Universidade Federal de Minas Gerais
Instituto de Ciência Biológicas
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TESE DE DOUTORADO

Avaliação da ocupação e da adequabilidade ambiental para a preguiça-de-coleira (*Bradypus torquatus,* Illiger 1811): uma abordagem multi-espacial e multi-temporal com contribuições para a conservação da biodiversidade.

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Belo Horizonte – MG
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Tese apresentada ao Instituto de Ciências
Biológicas da Universidade Federal de
Minas Gerais, para obtenção do título de
Doutora em Ecologia, Conservação e
Manejo da Vida Silvestre.

Orientador: Dr. Adriano Pereira Paglia
Coorientadores: Dr. Adriano Garcia Chiarello e
Dr. Milton Cezar Ribeiro

Belo Horizonte – MG
2020

À Maria luiza e à Maria Angélica,
por sempre me mostrarem
a força que há dentro de mim.

"A única coisa que separa as mulheres de cor de qualquer outra pessoa é a oportunidade."

Viola Davis

"*Os (...) entomologistas Bert Hölldobler e Ed Wilson fizeram uma afirmação intrigante no livro* Journey to the ants. *(...) há dois tipos de cientistas. Um é o teórico, que se interessa por uma questão específica e procura o melhor organismo para resolvê-la. (...). O outro tipo é o naturalista, que se interessa por uma classe específica de animais em si, percebendo que cada animal tem sua história para contar, que se revelará dotada de interesse teórico se for suficientemente estudada. Hölldobler e Wilson consideram-se pertencentes à segunda classe, assim como eu. "*

Frans De Waal, no livro "*Eu, primata*"

Agradecimentos

Eu demorei 1 mês para conseguir escrever esses agradecimentos. Não é fácil, definitivamente, transpor em linhas os sentimentos acumulados nesses 7 anos de pós-graduação, entre mestrado e doutorado. Há uma grande possbilidade de eu ter esquecido de alguém. Não por mal, mas escrever essa parte da tese enche meus olhos de lágrimas.

Em um momento de ataques, desvalorização e desmonte da ciência e educação brasileira, gostaria de começar agredecendo imensamente à CAPES e ao CNPq. Se não fossem pelas bolsas que recebida ao longo desses anos é evidente que pouco provavelmente, eu estaria aqui. Graças à CAPES (Processo 88881.188493/2018-01), eu realizei um sonho de morar 6 meses nos EUA para realizar parte de meu doutorado, e ir além em minha formação profissional. Gostaria de agredecer a Rufford Small Grants (21498-1), por financiar meus trabalhos de campo.

Tive sorte de ter em meu caminho, um super time de orientadores que se fizeram presentes nos processos dessa tese. Quero agradecer profundamente o meu orientador, Adriano Pereira Paglia, que abriu os braços a mim em 2013, e que desde então, vem me apoiado, em ensinado e me guiado. Também gostaria de agradecer aos meus coorientadores: Milton Cezar Ribeiro e Adriano Garcia Chiarello. Suas diferentes visões de ciência e de mundo me fizeram pensar muito além do que eu poderia imaginar. E claro, não poderia finalizar sem agradecer à Larissa Lynn Bailey, à qual eu tive a oportunidade de conviver por 6 meses, e que mostrou a simplicidades das coisas, a tranquilidade e me apresentou à uma ecologia nunca antes debravada por mim.

À UFMG, pelo suporte incrível, por me oferecer uma biblioteca incrível, por me alimentar com uma comida boa e de qualidade. À Vila Parentoni, pela amizade, companheirismo e alegria, que me acompanharam todo o tempo. Ao Laboratório de Ecologia e Conservação (LEC – UFMG) – Lud, Pão, Rodrigo, Aninha, Rodolfo, Léo, Augusto, Arthur, Dani, pelo companheirismo, alegrias, e ciência compartilhada, em especial à Gabi, por todo o suporte ao longo desses anos, todo aprendizado, todo toró de ideia, e amizade. Ao Laboratório de Ecologia Espacial e Conservação (LEEC – UNESP) – Rê, Milene, Ju Assis, Ju Oshima, Ju Silveira, Felipe Martelo, Erison, Ber, André Regolin, Thadeu Sobral, Laurinha, João Penna, Vinicius e demais, por todo aprendizado, por sempre me receberem tão bem nas minhas idas à Rio Claro. E por fim, ao Laboratório de Ecologia e Conservação (LAEC – FFLCRP/USP) - Roberta, Nielson, Vinicius, Natalia, Victor - que mesmo não tão frequente, me ajudaram de diversas formas nessa tese. A todos os meus amigos em Fort Collins, que me fizeram sentir em casa: Abbey, Emma, John, Paul, Kim, Gillian, Melody, Kris, Danny, Bennet, obrigada por fazer minha estadia nos EUA leve.

Ao Instituto de Pesquisas de Tamanduás do Brasil – Instituto Tamanduá, por terem me recebido tão bem a pouco mais de um ano, e que desde então, me fez entender o verdadeiro de significado de Conservação da Natureza. Em especial à Flávia Miranda, heroína da conservação, que tanto me inspira e me incentiva a trilhar meu caminho junto à conservação aplicada.

A todo pessoal capixaba – ao IEMA/ES, pelas autoriazações de pesquisa e suporte ao longo desses anos. Ao Professor Sérgio Lucena Mendes, que desde o mestrado tem me ajudado de diversas formas, mesmo com recursos limitados. Ao pessoal da UFES, pelo apoio e sporte logístico em meus campos: Andressa Gatti, Dani Moreira, Joana Zorzal e principalmente, à Nila Rássia, por me ajudar em campo, sem hesitar. Pela companhia, amizade nos mais de 8 meses de campo.

À minha família, que sempre me apoiou e que foram (e são!) fundamentais nessa caminhada. Aos meus dois irmãos – Eduardo e Allyson, pelo carinho, suporte, e atenção comigo. Ao meu pai Eduardo, que sempre esteve comigo, do seu jeito calado, mas amoroso. Ao meu padrasto Flávio por toda preocupação e atenção. Às minhas sobrinhas Flavinha e Ana Marcela, por toda alegria e pureza. Às minhas cunhadas Clécia e Riana, pelos sorrisos e palavras de afeto. À minha sogra, dona Tuca, pela tranquilidade e paz.

Dedico esse parágrafo a somente ela. Ela que desde cedo me falou para eu ser forte, e semrpe me mostrou onde buscar essas forças. Ela que matava 3 leões por dia para me dar os melhores cuidados. Ela que enfretou de cabeça erguida uma sociedade machista e racista. Ela que não mediu esforços para proteger e educar os seus 3 filhos. À minha mãe, Maria Luiza, um muito obrigada. Palavras não cabem aqui, o amor incondicional é o que prevalece.

Ao Candomblé e à minha família de santo, que me mostrou um novo sentido à vida quando eu mais precisava. À Eduardo de Omolu e à Alessandra Gomes, por todo amor, carinho, apoio, compreensão e ensinamentos. À Loy, por todos os conselhos, amor e abrigo. Aos meus queridos irmãos de santo por todo amor e amizade: Ti, Carioca, Bruna, Mari, Guto, Flávia, Richard, Roberto, Mirna, Philip, Rômulo, Gabriel, Iara, João, Vini, vocês são incríveis! À mãe da minha cabeça, Oyá, por me dá forças sempre que eu me mostro fraca. Ao meu pai Ogum, por me ajudar a abrir meus caminhos. A Exu, por sempre me guiar e me mostrar o caminho. A todos os orixás e entidades que me acompanham e não me deixam só, à toda minha ancestralidade, que me nutre com uma força inimaginável: Obrigada!

Aos meus amigos fora da academia e da universidade, que estão presentes em diversos momentos: Alysson, Mateus, Pedro, Marcinho, Rayana, Mayra, Sassá, Lu, Ciba, Patilda e em especial às novas baianas Kele, Alice, Jana e Cacá, pela amizade e amor desde que cheguei em BH. Aos meus tambores que nunca se calaram! E por sempre me mostrarem a força que há dentro de mim. Ao Baque mulher, ao mulheraço, ao Babadan e ao Magia negra, reisiginificar o sentido de resistência!

E por fim, mas não menos importante. Esse parágrafo é dedicado ao Alê, mas poderia ser um agradecimento à parte. Meu companheiro, meu amor, meu melhor amigo. Concordou em ficar 6 meses longe de mim quando fui para os EUA. Me abraçou forte nos meus momentos de tristeza, nas incertezas do futuro. Me dá conforto, compreensão. Me ensina que a vida precisa ser mais calma. Me ensina a respirar. Me ensina o que é amor. A você, Alê, um muito obrigada. Palavras não são suficientes para descrever o que você e para mim.

Enfim, a todos que contribuíram não só para essa tese, mas para a minha formação pessoal. Obrigada.

Sumário

Resumo

De acordo com o Painel Intergovernamental sobre mudanças Climáticas (IPCC), áreas antrópicas relacionadas à produção de alimentos são uma das grandes responsáveis pelas mudanças climáticas. A conversão de grandes áreas naturais em áreas agropastoris cumpre uma função fundamental no aumento da liberação do CO_2 no mundo. A crescente perda de habitat interrompe fluxos gênicos e processos ecológicos importantes para a biodiversidade e assim, as mudanças no uso da terra e seus efeitos nas mudanças climáticas correspondem a uma das principais causas de extinção de espécies. Espécies arborícolas são as maiores atingidas pela perda de habitat, como é o caso da Preguiça-de-Coleira (*Bradytpus torquatus*), exclusiva da ameaçada Mata Atlântica. Assim, a presente tese teve como objetivo principal entender a influência de fatores ambientais na probabilidade de ocupação da preguiça-de-coleira e avaliar a adequabilidade ambiental atual e futura para a espécie, além de contribuir com a geração de dados de biodiversidade de uso livre. O primeiro capítulo buscou compilar e disponibilizar dados de ocorrência sobre os xenartros na região neotropical, no intuito de facilitar análises e modelagens biológicas e ecológicas diversas. O segundo capítulo objetivou identificar a influência da cobertura florestal e outras varáveis na probabilidade de ocupação da preguiça-de-coleira. O terceiro capítulo investigou a adequabilidade ambiental para a espécie, levando em consideração cenários de regeneração e cenários de mudanças climáticas. Como principais resultados podemos citar: 1) a compilação de mais 30 mil registros de xenartros – incluíndo da preguiça-de-coleira, de diferentes instituições de todo mundo e de diferentes fontes – dados estes que, em sua maioria, até então estavam indisponíveis para o acesso público; 2) a descoberta de que preguiça-de-coleira responde a um limiar de 35% de cobertura florestal, abaixo do qual a probabilidade de ocupação desta espécie declina consideravelmente, chegando a quase zero em regiões com menos de 20% de floresta. Além disso, verificamos que a porcentagem de áreas abertas, como pastos, pastos abandonados e áreas de solo expostos, afetam negativamente a probabilidade de ocupação desta preguiça, enquanto áreas com presença de árvores importantes para a sua dieta tem influência positiva; 3) cenários de regeneração natural podem mitigar os efeitos das mudanças climáticas na adequabilidade ambiental para a preguiça. De modo geral, essa tese reforça a importância de áreas florestais como preditoras da ocorrência da espécie, sendo locais com baixa cobertura florestal inadequadas para a sua presença. Além disso, a disponibilização de dados de ocorrência dos xenartros irá facilitar o desenvolvimento de diversas pesquisas e avaliações conservacionistas voltadas à este grupo relativamente ainda pouco estudado. Os produtos aqui gerados irão contribuir com metas e ações estabelecidos em planos de ações nacionais, visando a conservação a longo-prazo da espécie.

Palavras-chave: Mata Atlântica, desmatamento, biodiversidade, ecologia de paisagem, conservação

Abstract

According to the Intergovernmental Panel on Climate Change (IPCC), food production is one of the main responsible for climate change. The conversion of natural areas into large agricultural areas plays a fundamental role in global warming. Additionally, the habitat loss may interrupt gene flows and important ecological processes. Therefore, changes in land use and its effects on climate change correspond to one of the main causes of species extinction. Arboreal species are the most affected by habitat loss, due to their high dependence on forests, as is the case of the maned sloth (*Bradytpus torquatus*), exclusive of the threatened Atlantic Forest. Thus, the main objective of this present thesis was to understand the influence of environmental factors in the occupancy probability of *B.torquatus* and to evaluate the current and future environmental suitability for the species, besides contributing to the generation of open biodiversity data. The first chapter sought to compile and make available occurrence data on the xenarthrans, in order to contribute with several analyzes and ecological modeling. The second chapter aimed to identify the influence of forest cover and other variables on the occupancy probability of *B.troquatus*. The third chapter evaluated the environmental suitability for the species, considering regeneration and climate change scenarios. As a result: 1) We compiled over 30,000 xenarthran records, from different institutions around the world and from different sources - including data that until then were unavailable for public access; 2) The occupancy probability of the maned sloth is 0.97, but it decreases abruptly at 35% of forest cover, reaching zero in areas with less than 20% of forest cover. In addition, open areas cover, such as pastures, abandoned pastures and exposed soil, has a negative effect on *B.torquatus* occupancy probability, whereas areas with the presence of important trees to their diet affect positively; 3) Natural regeneration can mitigate the effects of climate change on environmental suitability for maned sloth. Overall, this thesis reinforces that forest areas are important predictors for species, and their low coverage implies in unsuitable areas for their presence. Additionally, the provision of xenarthran data will favor the development of several research and conservationist assessments focused on the group. The products generated here will contribute to goals and actions established in national action plans, aiming the long-term conservation of the species.

Keywords: Atlantic Forest, deforestation, biodiversity, landscape ecology, conservation

Introdução geral

De acordo com o último relatório do IPCC (Painel Intergovernamental sobre Mudanças Climáticas; em inglês *Intergovernmental Panel on Climate Change* 2019), cerca de 56% das áreas terrestres mundiais são utilizadas para fins econômicos (pecuária, agricultura, silvicultura, extração de madeira e infraestrutura), e apenas 16% são ocupadas por vegetação nativa, entre florestas e áreas naturais não-florestais. Essa intensa conversão de ambientes naturais em extensas áreas antrópicas cria ambientes cada vez mais hostis para diversas espécies, ameaçando fortemente a conservação da biodiversidade mundial (BELLARD *et al.*, 2014; HADDAD *et al.*, 2015; KOUMARIS; FAHRIG, 2016).

A quantidade de habitat remanescente possui um papel fundamental na dinâmica de populações e comunidades (FAHRIG, 2013). Alguns grupos reagem linearmente à perda de habitat (BECA *et al.*, 2017), enquanto outros exibem uma resposta não-linear (BOESING; NICHOLS; METZGER, 2018; MUYLAERT; STEVEN; RIBEIRO, 2016). Este último relaciona-se aos limiares críticos (*critical thresholds),* e seu conceito sugere que pequenas modificações na proporção de habitat disponível podem levar a mudanças abruptas nas respostas ecológicas (SWIFT; HANNON, 2010). Além da quantidade de habitat, as espécies – principalmente as florestais – necessitam de áreas naturais adequadas e bem estruturadas para desempenhar suas atividades diárias. Habitats complexos englobam uma estratificação florestal bem definida e formada por muitos estratos (AUGUST, 1983). Sendo assim, fatores como altura do dossel, abertura da copa, composição florística, estratificação florestal e complexidade de habitat são essenciais para manter a estrutura e a viabilidade de populações e comunidades em uma mancha de habitat (GRELLE, 2003; PAIM, FERNANDA P. *et al.*, 2017; PAIM, FERNANDA POZZAN *et al.*, 2018; SMITH *et al.*, 2019).

Áreas florestais também são grandes responsáveis por estocar grande parte do carbono mundial, e transformá-las em áreas agropastoris - liberando o carbono armazenado – cumprem papel fundamental no aquecimento global (IPCC, 2018). Portanto, diminuir – ou zerar – o desmatamento em larga escala é uma das formas mais eficazes de mitigar os efeitos das mudanças climáticas. Além disso, torna-se necessário o estímulo à regeneração e à restauração florestal, uma vez que árvores jovens em crescimento são importantes sumidouros de carbono (CASPERSEN *et al.*, 2000). Além de ajudar na regulação climática, o crescimento das áreas florestais viabiliza a manutenção conservação da biodiversidade (METZGER *et al.*, 2019).

