977, CN1984, CN1989, CN1990, CN2010-2015, CN2031, CN2034, CN2039, CN2040; CN2009 (eggs). ESEC Grão-Pará Centre: CN2062. *Kentropyx striata* - ESEC Grão-Pará Centre: CN2147. Amphisbaenians. **Amphisbaenidae.** *Amphisbaena fuliginosa* - ESEC Grão-Pará South: CN612. *Amphisbaena vanzolinii* - ESEC Grão-Pará South: CN614-616, CN625, CN639, CN676, CN724, CN739, CN840, CN841, CN885, CN898, CN901, CN945-948, CN950, CN951. *Mesobaena* sp. n. - FLOTA Faro: CN7. Snakes. **Leptotyphlopidae.** *Leptotyphlops albifrons* - ESEC Grão-Pará North: CN1201. FLOTA Paru: CN1903. ESEC Grão-Pará Centre: CN2070, CN2219, CN2220. *Leptotyphlops cupinensis* - ESEC Grão-Pará South: CN767, CN902A. Typhlopidae. *Typhlops brongersmianus* - FLOTA Faro: CN282. **Boidae.** *Corallus caninus* - ESEC Grão-Pará North: CN973. *Corallus hortulanus* - FLOTA Faro: CN86, CN321. REBIO Maicuru: CN1634. *Eunectes murinus* - ESEC Grão-Pará Centre: CN2051. **Colubridae.** *Apostolepis nigrolineatus* - ESEC Grão-Pará North: CN1317. ESEC Grão-Pará Centre: CN2272. *Apostolepis quinquelineatus* - ESEC Grão-Pará South: CN902. ESEC Grão-Pará North: CN1158, CN1294. *Atractus badius* - ESEC Grão-Pará South: CN804. *Atractus torquatus* - ESEC Grão-Pará North: CN1251 CN1365, CN1368. *Chironius exoletus* - FLOTA Faro: CN320. *Chironius fuscus* - ESEC Grão-Pará North: CN1145. *Chironius multiventris cochranae* - FLOTA Trombetas: CN556. *Chironius scurrulus* - ESEC Grão-Pará North: CN970. FLOTA Paru: CN1930. *Clelia clelia* - FLOTA Trombetas: CN510. *Dendrophidion dendrophis* - FLOTA Faro: CN121. ESEC Grão-Pará North: CN1012, CN1023, CN1314. REBIO Maicuru: CN1532. *Dipsas catesbyi* (Sentzen, 1796) - FLOTA Trombetas: CN535. REBIO Maicuru: CN1511. *Drymoluber dichrous* - FLOTA Trombetas: CN365. FLOTA Paru: CN2025. *Erytrholamprus aesculapii* - ESEC Grão-Pará North: CN1227, CN1295. REBIO Maicuru: CN1460. *Helicops angulatus* - FLOTA Faro: CN79. FLOTA Trombetas: CN487. FLOTA Paru: CN1858, CN1859. *Imantodes cenchoa* - FLOTA Faro: CN170. FLOTA Trombetas: CN330, CN486. *Leptodeira annulata* - REBIO Maicuru: CN1382. ESEC Grão-Pará Centre: CN2361. *Liophis reginae* - ESEC Grão-Pará South: CN723, CN937. ESEC Grão-Pará North: CN993, CN1176, CN1177, CN1255, CN1366. REBIO Maicuru: CN1443, CN1493, CN1578. *Liophis typhlus* - FLOTA Trombetas: CN343, CN353, CN357, CN506, CN557, CN575, CN597. FLOTA Paru: CN1756. *Mastigodryas boddaerti* - FLOTA Trombetas: CN593. FLOTA Paru: CN1936. ESEC Grão-Pará, Estanífera: CN2052. *Oxyrhopus petola* - FLOTA Paru: CN2008. *Pseudoboa coronata* - FLOTA Faro: CN243. ESEC Grão-Pará Centre: CN2187. *Pseudoboa neuwiedi* - ESEC Grão-Pará Centre: CN2218. *Pseustes poecilonotus* - ESEC Grão-Pará Centre: CN2133. *Pseustes sulphureus* - ESEC Grão-Pará South: CN878. ESEC Grão-Pará North: CN1170. REBIO Maicuru: CN1548. ESEC Grão-Pará Centre: CN2076, CN2282. *Rhinobothryum lentiginosum* - ESEC Grão-Pará Centre: CN2095. *Siphlophis compressus* -ESEC Grão-Pará Centre: CN2096. *Taeniophallus brevirostris* - FLOTA Faro: CN305. ESEC Grão-Pará North: CN977, CN1062. *Taeniophallus nicagus* - ESEC Grão-Pará North: CN1287. *Tantilla melanocephala* - FLOTA Faro: CN322. ESEC Grão-Pará South: CN933. *Thalesius viridis* - ESEC Grão-Pará North: CN1292. *Xenopholis scalaris* - REBIO Maicuru: CN1602. *Xenoxybelis argenteus* - ESEC Grão-Pará South: CN619, 635. **Elapidae.** *Micrurus averyi* - ESEC Grão-Pará North: CN1086, CN1129. *Micrurus hemprichii* - ESEC Grão-Pará Centre: CN2287. *Micrurus lemniscatus* - FLOTA Faro:

CN284. REBIO Maicuru: CN1469. *Micrurus paraensis* - ESEC Grão-Pará South: CN793. *Micrurus surinamensis* - FLOTA Faro: CN168. **Viperidae.** *Bothriopsis taeniatus* - FLOTA Trombetas: CN379. *Bothrops atrox* - FLOTA Trombetas: CN329, CN385, CN399, CN457, CN583. ESEC Grão-Pará North: CN971, CN1138. FLOTA Paru: CN1777, CN1830, CN1878, CN1932, CN1978, CN2020. *Lachesis muta* - REBIO Maicuru: CN1549, CN1557. FLOTA Paru: CN1809. Chelonia. **Testudinidae.** *Chelonoidis carbonária* - FLOTA Faro: CN328. ESEC Grão-Pará South: CN622. *Chelonoidis denticulata* - ESEC Grão-Pará South: CN664. ESEC Grão-Pará North: CN1250. REBIO Maicuru: CN1580, CN1626. **Chelidae.** *Mesoclemmys gibba* - REBIO Maicuru: CN1452. *Platemys platycephalus* - FLOTA Trombetas: CN340, CN554, CN555. Crocodylia. **Alligatoridae.** *Caiman crocodilus* - FLOTA Faro: CN306. *Paleosuchus trigonatus* - ESEC Grão-Pará North: CN1268. ESEC Grão-Pará Centre: CN2263.

NOTE ADDED IN PROOF

Franco & Ferreira (2003) mention specimens of *Thamnodynastes strigatus* (Günther, 1858) from Tapiru, Rio Paru, Municipality Almeirim (MNRJ 8735), and one from Roraima (MNRJ 0668) in the National Museum in Rio de Janeiro. As the specimens reported are far away from the known distribution of *T. strigatus,* they most likely are *T. ramonriveroi* Manzanillo & Sanchez, 2005, a species described from Venezuela, and also reported from Trinidad, Guyana, Suriname and Roraima (Brazil) by Bailey & Thomas (2007). These latter authors state that *T. ramonriveroi* is closely related to *T. strigatus* and specifically include the specimen MNRJ 0668 from Roraima in *T. ramonriveroi*. However, they do not mention the specimen from Tapiru (MNRJ 8735, which is only a head and anterior portion of body), but we think this also belongs to *T. ramonriveroi*. Bailey *et al.* (2005) described *T. lanei* from, among other places, the municipalities of Monte Alegre and Óbidos. Thus *T. ramonriveroi* and *T. lanei* can be added to the herpetofauna of CNP. Taking these new data into account, the total number of snakes known from CNP, but not collected by us, rises from 29 (see p. 48) to 31, and consequently the total number of species of reptiles known from CNP rises from 138 (see p. 71) to 140.