Alguns mecanismos conservacionistas se destacam para frear a perda de habitat e garantir a preservação de áreas naturais, como por exemplo o estabelecimento de áreas protegidas. No Brasil, as áreas protegidas são conhecidas por Unidades de Conservação e estão garantidas por lei. O Sistema Nacional de Unidades de Conservação (SNUC – Lei 9,985/2000) foi instituído como forma de potencializar o papel das diferentes categorias de UCs na conservação da biodiversidade. Complementando as funções das UCs no Brasil, a Lei de Preservação da Vegetação Nativa (LPVN, Lei 12,651/2012) estabelece a proteção de áreas ambientais áreas sensíveis, como topos e encostas de morros, nascentes e margens de rios, lagos e lagoas – as chamadas Áreas de Preservação Permanente (APPs), além da proteção de áreas de vegetação nativa localizadas em propriedades particulares – Reservas Legais (RL). Tais mecanismos visam a preservação de áreas não englobadas pelo SNUC, de forma a garantir diversos serviços ecossistêmicos. Porém, de modo geral, algumas dessas áreas definidas e protegidas vêm sendo constantemente ameaçadas por propostas de leis que flexibilizam a supressão vegetal para fins agrícolas – no caso das RLs (Projeto de Lei n. 2362/2019, o qual já fora retirado de votação do Senado Federal), ou seja por propostas de leis que permitem a abertura e uso de estradas dentro de Parques Nacionais (Projetos de Lei 984/2019 - em trâmite - e 61/2013 - este último foi barrado pelo Superior Tribunal Federal recentemente).

A Mata Atlântica brasileira ocupa hoje um território de 1,08 milhão km^2 (MUYLAERT *et al.*, 2018). Com sua distribuição restrita a pouco mais de 28% da cobertura original (REZENDE *et al.*, 2018), o bioma possui um alto déficit de Unidades de Conservação, APPs e Reservas Legais (SOARES-FILHO *et al.*, 2014). Considerado um *hotspot* para a conservação da biodiversidade (MYERS *et al.*, 2000), diversas espécies endêmicas e ameaçadas habitam a área do bioma, e a deficiência das áreas legalmente protegidas pode agravar a situação de ameaça. Dentre as espécies endêmicas, encontra-se a Preguiça-de-Coleira *Bradypus torquatus* (Pilosa: Bradypodidae). Habitando quase que exclusivamente florestas ombrófilas densa, entre os estados de Sergipe e Rio de Janeiro (HIRSCH; CHIARELLO, 2012), a Preguiça-de-Coleira se alimenta basicamente folhas e brotos (CHIARELLO, 1998b; MONTGOMERY; SUNQUIST, 1975), fato intrinsicamente relacionado à baixa taxa metabólica (NAGY; MONTGOMERY, 1980). Em função de seu hábito estritamente arborícola e folívoro, a espécie é profundamente afetada pela fragmentação, perda e destruição do habitat (CHIARELLO *et al.*, 2018; CHIARELLO; MORAES-BARROS, 2014; SANTOS *et al.*, 2019). Tais fatores, associados a uma restrita e descontínua distribuição tornam essa espécie ameaçada, e atualmente ela está classificada como vulnerável tanto na lista nacional (CHIARELLO *et al.*, 2018), quanto na internacional (CHIARELLO; MORAES-BARROS, 2014) de espécies ameaçadas. A preguiça-de-coleira está, atualmente, no Plano de Ação Nacional para Conservação dos Primatas e Preguiça da Mata Atlântica (PPMA), o qual institui algumas metas e ações para a conservação da preguiça. Essa tese contribui diretamente na execução de importantes ações presentes no PPMA.

As preguiças pertencem à superordem Xenarthra juntamente com os tamanduás e tamanduaí – que compõe a Ordem Pilosa - e os tatus – da Ordem Cingulata (GIBB *et al.*, 2016). Os xenartros é um dos grupos de mamíferos mais antigos existentes – sendo um dos quatro clados basais dos mamíferos placentários (DELSUC *et al.*, 2002). Ademais, é o único grupo com origem na América do Sul, onde sua história teve início, por volta de 65 milhões de anos atrás (GIBB *et al.*, 2016; porém ver DELSUC; DOUZERY, 2008), e hoje conta com 13 gêneros existentes – a grande maioria pertencentes aos tatus (SANTOS *et al.*, 2019).

Embora os xenartros possam prover enormes descobertas acerca da evolução dos primeiros mamíferos placentários, de forma geral, muitos aspectos do grupo permanecem sem respostas (SUPERINA; LOUGHRY, 2015). Os xenartros podem ser bastante crípticos ao ambiente em que vivem, tornando difíceis pesquisas que abordem parâmetros demográficos. Felizmente, a ciência tem avançado de forma contínua, permitindo o desenvolvimento de modelos estatísticos e matemáticos que possibilitam construir análises levando em consideração a baixa detectabilidade das espécies em seu meio natural. A modelagem de ocupação é uma alternativa para avaliar aspectos ecológicos e biológicos de espécies crípticas. Tal abordagem estima a proporção da área, de fragmentos ou de unidades de amostra que é ocupada, corrigida pela detecção imperfeita ou falsa ausência, i.e., a espécie pode estar lá, mas não foi possível detectá-la, em consequência de diversos fatores, como comportamento das espécies ou características do habitat (MACKENZIE *et al.*, 2006).

Adicionalmente, por meio da obtenção de dados já existentes em banco de dados e bibliotecas virtuais, é possível desenvolver outros tipos de modelos que forneçam importantes informações ecológicas acerca de um grupo. Aqui inclui-se a Modelagem de Distribuição de Espécies (em inglês *Species Distribution Models* - SDM). Tal abordagem fundamenta-se ecologicamente no conceito de nicho ecológico - o “ *hiper-volume n-dimensional*” (HUTCHINSON, 1957), ou o conjunto de condições e recursos que permitem à espécie suprir suas necessidades mínimas para sobreviver (CHASE; LEIBOLD, 2003). Dessa forma, o SDM é capaz de prever áreas potenciais para a distribuição de uma espécie ou avaliar áreas adequadas para um grupo (FERRAZ *et al.*, 2012; GUISAN *et al.*, 2013; JOSE V; NAMEER, 2020) através de dados de ocorrência e de varáveis ambientais, acessando a relação entre a distribuição de uma determinada espécie e as condições ambientais (MARTÍNEZ-MEYER *et al.*, 2006; PETERSON, 2006), com amplo uso biológico (MORATO *et al.*, 2014; PORTUGAL *et al.*, 2019).

Diversas plataformas on-line, como *SpeciesLink* (http://splink.cria.org.br/), GBIF (https://www.gbif.org/) e GIFT (http://gift.uni-goettingen.de/home), disponibilizam dados de biodiversidade, os quais podem ser utilizados em variadas análises. Se somam a essas plataformas os projetos de *datapapers* das séries ATLANTIC SERIES e NEOTROPICAL SERIES, gerados e publicados nos três últimos anos. Ao compilar, integrar e disponibilizar dados diversos de biodiversidade (muitos deles não publicados e presentes apenas em dissertações, teses e relatórios de consultorias) de acesso gratuito e livre, os *datapapers* integra-se ao *Open data movement* (tradução livre: movimento (ou iniciativa) por dados abertos) que promove a disponibilização e uso de dados científicos de forma livre e irrestrita (BAACK, 2015).

Utilizando modelos de ocupação e modelos de distribuição de espécies, a presente tese buscou entender a influência de fatores locais e espaciais sobre a probabilidade de ocupação da preguiça-de-coleira e avaliar a adequabilidade ambiental presente e futura para a espécie ao longo de sua distribuição. Essa tese buscou, ainda, a compilação e a disponibilização de dados biológicos, se alinhando ao *open data movement*. A estrutura da tese se encontra dividida em três capítulos. O primeiro capítulo – já publicado no periódico internacional *Ecology* - consistiu em reunir, padronizar e disponibilizar dados de ocorrência da superordem Xenarthra em toda região Neotropical (SANTOS *et al.*, 2019). Como resultado, compilamos mais de 35 mil registros de ocorrência, distribuídos desde o Sul da Argentina/Chile, até a região Sudeste do Estados Unidos. O *datapaper* contou com colaboração de 505 pesquisadores de 282 instituições de várias partes do mundo que nos enviaram dados de xenartros de diversos, anos, tipo e locais. Além dos dados enviados pelos colaboradores, foram compilados também dados de literatura – artigos, tese, dissertação, relatórios. Constatou-se que dados de xenartros já publicados e disponíveis correspondem a menos de 20% do *dataset*, e, portanto, o *datapaper* está sendo fundamental na integração e disponibilização de dados exclusivos. O presente capítulo se junta a iniciativas como ATLANTIC CAMTRAP (LIMA, F. *et al.*, 2017), ATLANTIC BATS (MUYLAERT *et al.*, 2017) , ATLANTIC PRIMATES (CULOT *et al.*, 2018) e ATLANTIC SMALL MAMMALS (BOVENDORP *et al.*, 2017), sendo o primeiro da série NEOTROPICAL a ser publicado (SANTOS *et al.*, 2019).

O segundo capítulo - publicado no periódico internacional *Biological Conservation* - buscou identificar e compreender como variáveis locais e espaciais influenciam a probabilidade de ocupação da preguiça-de-coleira. Para isso, foram realizadas campanhas de campo a fim de se detectar a espécies e coletar variáveis locais, em mais de 60 pontos amostrais localizados na região Serrana do Espírito Santo. Por meio de ferramentas de SIG, realizamos análises espaciais para calcular a porcentagem de floresta e de áreas abertas, utilizando a abordagem de multi-escala. Por meio de seleção de modelos, selecionamos a escala de efeito mais apropriada e utilizamos a modelagem de ocupação para identificar limiares críticos para a presença da preguiça-de-coleira (SANTOS *et al.*, 2019).

Já o terceiro capítulo consiste na utilização de Modelos de Distribuição de Espécies e dos dados compilados nos dois capítulos anteriores para avaliar a adequabilidade ambiental presente e futura para a preguiça-de-coleira ao longo de sua distribuição. Para isso, levamos em consideração um cenário atual e três cenários futuros relacionados à porcentagem de cobertura florestal, e em cada cenário incluímos variáveis climáticas em diferentes cenários de mudanças climáticas. Particularidades genéticas das preguiças-de-coleira foram consideradas, analisando as duas Unidades Evolutivas Significativas separadamente.

Referências

AUGUST, Peter V. The Role of Habitat Complexity and Heterogeneity in Structuring Tropical Mammal Communities. Ecology, v. 64, n. 6, p. 1495–1507, 1983.

BAACK, Stefan. Datafication and empowerment: How the open data movement re-articulates notions of democracy, participation, and journalism. Big Data and Society, v. 2, n. 2, p. 1–11, 2015.

BECA, Gabrielle et al. High mammal species turnover in forest patches immersed in biofuel plantations. Biological Conservation, v. 210, p. 352–359, 2017. Disponível em: <http://dx.doi.org/10.1016/j.biocon.2017.02.033>.

BELLARD, Céline et al. Vulnerability of biodiversity hotspots to global change. Global Ecology and Biogeography, v. 23, n. 12, p. 1376–1386, 2014.

BOESING, Andrea Larissa; NICHOLS, Elizabeth; METZGER, Jean Paul. Biodiversity extinction thresholds are modulated by matrix type. Ecography, p. 1520–1533, 2018.

BOVENDORP, Ricardo S. et al. Atlantic small-mammal: a dataset of communities of rodents and marsupials of the Atlantic forests of South America. Ecology, v. 98, n. 8, p. 2226, 2017.

CASPERSEN, J. P. et al. Contributions of land-use history to carbon accumulation in U.S. Forests. Science, v. 290, n. 5494, p. 1148–1151, 2000.

CHASE J.M.; LEIBOLD, M.A. Ecological niches: linking classical and contemporary approaches. The University of Chicago Press, Chicago. 2003.

CHIARELLO, Adriano G et al. Mamíferos - Livro Vermelho, Vol II. Brasilia: ICMBio, 2018.

CHIARELLO, Adriano Garcia. Diet of the Atlantic forest maned sloth Bradypus torquatus (Xenarthra : Bradypodidae). Journal of Zoology, v. 246, p. 11–19, 1998.

CHIARELLO, Adriano Garcia; MORAES-BARROS, Nadia De. Bradypus torquatus,. . [S.l: s.n.], 2014. Disponível em: <https://www.iucnredlist.org/species/3036/47436575>.

CULOT, Laurence et al. ATLANTIC-PRIMATES: A dataset of communities and occurrences of primates in the Atlantic Forests of South America. Ecology, 2018.

DELSUC, Frédéric et al. Molecular phylogeny of living xenarthrans and the impact of character and taxon sampling on the placental tree rooting. Molecular Biology and Evolution, v. 19, n. 10, p. 1656–1671, 2002.

FAHRIG, Lenore. Rethinking patch size and isolation effects: the habitat amount hypothesis. Journal of Biogeography, v. 40, n. 9, p. 1649–1663, 2013. Disponível em: <http://doi.wiley.com/10.1111/jbi.12130>.

FERRAZ, Katia Maria Paschoaletto Micchi de Barros et al. Environmental suitability of a highly fragmented and heterogeneous landscape for forest bird species in south-eastern Brazil.

Environmental Conservation, v. 39, n. 4, p. 316–324, 2012.

GIBB, Gillian C. et al. Shotgun mitogenomics provides a reference phylogenetic framework and timescale for living xenarthrans. Molecular Biology and Evolution, v. 33, n. 3, p. 621–642, 2016.

GRELLE, Carlos Eduardo Viveiros. Forest Structure and Vertical Stratification of Small Mammals in a Secondary Atlantic Forest , Southeastern Brazil. Studies on Neotropical Fauna and Environment, v. 38, n. March 2013, p. 81–85, 2003.

GUISAN, Antoine et al. Predicting species distributions for conservation decisions. Ecology Letters, v. 16, n. 12, p. 1424–1435, 2013.

HADDAD, N. M. et al. Habitat fragmentation and its lasting impact on Earth's ecosystems. Science Advances, v. 1, n. 2, p. e1500052–e1500052, 2015. Disponível em: <http://advances.sciencemag.org/cgi/doi/10.1126/sciadv.1500052>.

HIRSCH, André; CHIARELLO, Adriano Garcia. The endangered maned sloth Bradypus torquatus of the Brazilian Atlantic forest: a review and update of geographical distribution and habitat preferences. Mammal Review, v. 42, n. 1, p. 35–54, 20 jan. 2012. Disponível em: <http://doi.wiley.com/10.1111/j.1365-2907.2011.00188.x>. Acesso em: 7 jan. 2015.

HUTCHINSON, G.E. Concluding remarks. Cold Spring Harbour Symposium on Quantitative Biology 22: 415-427. 1957.

IPCC. Aquecimento Global de 1,5°C. Sumário para Formuladores de Políticas. IPCC, Geneva, Switzerland. Seneva: [s.n.], 2018.

JOSE V, Sanjo; NAMEER, P. O. The expanding distribution of the Indian Peafowl (Pavo cristatus) as an indicator of changing climate in Kerala, southern India: A modelling study using

MaxEnt. Ecological Indicators, v. 110, n. November 2019, p. 105930, 2020. Disponível em: <https://doi.org/10.1016/j.ecolind.2019.105930>.

KOUMARIS, Alex; FAHRIG, Lenore. Different Anuran Species Show Different Relationships to Agricultural Intensity. Wetlands, v. 36, n. 4, p. 731–744, 2016. Disponível em: <http://dx.doi.org/10.1007/s13157-016-0781-4>.

LIMA, F. et al. ATLANTIC-CAMTRAPS: a dataset of medium and large terrestrial mammal communities in the Atlantic Forest of South America. Ecology, v. 98, n. 11, 2017.

MACKENZIE, Darryl I. et al. Occupancy Estimation and Modeling: Inferring Patterns and Dynamics of Species Occurence. 1. ed. [S.l.]: Elsevier Inc., 2006.

MARTÍNEZ-MEYER, Enrique et al. Ecological niche modelling and prioritizing areas for species reintroductions. Oryx, v. 40, n. 4, p. 411–418, 2006.

METZGER, Jean Paul et al. Why Brazil needs its Legal Reserves. Perspectives in Ecology and Conservation, v. 17, n. 3, p. 91–103, 2019. Disponível em: <https://doi.org/10.1016/j.pecon.2019.07.002>.

MONTGOMERY, G G; SUNQUIST, M E. Impact of sloths on Neotropical forest energy flow and nutrient cycling. Tropical Ecology Systems, Trends in Terrestrial and Aquatic Research, p. 69–98, 1975.

MORATO, Ronaldo Gonçalves et al. Identification of priority conservation areas and potential corridors for Jaguars in the Caatinga Biome, Brazil. PLoS ONE, v. 9, n. 4, 2014.

MUYLAERT, R.L. et al. ATLANTIC BATS: a data set of bat communities from the Atlantic Forests of South America. Ecology, v. 98, n. 12, p. 3227, 2017.

MUYLAERT, R.L. et al. Uma Nota Sobre Os Limites Territoriais Da Mata Atlântica. Oecologia Australis, v. 22, n. 03, p. 302–311, 2018.

MUYLAERT, R.L.; STEVEN, R.D.; RIBEIRO, M.C. Threshold effect of habitat loss on bat richness in cerrado-forest landscape. Ecological Applications, v. 26, n. 6, p. 1854–1867, 2016.

MYERS, Norman et al. Biodiversity hotspots for conservation priorities. Nature, v. 403, n. 6772, p. 853–858, 2000.

NAGY, Kenneth A.; MONTGOMERY, G Gene. Field Metabolic Rate , Water Flux , and Food Consumption in Three-Toed Sloths (Bradypus Variegatus). Journal of Mammalogy, v. 61, n. 3, p. 465–472, 1980. Disponível em: <http://www.jstor.org/stable/1379840>.

PAIM, Fernanda P. et al. Does Resource Availability Affect the Diet and Behavior of the Vulnerable Squirrel Monkey, Saimiri vanzolinii? International Journal of Primatology, v. 38, n. 3, p. 572–587, 2017.

PAIM, Fernanda Pozzan et al. Tree community structure reflects niche segregation of three parapatric squirrel monkey species (Saimiri spp.). Primates, v. 59, n. 4, p. 395–404, 2018. Disponível em: <https://doi.org/10.1007/s10329-018-0659-6>.

PETERSON, A. Townsend. Uses and Requirements of Ecological Niche Models and Related Distributional Models. Biodiversity Informatics, v. 3, n. 0, p. 59–72, 2006.

PORTUGAL, Marina Peres et al. Priority areas for jaguar Panthera onca conservation in the Cerrado. Oryx, 2019.

REZENDE, Camila Linhares et al. From hotspot to hopespot : An opportunity for the Brazilian Atlantic Forest. Perspectives in Ecology and Conservation, 2018.

SANTOS, P.M.; BOCCHIGLIERI, A.; et al. NEOTROPICAL XENARTHRANS: a data set of occurrence of xenarthran species in the Neotropics. Ecology, v. 100, n. 7, 2019.

SANTOS, P.M.; B., A.; et al. NEOTROPICAL XENARTHRANS: a data set of occurrence of xenarthran species in the Neotropics. Ecology, v. 100, n. 7, p. 1–4, 2019.

SANTOS, Paloma Marques et al. Living on the edge: Forest cover threshold effect on endangered maned sloth occurrence in Atlantic Forest. Biological Conservation, v. 240, p. 108264, dez. 2019. Disponível em: <https://linkinghub.elsevier.com/retrieve/pii/S0006320719301855>.

SMITH, Justine A. et al. Habitat complexity mediates the predator–prey space race. Ecology, v. 0, n. 0, p. e02724, 2019. Disponível em: <https://onlinelibrary.wiley.com/doi/abs/10.1002/ecy.2724>.

SOARES-FILHO, Britaldo et al. Cracking Brazil ’ s Forest Code. Science, v. 344, n. April, p. 363–364, 2014.

SUPERINA, Mariella; LOUGHRY, W. J. Why do xenarthrans matter? Journal of Mammalogy, v. 96, n. 4, p. 617–621, 2015.

SWIFT, Trisha L.; HANNON, Susan J. Critical thresholds associated with habitat loss: A review of the concepts, evidence, and applications. Biological Reviews, v. 85, n. 1, p. 35–53, 2010.

Capítulo 1

NEOTROPICAL XENARTHRANS: a dataset of occurrence of xenarthran species in the Neotropics

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** Manuscript, data and complete list of authors and institutions are published in Ecology: https://doi.org/10.1002/ecy.2663

Introduction

The superorder Xenarthra *(xenon* = stranger; *arthros* = articulations) is one of the four major clades of placental mammals (Madsen et al. 2001, Delsuc et al. 2002, Delsuc and Douzery, 2008). This group, which includes the orders Cingulata (armadillos) and Pilosa (anteaters and sloths), began its radiation in South America and later dispersed to Central and North America through the establishment of land bridges (Vizcaíno and Loughry, 2008). Molecular dating estimates Xenarthra split into Cingulata and Pilosa about 67 million years ago (Gibb et al. 2016). However, molecular dating estimate that the group originated earlier, approximately 105 million years ago (Springer 2003, Delsuc et al. 2004, Delsuc and Douzery 2008).

Xenarthrans encompass more than 150 described genera through Earth's history, including recently extinct taxa such as glyptodonts and giant ground sloths (Fariña 1996). This number decreased to only 13 extant genera, represented by 37 species (21 armadillos, six sloths, ten anteaters) classified in six families: Dasypodidae (long-nosed armadillos), Chlamyphoridae (fairy, hairy, three-banded, naked-tailed, and giant armadillos), Myrmecophagidae (lesser and giant anteaters), Cyclopedidae (pygmy anteaters), Bradypodidae (three-toed sloths), and Megalonychidae (two-toed sloths) (Abba et al. 2015, Gibb et al. 2016, Feijó and Cordeiro-Estrela 2016, Miranda et al. 2017, Feijó et al. 2018). They are distributed from the southeastern United States of America to southern Patagonia, with more diversity in South America (Gardner 2008, Vizcaíno and Loughry 2008, Taulman and Robbins 2014).

Each family has very distinctive morphological and ecological characteristics, making Xenarthra a unique and morphologically diverse group. The bodies of armadillos are covered by a carapace comprised of mobile articulated plates, which offers protection against predators (McDonough and Loughry 2008). Anteaters possess a protrusible tongue and have a long and tubular skull characterized by the complete loss of teeth, as well as large front claws used to feed on ants and termites (Wilson and Mittermeier 2018). Three-toed sloths have three long digits on each forelimb, whereas two-toed sloths only have two. Both are strictly arboreal and possess long claws that they use to hang on to tree branches. Most mammals have seven cervical vertebrae; however, the living sloths have a variable number: 5–8 in two-toed sloths (*Choloepus*) and 8–10 in three-toed sloths (*Bradypus*) (Buchholtz and Stepien 2009).

Besides their unique anatomical structures and ecology, the xenarthrans have an exceptional physiology, with a lower metabolism than expected from similar-sized mammals, and variable body temperature, characteristics that may be related to a low energy intake diet and the ingestion of non-nutritive material during feeding (McNab 1984). Their diets are mainly based on ants and termites (anteaters and armadillos), arthropods (armadillos), and leaves (sloths). The living sloths are arboreal, feeding on leaves from trees, vines, and lianas, and their low metabolism might assist in reducing the absorption of toxic leaves (Gilmore et al. 2001). Armadillos use burrows as shelter and to buffer their body temperature from environmental variation (Attias et al. 2018), as well as the Anteaters (Camilo-Alves and Mourão, 2006; Mourão and Medri 2007). Additionally, xenarthrans play important ecological roles. Armadillos act as ecosystem engineers with many species associated with their burrows (Desbiez and Kluyber 2013, Aya-Cuero et al. 2017). Armadillos and anteaters impact ant and termite populations contributing, in turn, to the structure and diversity of plant communities (Rao 2000, Terborgh et al. 2006). Sloths are important components of the arboreal vertebrate biomass, being top prey for large raptors and contributing to the nutrient cycling of tropical forests. Their pelage is also the substrate to a diverse array of microorganisms and invertebrates (Montgomery and Sunquist 1978; Higginbotham et al. 2014).

According to the International Union for Conservation of Nature (IUCN), five xenarthran species are at some risk of extinction – *Bradypus pygmaeus, Bradypus torquatus, Myrmecophaga tridactyla*, *Priodontes maximus*, and *Tolypeutes tricinctus*. Another four are near threatened – *Cabassous chacoensis, Dasypus sabanicola*, *Tolypeutes matacus*, and *Zaedyus pichiy* – all showing decreasing population trends. Additionally, because of recent taxonomic revisions, three species of *Dasypus* and seven species of *Cyclopes* have pending conservation status evaluations (Feijó and Cordeiro-Estrela 2016, Miranda et al. 2017, Feijó et al. 2018). For all xenarthran species, the major threats are habitat loss resulting from fragmentation (Chiarello and Moraes-Barros 2014, ICMBio 2015), domestic and feral dog attacks, roadkill (Chiarello and Moraes-Barros 2014, Ascenção et al. 2017), subsistence hunting, illegal capture (ICMBio 2015), and fires (Miranda et al. 2014).

Despite the increasing interest in living xenarthran species (Diniz and Brito 2012, Superina et al. 2014), they remain a relatively understudied group when compared to other groups of mammals (Superina and Loughry 2015). Therefore, many aspects of their ecology are data deficient, making the correct assessment of population trends a difficult task. Conservation of xenarthrans is becoming more pressing as this taxon faces increasing negative impacts from anthropogenic actions. The Anteater, Sloth and Armadillo Specialist Group is a network of mammalogists and conservationists within the IUCN. Its main goal is to comprehend and provide information to aid in conservation action for those species. There are a growing number of specific xenarthran conservation initiatives, including rehabilitation, education, monitoring programs, and scientific research, supported by non-governmental organizations such as Fundacion Aiunau (www.aiunau.org/), Colombia; Asociación Panamericana para la Conservación (http://www.appcpanama.org/), Panama; Instituto de Pesquisa e Conservação de

Tamanduás do Brazil; Projeto Tamanduá (http://www.tamandua.org/), Brazil; Projeto Bandeiras e Rodovias (www.tamanduabandeira.org), Brazil; Proyecto Iberá - Oso Hormiguero, (http://www.proyectoibera.org/especiesamenazadas_osohormiguero.htm), Argentina; Proyecto Hormigueros (https://www.cunaguaro.co/proyecto-hormigueros), Colombia; Programa Tatu-bola (http://tatubola.org.br/), Brazil; Armadillos de Chile (http://www.armadilloschile.cl/), Chile; The Sloth Conservation Foundation (https://slothconservation.com/), United Kingdom; and Projeto Tatu-canastra (www.icasconservation.org.br/o), Brazil. Nonetheless, relatively few species are considered in those programs (such as *Myrmecophaga tridactyla*, *Priodontes maximus*, *Cyclopes* sp. and *Tolypeutes tricinctus*).

Most xenarthran data are unpublished or have been published in the grey literature, including reports, Master and PhD theses in different languages, with low accessibility to the broad scientific community. In an effort to gather this dispersed and unavailable data in one place, we compiled published and unpublished data on xenarthrans, from the years 1855 to 2018, including occurrence and quantitative data. A total of 24,847 unique georeferenced records were assembled, ranging from the northern frontier of the Neotropics (Mexico, southern USA, and Caribbean regions), through to the austral south of South America (Chile, Argentina, Uruguay, and Paraguay). Neotropical Xenarthrans is by far the largest dataset ever assembled with respect to armadillos, sloths, and anteaters.

This work is part of the Neotropical, Atlantic, Brazil, and Amazonia series initiative, the objective of which is to make data on the biodiversity of these regions publicly available. Until now, the following data-papers of these series have been published: Atlantic Frugivory (Bello et al. 2017), Atlantic Camtraps (Lima et al. 2017), Atlantic Small Mammals (Bovendorp et al. 2017), Atlantic Bats (Muylaert et al. 2017), Atlantic Birds (Hasui et al. 2018), Atlantic Mammal

Traits (Gonçalves et al. 2018), Atlantic Amphibians (Vancine et al. 2018), Non-volant mammals from the Upper Paraná River Basin (Gonçalves et al. 2018), Atlantic Primates (Culot et al. 2018), Jaguar GPS movement (Morato et al. 2018), and Brazil roadkill (Grillo et al. 2018).

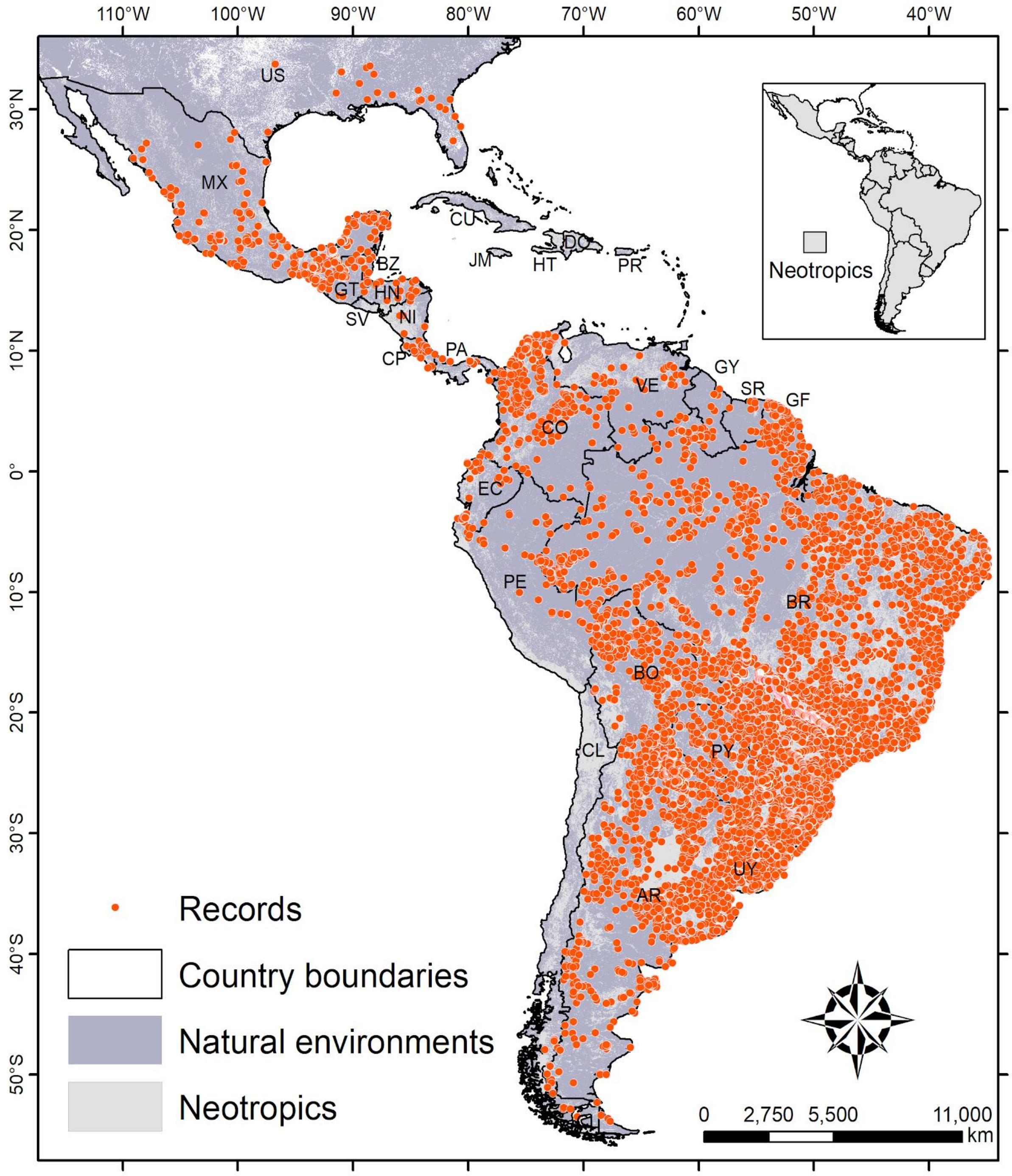

Fig. 1: Distribution of the Xenarthra records of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from years of 1855 to 2018; several populations may thus be extinct today.