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BOLETIM DO MUSEU PARAENSE EMÍLIO GOELDI. CIÊNCIAS NATURAIS

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1. Lagarto com 4 patas minúsculas.....2
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2. Dígitos geralmente sem unhas, dorsais lisas.....*Bachia flavescens*
   Dígitos com unhas, dorsais quilhadas.....*Bachia panoplia*
3. Mãos com apenas 4 dedos.....4
   Mãos com 5 dedos.....5
4. Escamas dorsais lisas.....*Gymnophthalmus underwoodii*
   Escamas dorsais quilhadas.....*Amapasaurus teradactylus*
5. Cabeça com grandes placas.....6
   Cabeça com escamas pequenas.....7
6. Placas posteriores da cabeça formam uma linha redonda.....*Alopoglossus angulatus*
   Placas posteriores da cabeça formam uma linha reta..... *Arthrosaura kockii*
7. Etc.
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As ilustrações e gráficos devem ser apresentados em páginas separadas e numeradas, com as respectivas legendas, e em arquivos à parte. Imagens digitalizadas devem ter resolução mínima de 300 dpi, em formato TIFF (preferencialmente) ou JPEG. Imagens em preto-e-branco devem ser escaneadas em tons de cinza. O Boletim publica apenas fotografias em preto-e-branco, mas fotografias coloridas podem ser publicadas desde que o autor se responsabilize pelos custos adicionais de impressão. O texto deve, obrigatoriamente, fazer referência a todas as tabelas, gráficos e ilustrações.

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Título – No idioma do texto e em inglês (quando este não for o idioma do texto). Deve ser escrito em caixa baixa, em negrito, centralizado, e deve ser citado da mesma maneira na página de rosto e na página dois.

Resumo e Abstract – Texto em um único parágrafo, ressaltando os objetivos, métodos e conclusões do trabalho, com, no máximo, duzentas palavras, no idioma do texto (Resumo) e em inglês (Abstract). A versão para o inglês é de responsabilidade do(s) autor(es).

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Introdução – Deve conter uma visão clara e concisa de conhecimentos atualizados sobre o tema do artigo, oferecendo citações pertinentes e declarando o objetivo do estudo.

Material e métodos – Exposição clara dos métodos e procedimentos de pesquisa e de análise de dados. Técnicas já publicadas devem ser apenas citadas e não descritas. Termos científicos, incluindo espécies animais e vegetais, devem ser indicados de maneira correta e completa (nome, autor e ano de descrição).

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Agradecimentos – Devem ser sucintos: créditos de financiamento; vinculação do artigo a programas de pós-graduação e/ou projetos de pesquisa; agradecimentos pessoais e institucionais. Nomes de instituições devem ser por extenso, de pessoas pelas iniciais e sobrenome, explicando o motivo do agradecimento.

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Keys have to be presented in the following format:

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   Lizard with 4 well developed limbs 3
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   Fingers and toes with nails, dorsals keeled ..... *Bachia panoplia*
3. Hands with only 4 fingers 4
   Hands with 5 fingers 5
4. Dorsal scales smooth ..... *Gymnophthalmus underwoodii*
   Dorsal scales keeled ..... *Amapasaurus teradactylus*
5. Head with large scales 6
   Head with small scales 7
6. Posterior scales of head forming arounded line ..... *Alopoglossus angulatus*
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Acknowledgements – Acknowledgements are brief and can mention: support and funding; connections to graduate programs and/or research projects; acknowledgement to individuals and institutions. The names of institutions should be written in full, those of individuals with initials and family name, indicating what motivated the acknowledgement.

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