METADATA

Class I - Data set descriptors

A. Data set identity

Tile: NEOTROPICAL XENARTHRANS: A DATASET OF OCCURRENCE OF XENARTHRAN SPECIES IN THE NEOTROPICS

B. Data set and metadata identification code

Suggested data set identity codes:

NEOTROPICAL_XENARTHRANS_QUANTITATIVE.csv

NEOTROPICAL_XENARTHRANS_QUALITATIVE.csv

NEOTROPICAL_XENARTHRANS_REFERENCES.csv

C. Data set description

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Abstract:

Xenarthrans – anteaters, sloths, and armadillos – have essential functions for ecosystem maintenance, such as insect control and nutrient cycling, playing key roles as ecosystem engineers. Because of habitat loss and fragmentation, hunting pressure, and conflicts with domestic dogs, these species have been threatened locally, regionally, or even across their full distribution ranges. The Neotropics harbor 21 species of armadillos, ten anteaters, and six sloths. Our dataset includes the families Chlamyphoridae (13), Dasypodidae (7), Myrmecophagidae (3), Bradypodidae (4), and Megalonychidae (2). We have no occurrence data on *Dasypus pilosus*

(Dasypodidae). Regarding Cyclopedidae, until recently, only one species was recognized, but new genetic studies have revealed that the group is represented by seven species. In this data-paper, we compiled a total of 42,528 records of 31 species, represented by occurrence and quantitative data, totaling 24,847 unique georeferenced records. The geographic range is from the south of the USA, Mexico, and Caribbean countries at the northern portion of the Neotropics, to its austral distribution in Argentina, Paraguay, Chile, and Uruguay. Regarding anteaters, *Myrmecophaga tridactyla* has the most records (n=5,941), and *Cyclopes* sp. has the fewest (n=240). The armadillo species with the most data is *Dasypus novemcinctus* (n=11,588), and the least recorded for *Calyptophractus retusus* (n=33). With regards to sloth species, *Bradypus variegatus* has the most records (n=962), and *Bradypus pygmaeus* has the fewest (n=12). Our main objective with Neotropical Xenarthrans is to make occurrence and quantitative data available to facilitate more ecological research, particularly if we integrate the xenarthran data with other datasets of Neotropical Series which will become available very soon (i.e. Neotropical Carnivores, Neotropical Invasive Mammals, and Neotropical Hunters and Dogs). Therefore, studies on trophic cascades, hunting pressure, habitat loss, fragmentation effects, species invasion, and climate change effects will be possible with the Neotropical Xenarthrans dataset.

D. Key words

Xenarthra, Pilosa, Cingulata, Biodiversity Hotspot, Neotropical region, Neotropical mammals, forest fragmentation, habitat loss

E. Description

To organize the dataset into the Neotropical realm, we selected all the countries and islands indicated in the literature as the Neotropical area and merged all polygons into a single shapefile. Our study extent includes the southern USA, Mexico, Central America, the Caribbean islands and South America (Figure 1). The dataset is comprised of 42,528 records (Figure 1; Table 1), including 40,794 (95.92%) with taxonomic certainty down to species-level identification, and 1,734 (4.08%) records of six genera with taxonomic uncertainty, with the majority of those records belonging to *Dasypus* sp. (1,359 records, 78.37%). In some cases, we taxonomically corrected some of those uncertain records, based on the distribution, on available literature, or on evidence material sent to us by the authors and after consulting specialists (more details, Table 2). When correction was not possible, we opted to maintain only the genus. A special case includes the genus *Cyclopes* sp. (240 records): at the beginning of this study, the genus was monospecific, *Cyclopes didactylus*. In the middle of the process, the taxon was subjected to a taxonomic review, which split the previously single species into seven (Miranda et al. 2017). To avoid misinterpretation of the data, we decided to maintain *Cyclopes* sp.

The two armadillo families appear most frequently in terms of both the number of records and species; Dasypodidae is responsible for the most records (n=14,790), followed by Chlamyphoridae (n=13,887), and they are represented by seven (two subspecies) and 13 species, respectively (Figures 3–5). Two of these species are the most common in the dataset (Figure 2): *Dasypus novemcinctus* (Dasypodidae, n=11,588) and *Euphractus sexcinctus* (Chlamyphoridae, n=7,325), both of which are species with wide distributions (Figures 3 and 4, respectively). Only one species, *Cyclopes* sp., represents the family Cyclopedidae (Figure 9; see the recent taxonomic review above). The other anteater species, Myrmecophagidae, is the third-most numerous, (n=11,349), represented by its three species *Myrmecophaga didactyla* (n=5,941), *Tamandua tetradactyla* (n=5,089), and *Tamandua mexicana* (n=319). The two sloth families are the least numerous, mainly the Megalonychidae, with only 414 records (Figure 7). *Bradypus variegatus*, from the family Bradypodidae, is the most-common sloth species, with 962 records (Figure 8). *Bradypus pygmaeus*, also from the family Bradypodidae, is the least-common species (n=12), both among sloth species and the dataset as a whole, reflecting its restricted insular distribution (Figure 8).

Approximately 99.94% of the records are from native species, and only 0.06% are from introduced (*Priodontes maximus*) and potentially introduced (*Bradypus* spp.) species. According to the most-recent IUCN Red List classification (IUCN 2018) and considering taxonomically confirmed species and the genus *Cyclopes*, 29,731 records (72.45%, 14 species and the genus *Cyclopes*) are from Least Concern (LC) species, 2,020 (4.92%, five species) are from Near Threatened (NT) species, 8,451 (20.6%, four species) are from Vulnerable (VU) species, and 12 records (0.03%, one species) are from Critically Endangered (CR) species. An additional 343 records (0.84%, four species) are from Data Deficient (DD) species, and another 477 records (1.16%, two species) are from Not Evaluated (NE) species (Table 1).

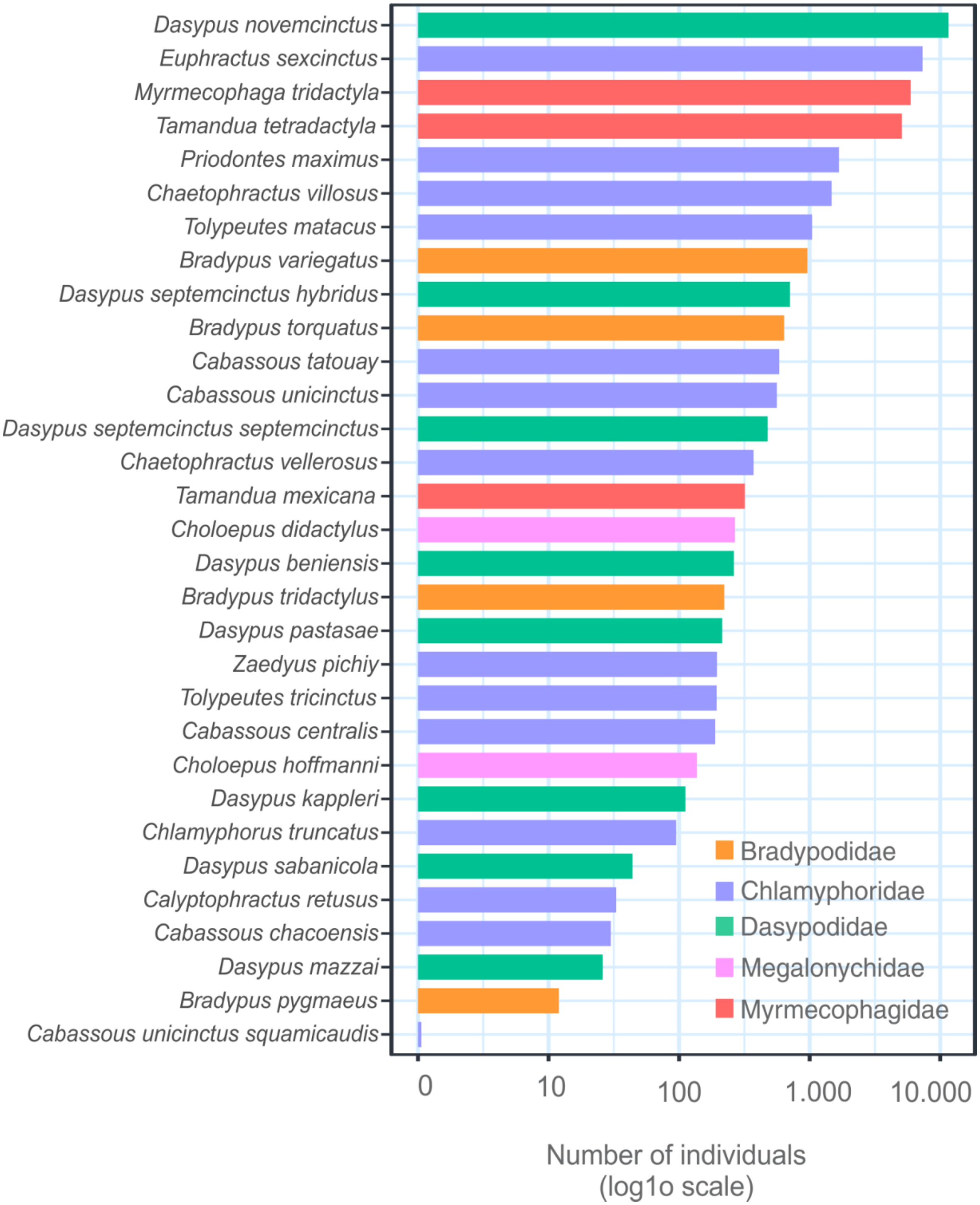

Fig. 2: Number of records per species of armadillos, anteaters and sloths within NEOTROPICAL XENARTHRANS dataset. Species with unconfirmed identification are not represented. Each color refers to a xenarthran family.

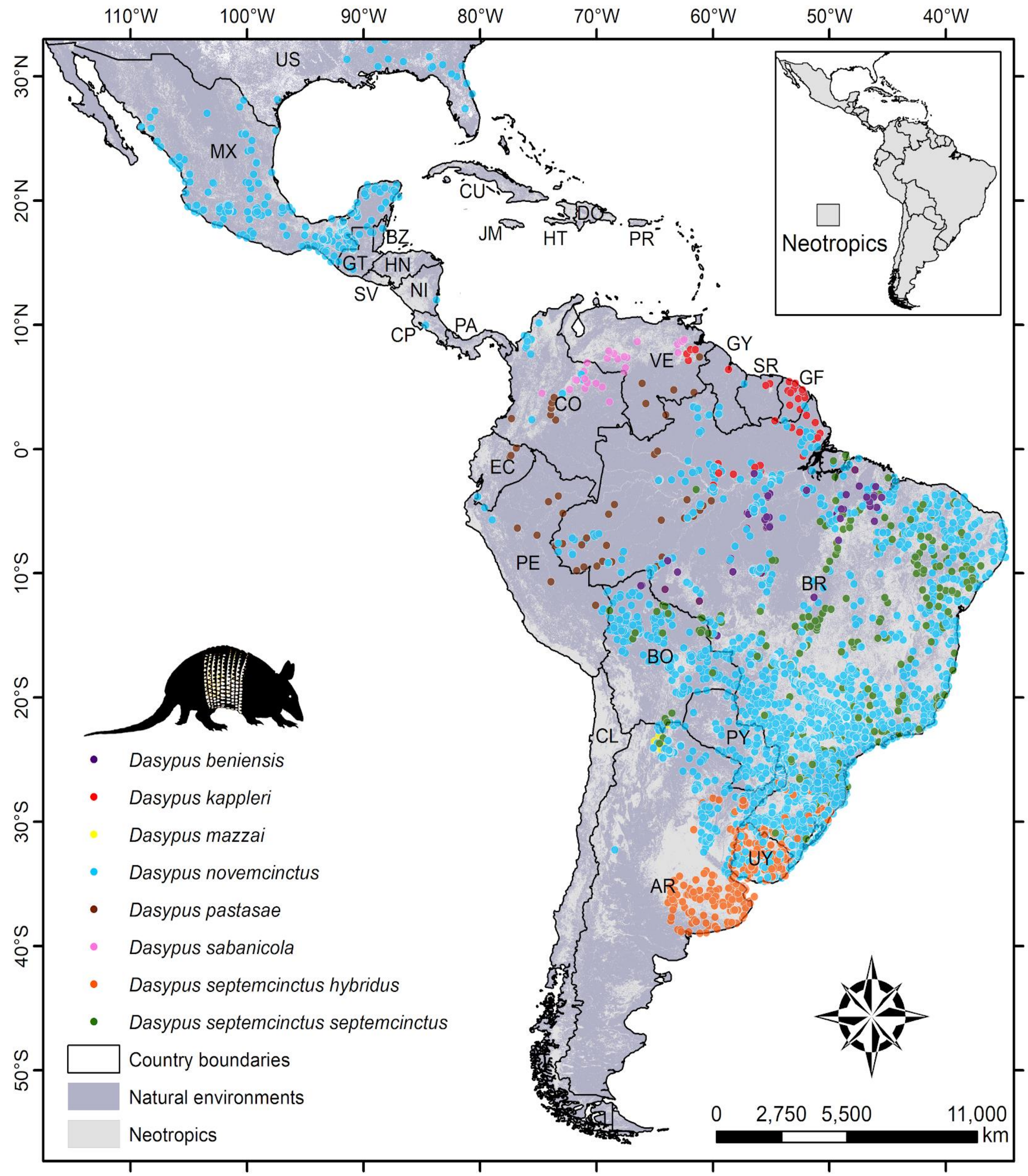

Fig. 3: Distribution of the records of the family Dasypodidae of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from 1896 to 2018, thus several populations may now be extinct. Unconfirmed species with "sp." are not included.

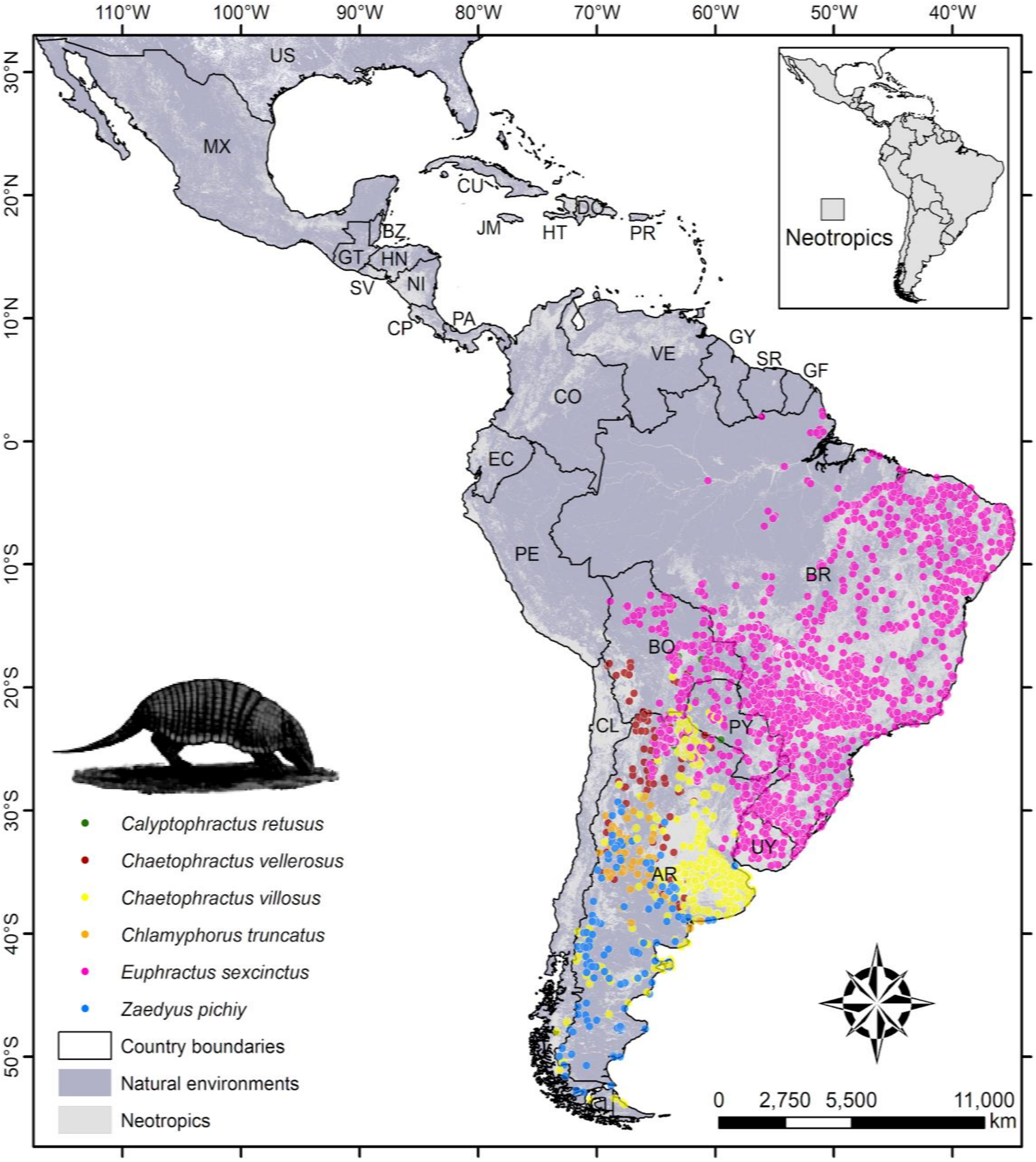

Fig. 4: Distribution of the records of the family Chlamyphoridae (Subfamilies Chlamyphoniae and Euphractinae) of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from 1910 to 2018, thus several populations may now be extinct. Unconfirmed species with "sp." are not included. Additional species in this family are shown in Figure 5.

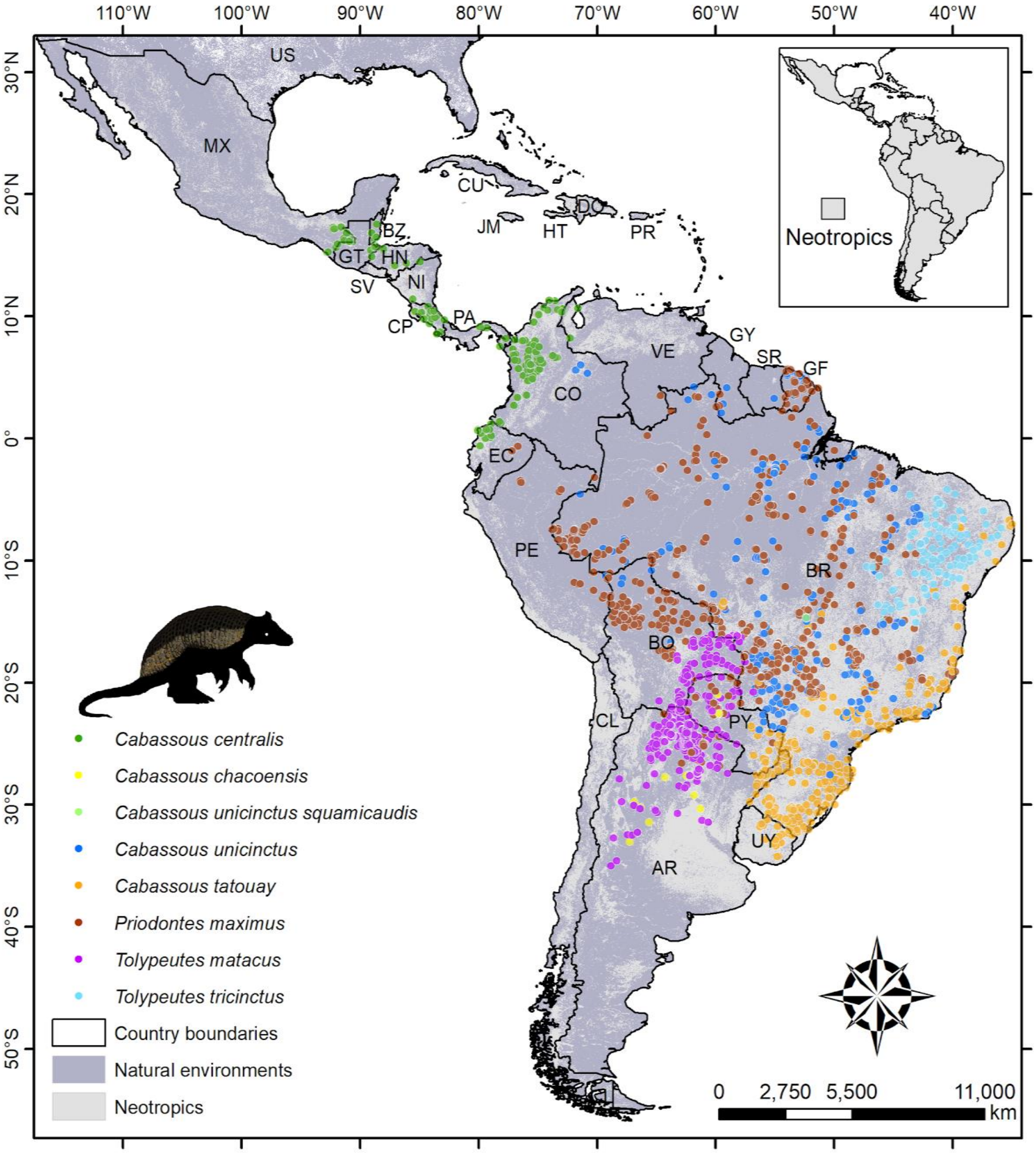

Fig. 5: Distribution of the records of the family Chlamyphoridae (Subfamily Tolypeutinae) of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from 1855 to 2018, thus several populations may now thus be extinct. Unconfirmed species with "sp." are not included.

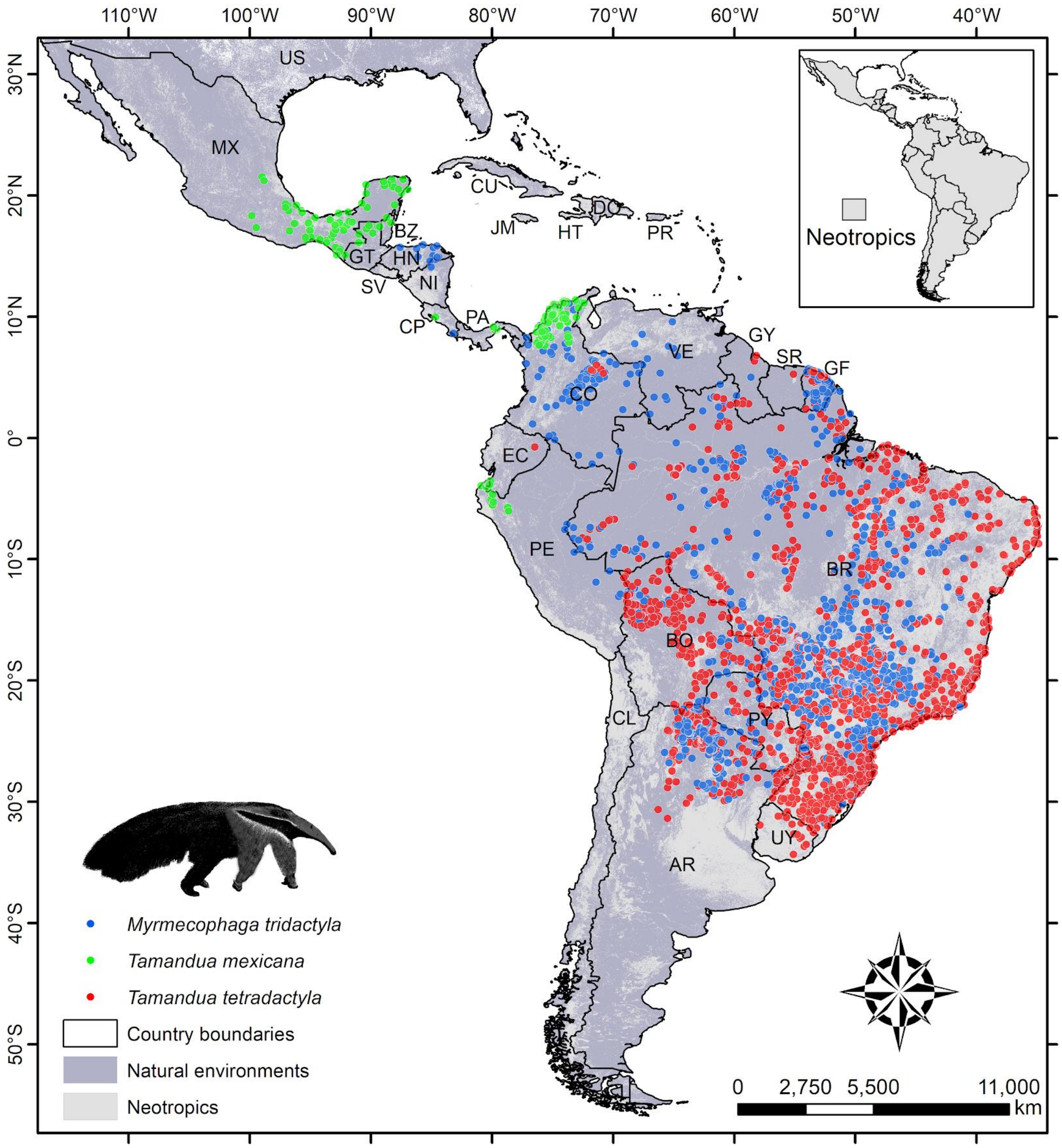

Fig. 6: Distribution of the records of the family Myrmecophagidae of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from 1899 to 2018, thus several populations may now be extinct. Unconfirmed species with “sp.” are not included.

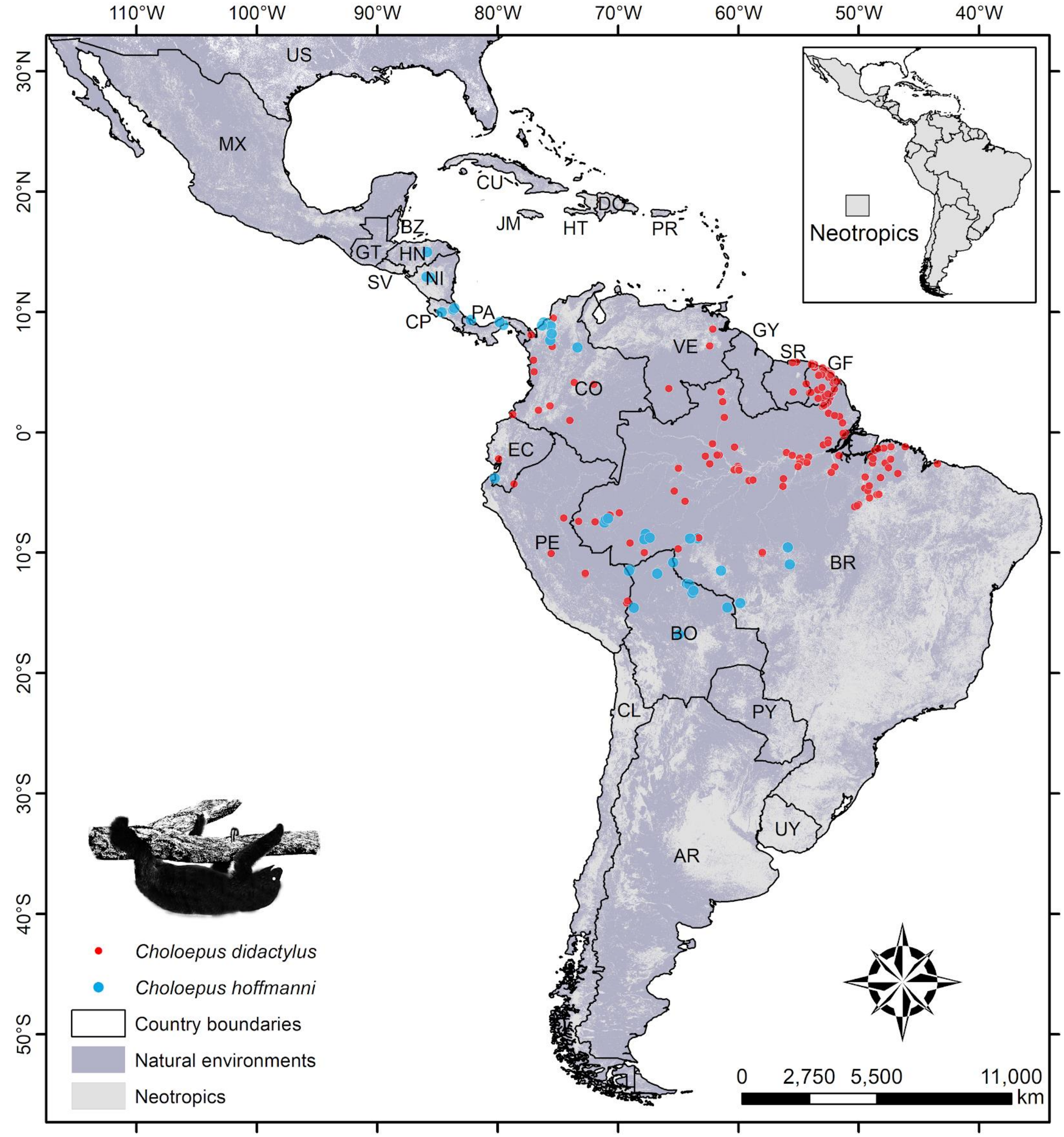

Fig. 7: Distribution of the records of the family Megalonychidae of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from 1919 to 2017, thus several populations may now be extinct. Unconfirmed species with "sp." are not included.

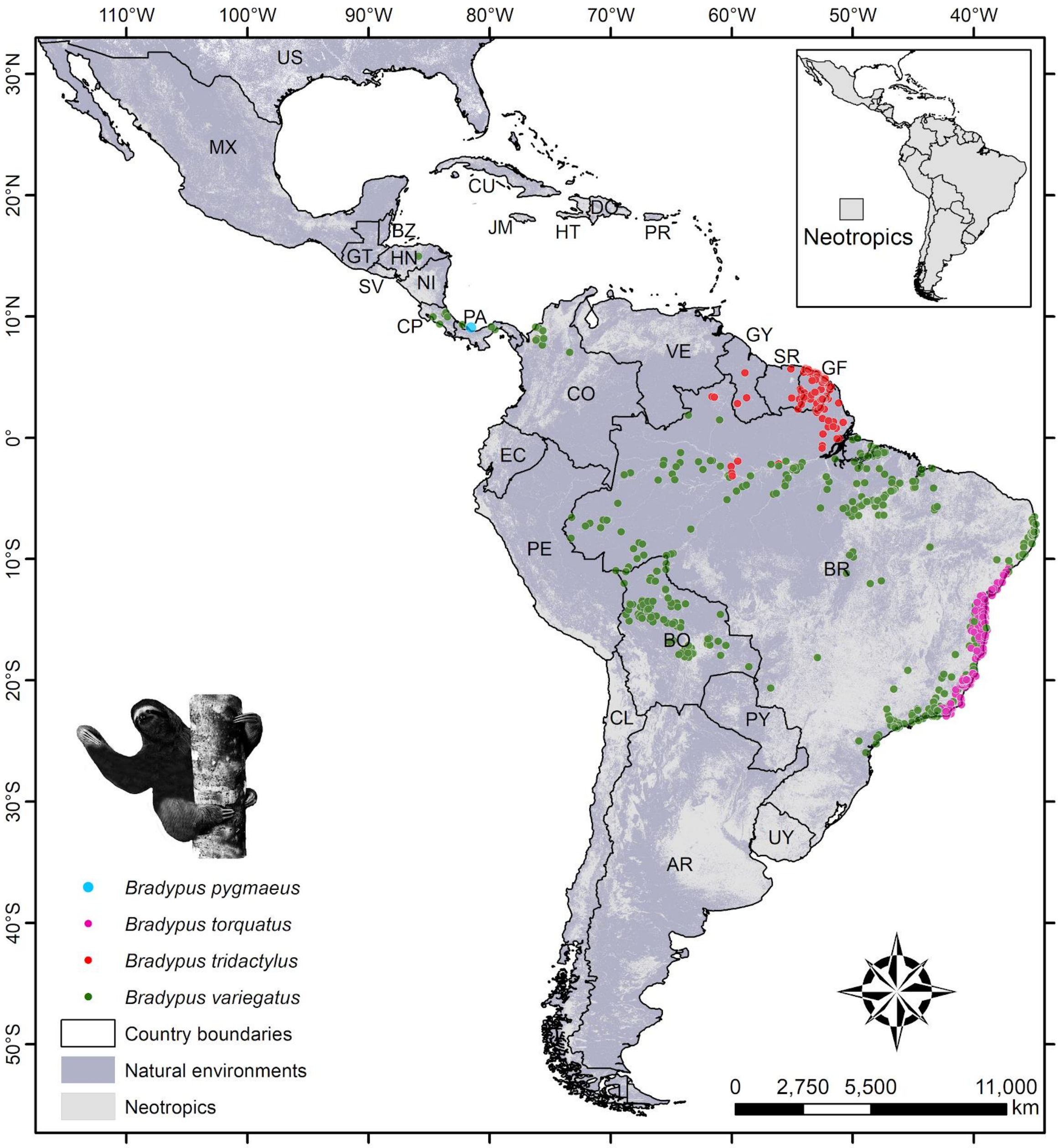

Fig. 8: Distribution of the records of the family Bradypodidae of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from 1911 to 2018, thus several populations may now be extinct. Unconfirmed species with "sp." are not included.

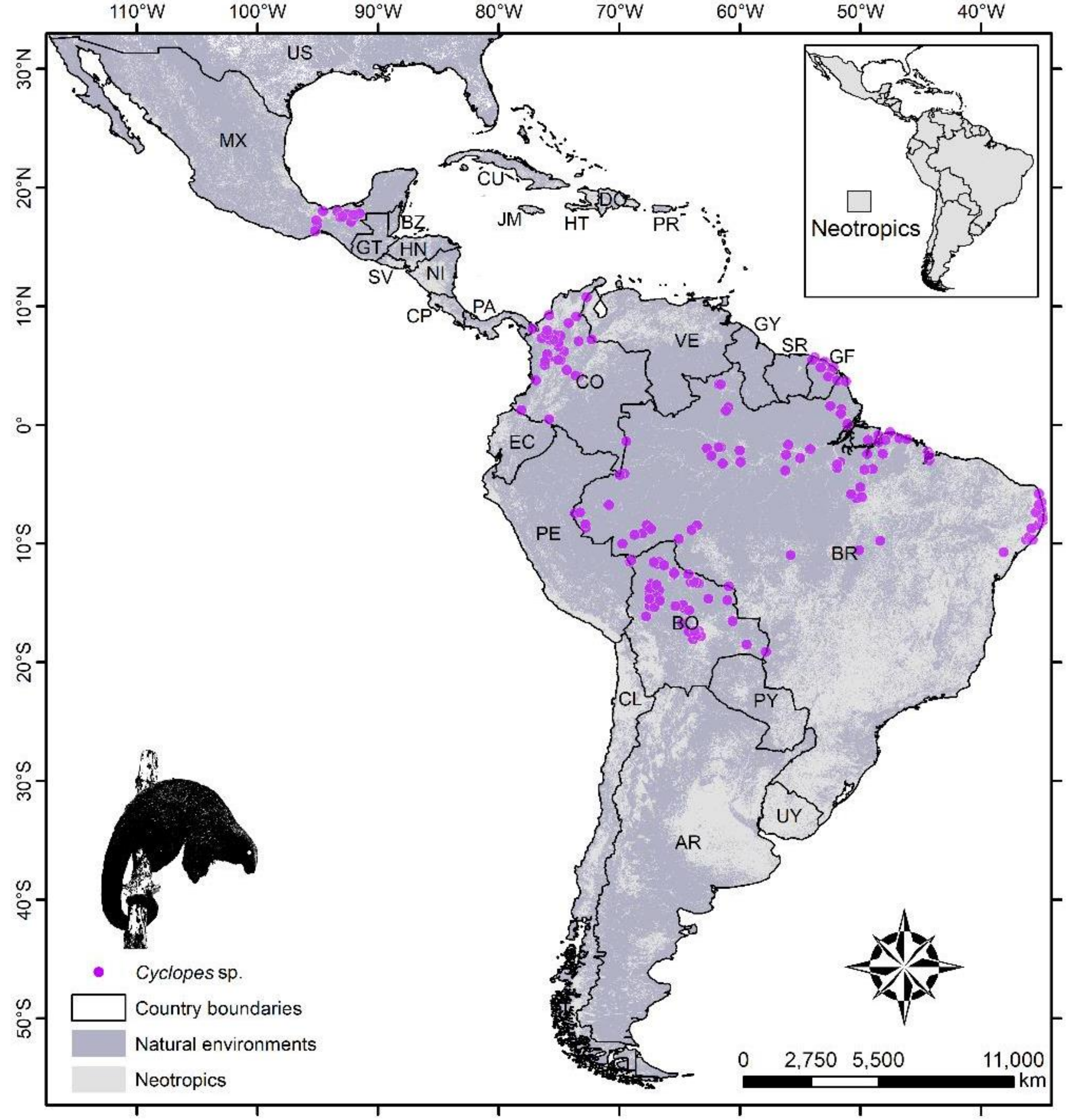

Fig. 9: Distribution of the records of the family Cyclopedidae of the NEOTROPICAL XENARTHRANS dataset in Neotropical realm. Records are from 1931 to 2017, thus several populations may now be extinct.

Of the 19 different methods identified, camera trapping most-frequently documents xenarthran species, responsible for 13,866 of the records (38.42%), especially when used in conjunction with other methods (Table 3). But even when used as the sole sampling method, camera trapping is still the most-frequently method (32.4%). Roadkill is the second most-successful method, accountable for 14.6% of the records. Active search is mostly used in combination with other methods, followed by interview. Other methods include line transect, vestiges, museum collections, telemetry, bibliographical survey, live trapping, sand plots, track plots, car monitoring, and opportunistic encounters (Table 3). About 83.90% of the records correspond to presence-only data, 10.02% to presence-absence data, and 6.08% to quantitative data.

According to our database, studies on Xenarthra have been increasing in recent years (Figure 10). Most of the data (< 10,000 records) were collected between 2010 and 2014, and this is the major period for most species (Figure 11). There are less than 100 records from a less-studied period from 1970 to 1974 (Figure 10) and 24 of the 31 species has records on this period (Figure 11).

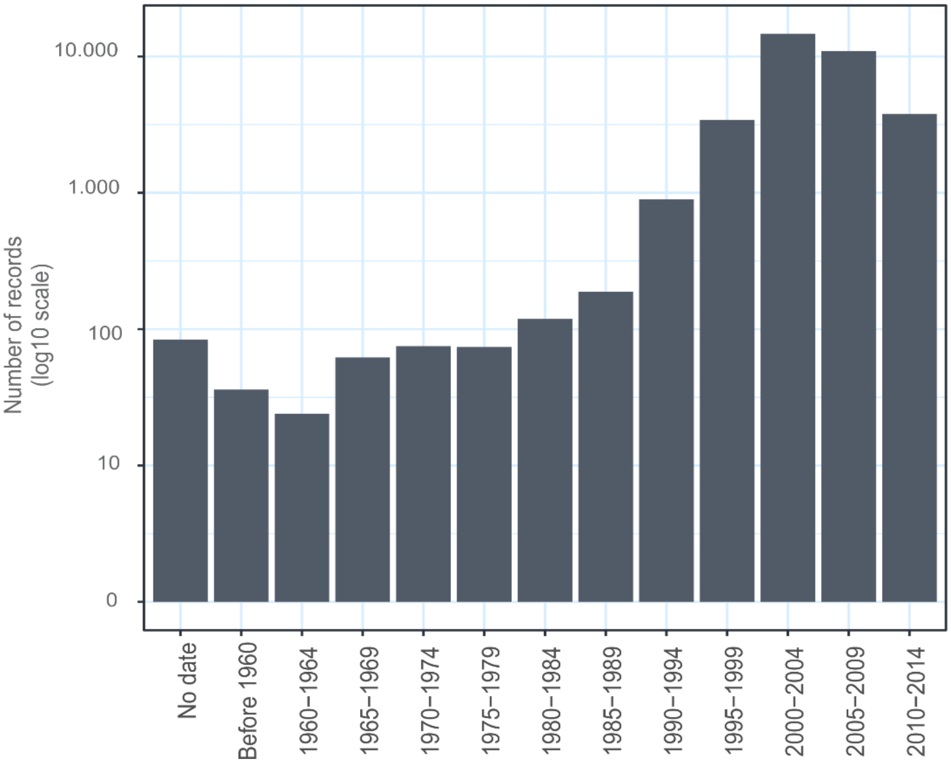

Fig.10: Number of xenarthran records over time.

Fig.11: Proportion of the records over time for each xenarthran species.

The records are concentrated in some regions along the Neotropical realm (Figure 1). On one hand, Bolivia, southeastern Brazil, northern Argentina, Mexico, and Guiana hold the most records. Alternatively, some regions, such as the Amazon - mainly due the low accessibility to this area (Figure 1) - and some countries in South and Central America such as Chile, Peru, Costa Rica, and

Panama, have few records - mainly due the lack of contact with researchers of theses area; Figure 1; More details - Class II, Topic C: Data Limitations and Potential Enhancements).

To characterize the environmental conditions of the Neotropical area, we overlapped all data locations with the environment maps, using the function "extract" of the raster package in the R program. The raster files corresponding to temperature and precipitation values were obtained from the WorldClim database 1.4 (http://www.worldclim.org/version1). The altitude of most records is below 1,000 m, with a peak around lowland regions (between 200 and 300 m; Fig. 12). The average annual temperature of the sampling sites varies mainly between 20 and 27° C, and few sampling records show temperatures below this range (which is expected for the neotropical region; Fig. 12). Lastly, annual precipitation varies mostly between 1,500 and 2,000 mm, and few sampling sites show values above 2,000 mm. Elevation data were obtained from the digital elevation map from the CGIARCSI database version v4.1 (http://www.cgiar-csi.org/data/srtm-90m-digital-elevation-database-v4-1). The digital elevation model has 1 km of spatial resolution and is available in a unique file in ".tif" format.

Natural environment layers for the maps were obtained from the land-use map from the http://due.esrin.esa.int/page_globcover.php. We used the description of Appendix III to identify only the areas described as natural areas that overlapped with the Neotropics realm boundary (http://due.esrin.esa.int/files/GLOBCOVER_Products_Description_Validation_Report_I2.1.1.pdf). The legend codes classified as natural environment areas were: 40, 50, 60, 70, 90, 100, 110, 120, 130, 140, 150, 160, 170, and 180.

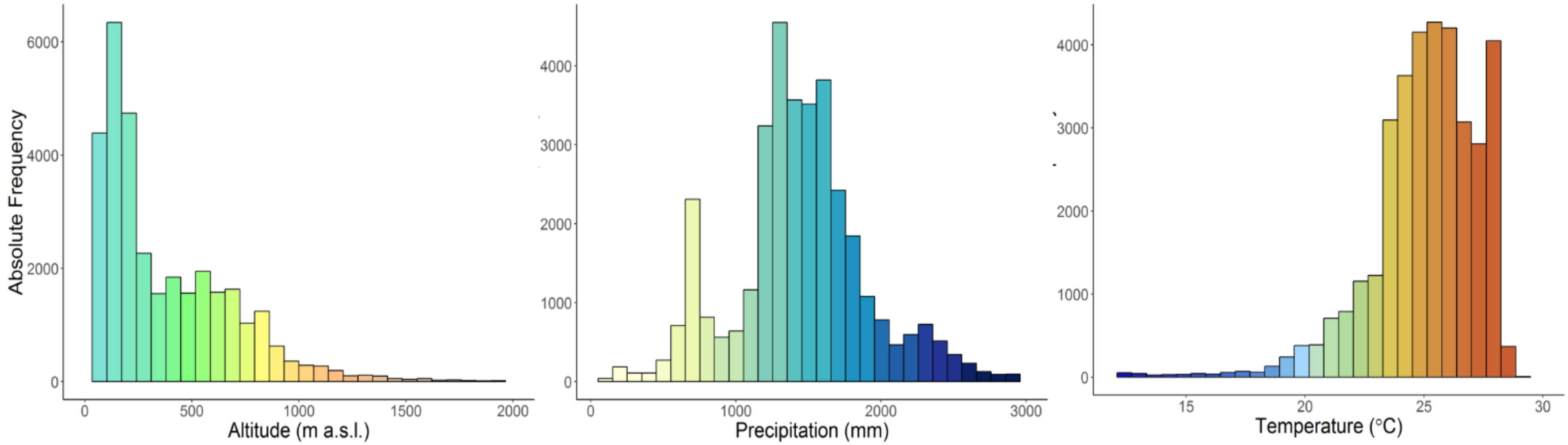

Fig. 12: Variation of altitudes, annual mean temperature, and annual precipitation of the study sites in the NEOTROPICAL XENARTHRAN dataset.

Class II - Research Origin Descriptors

A. Overall project description

Identity

A compilation of xenarthran (armadillos, anteaters, and sloths) occurrence and quantitative data in Neotropical Regions.

Originator (s)

The Neotropical Xenarthrans project was coordinated by Paloma M. Santos at the Universidade Federal de Minas Gerais (UFMG) and all authors contributed in the assembly of the database. This research is part of the NEOTROPICAL, ATLANTIC, BRAZIL, AMAZONIA, and NEOTROPICAL series, which is led by Mauro Galetti and Milton Cezar Ribeiro, Universidade Estadual Paulista (UNESP).

Period of the study

Years of source publications range from 1855 – 2018

Objectives

With this paper, we aimed (i) to compile all raw and unpublished xenarthran data collected in recent decades by researchers, projects, and consultants; (ii) to compile the information available in the Portuguese, Spanish, and English literature regarding xenarthran inventories in Neotropical regions, both occurrence only, population, and community data, including the corresponding methods and sampling efforts.

Abstract

Same as above

Source(s) of funding

The compilation of this dataset was supported by grants, fellowships, and scholarships from the Agence Nationale de la Recherche (National Research Agency from France) CEBA, ref. ANR-10-LABX-25-01, Agencia Nacional de Promoción Científica y Técnica de Argentina (National Agency for Scientific and Technical Promotion of Argentina, AGENCIA), Alexander Koenig Society, Amazonas Distribuidora de Energia S.A, Conselho Nacional de Desenvolvimento Científico e Tecnológico (Brazilian Research Council, CNPq) numbers 307016/2015-3, 106186/79, 300982/82, 153423/2016-1, 301061/2007-6, 425746/2016-0, 207195/2014-5, 457434/2012-0, 563134/2010-0, 457497/2012-2, 457491/2012-4, 401887/2014-6, 459735/2014-4, 161089/2014-3, 301652/2015-5, 484350/2013-7, 503372/2014-5, 150123/2018-3, 472802/2010-0, 141057/2008-4, 158990/2014-5, 303006/2014-5, 141263/2016-4, 306392/2013-5, 140730/2010-9, 140039/2018-1, 216938/2014-7, 457458/2012-7, 141041/2008-0, 307781/2014-3, 307303/2017-9, 306695/2015-4 and 421361/2017-4, Casadinho/PROCAD 552198/2011-0, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Coordination for the Improvement of Higher Education Personnel, CAPES) numbers 1840/2015, 817737/2015, 1537137, 303757/2012-4, 080410/0, 004/2012 and 3261/2013, PNPD/CAPES number 283-60/2013, COFECUB/CAPES numbers 88887.130202/201701 and 88887.143361/201700, American Society of Mammalogists, Anglo American, Associação Comunidade Waimiri Atroari, Associação de Defesa Etnoambiental Kanindé, BioFaces, Blue Moon, Brehm Foundation for International Bird Conservation, BRVias, Cambuhy Agrícola Ltda., Chinese Academy of Sciences President’s International Fellowship Initiative number 2018PB0040, Christian Rossell, Conservation International Brazil (CI Brazil), Cleveland Metropolitan Zoo, Club de amigos del yaguareté, CNEC WorleyParsons resources and energy, COFUSA Forestry company, Departamento Administrativo de Ciencia, Tecnología e Innovación, Estudios de Doctorado en el Exterior (COLCIENCIAS), Comisión Nacional Forestal, Secretaría de Medio Ambiente y Recursos Naturales, Comisión Nacional de Áreas Naturales Protegidas-Reserva de la Biosfera Pantanos de Centla; Área de Protección de Flora y Fauna Laguna de Términos, Companhia de Concessão Rodoviária de Juiz de Fora – RJ (CONCER), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Consejo Nacional de Ciencia y Tecnología de México (CONACYT), Conservation International's Margot Marsh Primate Action Fund numbers 1001257, 6002856, Conservation Leadership Programme number F02304217, Conservation Program of Endangered Species (PROCER-Mexico) of the National, Commission of Protected Areas (CONANP-Mexico), Conservation, Food and Health Foundation, Consorcio del Mayab, Cota-Robles Graduate Fellowship, China Three Gorges Corporation (CTG-Brazil), Darwin Initiative, DICE Small Grant Program, Durrell Wildlife Conservation Trust, Earthwatch Institute, El Colegio de la Frontera Sur, Unidad Campeche ECOSUR, Fauna and Flora International, Fazenda Barranco Alto and Fazenda Vera Lúcia, Fundação para a Ciência e a Tecnologia (FCT)-Portugal (SFRH/BD/40638/2007), Fibria Celulose S.A., Fundação de Amparo à Pesquisa do Estado do Amazonas (FAPEAM), Fundação de Amparo à Pesquisa do Estado de Goiás (FAPEG) number 11/2013, Fundação de Amparo à Pesquisa e ao Desenvolvimento Científico e Tecnológico do Maranhão (FAPEMA), Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG) numbers CRA- RDP-00104-10; CRA 00357/07; APQ 01145-10, APQ-03315-16 and APQ-00604-17, Fundação de Amparo à Pesquisa do Estado do Rio Grande do Sul (FAPERGS), Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ) numbers E-26/102.960/2012 and E26 /201.267/ 2014, Fundação de Amparo à Pesquisa e Inovação do Espírito Santo (FAPES) numbers 0607/2015 and 0510/2016, Fundação de Amparo à Pesquisa do Estado da Bahia (FAPESB), Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC) numbers 06/2016 and 189/2016; Programa de Apoio à Pesquisa (PAP/FAPESC) number 2017TR744, Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) numbers 2013/04957-8, 2012/14245-2, 2013/18526-9, 2014/16320-7, 2013/50421-2, 2016/11595-3, 2014/01986-0, 2015/18381-6, 2014/23095-0, 2014/23132-2, 2013/50421-2, 2014/10192-7, 2015/25742-5, 2015/11521-7, 2011/22449-4, 2014/01986-0, 2013/10029-6, 2014/24921-0, 2016/16433-1, 2015/22844-1, 2017/12925-0, 2014/50434-0, 2014/09300-0, 2013/50421-2, 2015/10778 and 2014/16320-7, Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco (FACEPE), Fundação de Amparo ao Ensino e Pesquisa (FAEP), Fundação de Tecnologia do Estado do Acre (FUNTAC), Fundação Estadual do Meio Ambiente e Recursos Hídricos de Roraima number 01683/09-01, Fundação Grupo Boticário de Proteção à Natureza, Fundación Vida Silvestre Argentina, Fundação de Desenvolvimento Científico e Cultural (FUNDECC) , Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia do Estado de Mato Grosso do Sul (FUNDECT) numbers 0223/2014 and 06/2016, Fundo Brasileiro para a Biodiversidade – Tropical Forest Conservation Act agreement (FUNBio/TFCA), Global Heritage Fund, Grupo de Ecología de Paisaje y Medio Ambiente de la Universidad de Buenos Aires, Grupo Zema, Hamerton Zoo Park, Heinrich Hertz Foundation, Hotel Belmond, Idea Wild, Instituto Estadual de Florestas (IEF/MG) number 2101010400410, Ingenieros Civiles Asociados división Infraestructura (ICAi), Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio), International Foundation for Science, International Paper Co. of Brazil, Instituto de Pesquisas e Estudos Florestais (IPEF), Kirschbaum Foundation, Lincoln Park Zoo, Liz Claiborne and Art Ortenberg Jaguar Small Grants (Panthera Foundation), Lwarcel Celulose Ltda, Max Planck Institute, Ministerio de Ecología y Recursos Naturales de la Provincia de Misiones, Ministério Público de Minas Gerais, Ministry of Culture and Science of North Rhine-Westphalia , Mohamed bin Zayed Species Conservation Fund numbers 12055114 and 0925815, National Council of Science and Technology of Mexico, National Geographic Society grant number W314-14, National Institute for Science and Technology in Wetlands (INAU / UFMT), National Science Foundation (NSF) Pre-doctoral Fellowship grant number 0709598, Overbrook, Programa de auxílio ao Pesquisador (PAPESQ/UNIFAP) number 015/2015, Pays de la Loire - Strategies Internationales (CASEST), Pesquisas Ecológicas de Longa Duração (PELD/CNPQ) numbers 88887.140649/2017-00 and 441278/2016-7 (JSS), PELD Parque Nacional da Serra da Bodoquena (PELD/PNSB), People’s Trust For Endangered Species (PTES), President's International Fellowship Initiative grant number 2018PB0040, Primate Conservation Inc. number 1158, Projeto de Conservação e Utilização Sustentável da Diversidade Biológica Brasileira do Ministério do Meio Ambiente (PROBIO/MMA), Programa Áreas Protegidas da Amazônia (ARPA), Programa Beca, Programa Clima, Naturaleza y Comunidades en Guatemala (CNCG), Programa das Nações Unidas para o Desenvolvimento (PNUD) , Programa de Concessão de Bolsa de Incentivo ao Pesquisador da Universidade Estadual de Goiás (PROBIP/UEG) number 009/2016, Programa Nacional de Incentivos a Investigadores, Projeto Estrada Ecológica and Novo Colégio, Projeto Onçafari, Pró-Reitoria de Pesquisa e Pós-Graduação da Universidade

Estadual de Santa Cruz–(PROPP/UESC) number 00220.1100.1735, Pró - Reitoria de Assuntos Estudantis da Universidade Federal do Rio Grande do Sul (PRAE, UFRGS), Pró -Vida Brazil, Rainforest Alliance, Red de Macro Universidades de América Latina y el Caribe and Santander Bank , Resource Award, Ridgeway Trust , Royal Ontario Museum (ROM Governors), Rufford Foundation grants number 18442 -1, 12658 -1, 20144 -2 and 21498 -1, San Diego Zoo Global, Segré Fondation, Secretaria do Meio Ambiente (SEMA), Secretaría de Ciencia y Técnica, Serviço Social do Comércio (SESC), Sistemas Estratégicos para la Gestión Ambiental (SEGA), Sistema Nacional de Pesquisa em Biodiversidade (SISBIOTA/CNPq) numbers 563134/2010 -0 and 563216/2010 - 7, Smithsonian Tropical Research Institute, Sophie Danforth Conservation Biology Fund, SOS Mata Atlântica Foundation, Studienstiftung des Deutschen Volkes, Superintendência da Zona Franca de Manaus (SUFRAMA), Suzano Papel e Celulose S.A., The Ashoka Foundation, The Conservation, Food and Health Foundation, The Nature Conservancy, The Rolex Awards, The Scott Neotropical Fund of the Lincoln Park Zoological Society, The Species Survival Fund from Wildlife Trust, The Whitley Awards, The Woodland Park Zoo, Tijoá Energy, Tropical Ecology Assessment and Monitoring (TEAM), United States Agency for International Development (USAID), United States Department of the Interior (USDOI), Universidade Vila Velha, University of California, University of Puerto Rico, Unidad para el Cambio Rural (UCAR), Ministerio de Agroindustria, Argentina (PIA) numbers 2011/10102 and 2014/14061, Universidad Nacional de San Luis, Facultad de Química, Bioquímica y Farmacia., Usina Caeté, Usina Coruripe LTDA, Wildlife Conservation Society (WCS) Bolivia, WCS Brazil, WCS Guatemala, WCS Jaguar Conservation Program, WCS Research Fellowship Program Grant , Wild Felid Legacy Scholarship, Wildlife Trust, World Wide Fund for Nature (WWF) United States of America, WWF

Brazil, WWF EFN Scholarship Program, Zoological Gardens of Dortmund and Cologne, Zoological Society of London; EDGE of Existence (EDGE , ZSL), Zoological Society of San Diego, Consórcio Capim Branco Energia (CCBE). MCR thanks FAPESP (process #2013/50421-2), CNPq (processes # 312045/2013-1; #312292/2016-3), and PROCAD/CAPES (project # 88881.068425/2014-01) for their financial support.

B. Specific Subproject description

Site Description

The target area comprises all the Neotropical realm and part of North America (Mexico and southeastern United States). We included those areas to cover the entirety of Xenarthra's distribution. The Neotropical region is one of the eight biogeographic terrestrial realms (i.e., "ecozones") of the Earth's surface (Olson and Dinerstein 1998, Olson et al. 2001). It extends from parts of Mexico, southeast USA (southern Florida and coastal central Florida), Central America, and Caribbean countries, to the austral distribution of South America. Including the Central USA and the highlands of Mexico, the coordinates extend from 30^{o}N to 50^{o}S, and 110^{o}W to 40^{o}W, encompassing approximately 51% of the American continent territory – about 21 million km^2 of territorial extension - with most parts located in South America. The vegetation type is composed of different forests, savannas, mangroves, chaco, sandy vegetation, xeric vegetation, altitudinal open and rocky fields, cloud forest, floodplains, freshwater marshes, Andean and lowland environments, etc. The region includes more than half of the American continent population (approximately 55%), residing mainly in important and large metropolitan areas, such as São Paulo, Mexico City, Buenos Aires, and Rio de

Janeiro (IBGE 2018, INEGI 2015, INDEC 2010). These figures suggest a strong and severe anthropogenic impact on natural areas, and consequently on biodiversity. The region has a high rate of endemism and a unique but threatened biodiversity. Therefore, the target area includes seven of the 35 world biodiversity hotspots: the Cerrado, the Atlantic Forest, Tropical Andes, Tumbes-Choco-Magdalena, Valdivian Forests, Mesoamerica and Caribbean Islands (Myers et al. 2000, Mittermeier et al. 2011), beyond the Amazon Forest, one of the largest and most important tropical forest in the world.

Data Compilation

We created a collaborative network of researchers who had collected and published data on xenarthran occurrence and community composition in the Neotropics and invited everyone to contribute to this NEOTROPICAL XENARTHRANS data-paper (i.e., their data would be added to our dataset). In addition, we collected occurrence data from the following museums and institutions: Museu Nacional/Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ), Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP), Centro de Primatologia do Rio de Janeiro, Rio de Janeiro, Brazil (CPRJ), Museu da Fauna, Rio de Janeiro, Brazil (MFRJ), Museu Paraense "Emílio Goeldi", Pará, Brazil (MPEG), Fundação Zoobotânica do Rio Grande do Sul (FZBRS), Museu de História Natural do Capão da Imbuia, Paraná, Brazil (MHNCI), Centro Universitário Barra Mansa, Rio de Janeiro, Brazil (CUBM), Pontifícia Universidade Católica do Rio Grande do Sul, Rio Grande do Sul, Brazil (PUC-RS), Universidade Federal da Paraíba (UFPB), Paraíba, Brazil, Universidade Federal do Rio Grande do Norte (UFRN), Rio Grande do Norte, Brazil, Universidade Federal de Viçosa (UFV), Minas Gerais, Brazil, Universidade de Brasília (UnB), Brasília, Brazil, Universidade Federal de Santa Catarina (UFSC), Santa Catarina, Brazil, Museu

Arquidiocesano Dom Joaquim, Santa Catarina, Brazil (MADJ), Museu do Colégio Agrícola de Camboriú Gert Hering, Santa Catarina, Brazil (MCAGH), Museu do Seminário Coração de Jesus, Santa Catarina, Brazil (MSCJ), Museu de Ciências Naturais, Rio Grande do Sul, Brazil (MCN), Museu de História Natural, Lisbon, Portugal (MHNL), Museu Bocage, Lisbon, Portugal (MBL), Museo de Historia Natural de Valparaíso, Chile (MHNV), Museu Argentino de Ciências Naturais Bernardino Rivadavia, Argentina (MACN), Museum Zoologicum Bogoriense (MZB), American Museum of Natural History, New York (AMNH), Field Museum of Natural History, Chicago (FMNH), British Museum (Natural History), London (BMNH), Smithsonian Institution National Museum of Natural History, Washington, D. C. (USNM), and Kansas University Natural History Museum, Lawrence, Kansas (KUNHM).

After the first round of data compilation, we performed a systematic review of published literature on occurrence records and abundance of Xenarthra in the Neotropics using the following electronic databases: Web of Science (http://scientific.thomson.com/isi/), Science Direct (https://www.sciencedirect.com/), PubMed (https://www.ncbi.nlm.nih.gov/pubmed/), and Google Scholar (https://scholar.google.com.br/). We searched these databases for relevant articles using combinations of the following search terms within the title, abstract, and/or keywords: genus of Neotropical xenarthrans and location names (countries, states, and provinces or biomes and ecosystems) that lacked information in the first round of data compilation. Search terms were used in both English, Portuguese, and Spanish.

Research Methods

All studies that report location coordinates of occurrence or abundance of xenarthrans were included in NEOTROPICAL XENARTHRANS, independent of sampling method or effort. All the recorded coordinates are in decimal degrees, and the datum is WGS 84. Although most of such data includes the precise location of species records, a small portion of the data refers to municipalities, roads, protected areas, or farms (i.e., the location is not precise). However, we have a PRECISION attribute on the database that allows users to track the geographic coordinate precision and identify whether the level of precision satisfies their requirements.

The focus of our data-paper is Neotropical regions, and we delineated this boundary considering the literature description of the realm boundary, encompassing Central America including Mexico, the Caribbean islands, and South America. For the complete database, however, we also allowed contributors to send data for the transitional zone between the Neotropics and neighboring regions, both at northern and southern parts of the Neotropical range. Therefore, if users are interested in the stricto sensu Neotropical regions, we suggest that they use their boundaries of interest, overlap that data, and extract which data they want to use.

We organized the entire dataset into two different sub-datasets, separated according to the data type: quantitative information (*i.e.*, more than one record per point) and qualitative information (i.e., presence and absence and presence-only data; only one record per point). The quantitative information (Table 4) contains all quantitative data (*i.e.* number of records per point) obtained by different methods, such as linear transect, telemetry, and camera trapping. Qualitative data (Table 5) includes all records of occurrence data (individual and occasional records of xenarthran species, independent of the method used), including interviews, museum collections, line transects, camera traps, roadkill, active searches, vestiges, and opportunistic visualization. All the missing information was labeled as “NA” in the dataset.

Data were compiled from Darwin 1842, Bard 1855, Lahille 1899, Miller 1899, Allen 1905, Thomas 1919, Yepes 1938a, 1938b, 1939, 1944, Minoprio 1945, Giai 1950, Vieira 1953, Zeballos 1960, Roig 1965, Rood 1970, Crespo 1974, 1982, Olrog 1976, 1979, Orcés and Albuja 1976, Wetzel and Avila-Pires 1980, Daciuk et al. 1981, Mares et al. 1981, 1996, McCarthy 1982, Massoia and Chebez 1985, Montgomery 1986, Navone 1987, 1988, George et al. 1988, Mascarenhas and Puorto 1988, Cardich 1988, Ojeda and Mares 1989, Cuaron et al. 1989, Stallings et al. 1990, Janzen 1991, Márquez et al. 1991, Carrillo-Jiménez and Wong-Reyes 1992, Del Vitto et al. 1993, Administración de Parques Nacionales 1993, Parker et al. 1993, Heinonen and Bosso 1994, Juliá et al. 1994, Barnnet and Cunha 1994, Vidoz and González 1994, NEA 1995, Pujalte et al. 1995, Brooks 1995, Bolkovi et al. 1995, Rodríguez and Chinchilla 1996, Capllonch et al. 1996, Cherem and Perez 1996, Heinonen Fortabat and Chebez 1997, Gaia 1998a, 1998b, 1998c, INEFAN/GEF 1998, BIOLAW 1998a, 1998b, Suare et al. 1998, Cadena et al. 1998, Díaz 1999, Acosta and Murúa 1999, Toledo et al. 1999, Bolkovic 1999, Calouro 1999, Chiarello 1999, Cuervo-Maya et al. 2000, Cullen et al. 2000, Diaz 2000, Lopes and Ferrari 2000, Sánchez 2000, Tabeni 2000, 2001, Wallauer et al. 2000, Balabusic and Ruiz 2001, McCain 2001, Printes et al. 2001, Vizcaíno and Giallombardo 2001, Bowen-Jones 2001, Caro et al. 2001, Graipel et al. 2001, Instituto Ambiental do Paraná 2002a, 2002b, 2004, 2006a, 2006b, 2015a, 2015b, 2015c, Marques-Aguiar et al. 2002, Perovic 2002, Sanabria and Quiroga 2002, Soares and Carneiro 2002, Trucco and Gato 2002, Ceballos 2002, Chalukian et al. 2002, Fernandez 2003, Gil and Heinonen 2003, Jerez and Halloy 2003, Medri et al. 2003, Moreno-Bejarano and Álvarez-León 2003, Moura 2003, Notarnicola and Navone 2003, Prado et al. 2003, 2008, Rodrigues et al. 2003, Agüero et al. 2003, Sanderson and Silveira 2003, Trolle 2003, Agüero et al. 2005, Braga 2003, 2010, Peres et al. 2003, Castaño et al.

2003, Amorim et al. 2004, Cherem et al. 2004, 2007, 2008, 2011, Cunha 2004, Fischer et al. 2004, Hervas et al. 2004, ICMBio 2004, 2005, 2006, 2007, 2008a, 2008b, 2008c, 2009, 2010, 2011a, 2011b, 2012a, 2012b, 2013a, 2013b, 2013c, 2016, Iwanaga 2004, Jones and Young 2004, Barbarán 2004, Naranjo et al. 2004, Pérez-Jimeno and Amaya 2004, Prada 2004, Sánchez et al. 2004, Superina et al. 2004, Unidad Administrativa Especial de Parques Nacionales Naturales de Colombia 2004, 2005, Mendes Pontes 2004, Brito et al. 2004, Arroyo Cabrales et al. 2005, Azurduy et al. 2005, Instituto de Biologia 2005, Mendes Pontes et al. 2005, 2016, Boada and Román 2005, Vaz 2005, Carrizo et al. 2005, CATIE et al. 2005, Alves and Andriolo 2005, Corredor et al. 2005, Cherem 2005, Srbek-Araujo and Chiarello 2005, 2013, Cisneros 2006, Correa and Ortiz 2006, Escobar Ocampo et al. 2006, Huertas and Donegan 2006, Barahona Cáceres 2006, Lorenzutti and Almeida 2006, Monguillot 2006, Mora 2006, Oliveira et al. 2006, 2013b, 2013a, 2015, 2016, Pavé and Calderón 2006, Reis et al. 2006, Ruiz 2006, Bordignon et al. 2006, Chassot et al. 2006, Chavez-Leon 2006, Rocha and Dalponte 2006, Aldana et al. 2006, Lara-Ruiz and Srbek-Araujo 2006, Trinca et al. 2006, Corredor-Carrillo and Muñoz-Saba 2007, FATMA 2007, 2009, 2010a, 2010b, 2016, Wetzel et al. 2007, Bovendorp and Galetti 2007, Cáceres et al. 2007, Kasper et al. 2007, Díaz-N and Sánchez-Giraldo 2008, Gardner 2008, Landmann et al. 2008, Barros 2008, Modesto et al. 2008a, 2008b, Moreira et al. 2008, Moreira-Ramírez et al. 2008, Penter et al. 2008, Pereira et al. 2008, 2013, Rodríguez-Mahecha et al. 2008, Silva 2008, Silva and Mendes Pontes 2008, Smith 2008, Tavares and Koenemann 2008, Vizcaíno and Loughry 2008, Bezerra et al. 2008, Santos et al. 2008, 2016, Araújo et al. 2008, Miranda et al. 2008, 2009, Abreu-Júnior and Köhler 2009, Chiquito and Percequillo 2009, INEA 2009, Ballesteros et al. 2009, INEA 2010, 2011a, 2011b, 2015a, 2015b, Koenemann 2009, Lima 2009, López and Hernández 2009, Mejía-Correa and Díaz-

Martínez 2009, Moreira De Lima et al. 2009, Pautasso et al. 2009, Pérez Jimeno and Llarín Amaya 2009, Sáenz-Bolaños and Carrillo-Jiménez 2009, Timm et al. 2009, Torres et al. 2009, Cassano and Kierulff 2009, Di Bitetti et al. 2009, Goulart et al. 2009, Rocha and Silva 2009, Srbek-Araujo et al. 2009, Pessôa et al. 2009, Santos-Filho and Silva 2009, Kreutz et al. 2009, CONABIO 2010, Araújo Xavier et al. 2010a, 2010b, Galván-Guevara 2010, Gomez and Bayly 2010, Balaguera-Reina et al. 2010, Instituto de Investigaciones Ambientales del Pacifico (IIAP) 2010, Jayat and Ortiz 2010, Macedo et al. 2010, Muñoz-Saba 2010, 2012, Paviolo 2010, Rezini 2010, Botello et al. 2010, Bruna et al. 2010, Castaño and Corrales 2010, Braga et al. 2010, 2014, 2018, Rosa et al. 2010, Dantas-Torres et al. 2010, Miranda and Superina 2010, Moraes-Barros et al. 2010, Ramírez-Chaves and Noguera-Urbano 2010, Wallace et al. 2010, 2013, Corpoguajira et al. 2011, Cruz-Rodríguez et al. 2011, Arcos Delgado 2011, Fabian et al. 2011, Galvis-Penuela et al. 2011, González-Zamora et al. 2011, Marques et al. 2011, Nascimento and Campos 2011, Tortato et al. 2011, 2014, Diniz and Brito 2012, Hack 2012a, 2012b, 2014, 2017, Manzatti and Franco 2012, Martins et al. 2012, 2016, Massoia et al. 2012, Padilla and Pérez 2012, Bertassoni et al. 2012, Penido and Zanzini 2012, Bertassoni et al. 2017, Salvador 2012, Sandoval-Gómez et al. 2012, SPVS 2012, Bonjorne 2012, Cabrera 2012, Hirsch and CHIARELLO 2012, Brocardo and Cândido Júnior 2012, Delciellos et al. 2012, Santos and Mendes-Oliveira 2012, Chacón Pacheco et al. 2012, 2013, 2017, Rocha et al. 2012, 2013, 2015, Botelho et al. 2012, Di Blanco et al. 2012, Catzeflis and Thoisy 2012, Monterrubio et al. 2012, Escobar-Lasso et al. 2013, Feijó and Langguth 2013, Fundación Jatun Sacha 2013, Geraldo Junior et al. 2013, Pazio 2013, Quiroga 2013, Rocha 2013, Rojano et al. 2013, 2016, Silva et al. 2013a, 2013b, 2013c, 2017, Weber et al. 2013, Bogoni et al. 2013, 2016a, 2016b, Nunes et al. 2013, Vásquez et al. 2013, Corrêa et al. 2013, Garmendia et al. 2013, Hack and Krüger

2013, Bauni et al. 2013, Costa 2014, Díaz-Pulido et al. 2014, Hack and Santos 2014, Juraszek et al. 2014, Miranda Júnior and Bertassoni 2014, Miretzki and Braga 2014, Pereira and Bazilio 2014, Racero-Casarrubia and González-Maya 2014, BirdLife International 2014, Bogoni 2014, Canon and Trujillo 2014, Carvalho et al. 2014, Clozato et al. 2014, 2015, Freitas et al. 2014, Borges et al. 2014, 2015, Brown et al. 2014, Magioli et al. 2014, 2016, Feijó and Cordeiro-Estrela 2014, 2016, Hannibal 2014, Dias and Bocchiglieri 2015a, 2015b, Aximoff et al. 2015b, 2015a, Hannibal et al. 2015, 2018, Baltensperger and Brown 2015, Jiménez-Alvarado et al. 2015, Batista 2015, Reyes-Amaya et al. 2015, Cherem and Althoff 2015, Feijó et al. 2015, 2018, Ramírez-Mejía and Sánchez 2015, Hannibal and Neves-Godoi 2015, Hendges et al. 2015, Fernandes-Ferreira et al. 2015, Benchimol and Peres 2015, De La Ossa Lacayo and De La Ossa 2015, Zanin et al. 2015, Falconi et al. 2015, Giné et al. 2015, Melo et al. 2015, David Lopez 2016, De La Ossa and Galván-Guevara 2016, Ecofuturo 2016, Figueroa-De-León et al. 2016, Bernardo 2016, Preuss et al. 2016, Tinoco-Sotomayor et al. 2016, Xavier 2016, Deffaci et al. 2016, Cuyckens et al. 2016, Porras et al. 2016, Paviolo et al. 2016, Abreu-Júnior et al. 2017, Cuarón Orozco and Ramos Rivera 2017, Dias et al. 2017b, 2017a, Dirzo Minjarez and Ramos Rivera 2017, Esselstyn 2017, Attias 2017, González Cózatl and Ramos Rivera 2017, Gual Díaz and Ramos Rivera 2017, Horváth and Ramos Rivera 2017, León Cortés and Ramos Rivera 2017, León Paniagua and Ramos Rivera 2017a, 2017b, López González and Ramos Rivera 2017, López Wilchis and Ramos Rivera 2017, Massocato et al. 2017, Meave del Castillo and Ramos Rivera 2017, Millen and Lim 2017, Monterrubio and Ramos Rivera 2017, Morales Pérez and Ramos Rivera 2017, Moreira-Ramírez 2017, Muñoz Alonso and Ramos Rivera 2017, Navarro Singüenza and Ramos Rivera 2017, Oliveira and Hannibal 2017, Polisar et al. 2017, Pozo de la Tijera and Ramos Rivera 2017a, 2017b, Ressl and Ramos Rivera

2017, Sánchez Cordero Dávila and Ramos Rivera 2017, South Australian Museum 2017, Velázquez Montes and Ramos Rivera 2017a, 2017b, Altamirano González Ortega and Ramos Rivera 2017, Ceballos González and Ramos Rivera 2017, Cepeda-D and Chacón Pacheco 2017, Cervantes Reza and Ramos Rivera 2017, Zimbres et al. 2017, Fornitano et al. 2017, Eaton et al. 2017, Laurindo et al. 2017, Cabral et al. 2017, Beca et al. 2017, Rosa and Souza 2017, Passos et al. 2017, Arevalo et al. 2017, Luna et al. 2017, Juárez-López et al. 2017, Lima et al. 2017, Bôlla et al. 2017, Feeney 2018, Gall 2018, Iezzi et al. 2018, Leuchtenberger et al. 2018, UNIBIO and IBUNAM 2018, University of Minnesota Bell Museum of Natural History 2018, Bradley 2018, Braun and King 2018, Campos et al. 2018a, 2018b, de la Torre et al. 2018, Gonçalves et al. 2018a, 2018b, Xavier da Silva et al. 2018, Lemos et al. in press, Sampaio et al. in press, 2010, Andrade-Núñez and Aide 2010, Arimoro et al. 2017, Bartrina et al. 2010, D`Bastiani et al. 2018, DPNVS 1999, Esquivel 2001, FMB 2005, Hurtado and Pacheco 2015, Juárez-López et al. 2017, Mourthé 2013, Mourthé and Barnett 2014, Núñez-Regueiro et al. 2015, Osto et al. 2004, Queirolo 2016,Ubaid et al. 2010, Wallace et al. 2013, Texera 1973, Atalah 1975, Johnson et al. 1992, Mccarthy et al. 1999, Timock and Vaughan 2002, Vaughan et al. 2007, Suutari et al. 2010, Peery and Pauli 2014, Ruiz-Aravena 2012, Pauli et al. 2012, 2014, Peery and Pauli 2012, Sierpe et al. 2013, Arriagada et al. 2017, Garcés-Restrepo et al. 2017, 2018, Sáenz-Bolaños et al. 2018, and Fountain et al. 2018.

Taxonomic data

Taxonomic identity was checked by experts of each family:

a) **Chlamyphoridae and Dasypodidae:** A. Desbiez, G. Mourão, A. Feijó, A. Bocchiglieri, N. Attias.

b) **Myrmecophagidae and Cyclopedidae:** F. Miranda, V. Tavares, F. Rodrigues, A. Paglia, A. Bertassoni.

c) **Bradypodidae and Megalonychidae:** A. Chiarello, P. Santos, G. Guiné, S. Silva.

All data were therefore changed with respect to the identity of most recent nomenclature and distribution, following Gibb et al. (2016), Miranda et al. (2017), Feijó et al. (2018), and other available literature (Table 2). The taxonomic uncertainties were maintained, using sp.

Validation

Specialists checked the localities for each xenarthran species and excluded the points that were erroneous (Table 2). Due to changes in taxonomic classification, several records of *Cyclopes didactylus* in North and South America were registered as *Cyclopes* sp., following Miranda et al. (2017).

C. Data Limitations and Potential Enhancements

The extant xenarthrans are a fascinating study group of interest, partly due to their ecology, biology, and taxonomy. Some species have a nocturnal lifestyle, others only inhabit tree canopies, and, in addition, they also show a great ability to camouflage themselves in the environment in which they live. This ability reflects directly in the number of studies; the super order Xenarthra has much less research than other mammal groups and therefore, gathering data from the various species is a significant challenge.

Nevertheless, we recognize the many efforts that researchers made to collect and identify the xenarthran data compiled here, given the cryptic habits of several species.

The xenarthran taxonomy, particularly for armadillos, is unusual and usually requires detailed examination for a correct classification. Therefore, some of the species are prone to misidentification, mainly due the similar morphological characteristics and similar common names in different regions. The misidentification and the uncertainty apply notably when it comes to data from interviews, or when the data are very old. In all cases, we resorted to the latest taxonomic classification and known distribution (Abba et al. 2015; Gibb et al 2016; Feijó and Cordeiro-Estrela, 2016, Miranda et al. 2017, Feijó et al. 2018; Table 2), besides an extensive consultation with xenarthran specialists (for more details, see item 4, section B, Class II and Table 2). Some of the records, mainly those from museums or interviews, were excluded due to a lack of certainty regarding occurrences. Two special cases should be highlighted. The recent taxonomic review of the genus *Cyclopes* (Miranda *et al.* 2017) led to uncertainty regarding the data that we received. In this case, after consulting key specialists on these species, we decided to adopt *Cyclopes* sp., thus avoiding errors in the current distribution of the species. The same approach applies to the genus *Dasypus*. We followed a recent review of the taxonomic classification, which splits the species *Dasypus kappleri* into two other species, *D. beniensis* and *D. pastasae* (Feijó *et al.* 2018).

The geographical accuracy of data is another important topic which deserves attention. We received several types of coordinates, some of them referring to the municipality or cities, while others referred to the fragment or point sampled. This difference could represent a bias in our dataset. Therefore, we strongly recommended that co-authors add the precision (in meters). In case of lack of clarity, we sent a protocol created by us to assist in estimating precision.

We made significant efforts to compile data from all different regions of the Neotropics and indeed, data from the different biomes and regions were assembled. There was, however, a concentration of records in some areas (e.g., the southeastern region of Brazil) in contrast to regions with few records (e.g., the Amazon, some countries of Central and South America). To fill this gap, we focused the literature search on those regions (see 2. Data Compilation section B, Class II), even though there are some areas with few or no studies. This pattern was found in other data-papers (such as Lima et al. 2017 and Vancine et al. 2017) and seems to reflect the frequency with which the different natural areas are being studied, often related to accessibility, mainly in the Amazon region. Additionally, we were unable to contact researchers who are developing (or have developed) xenarthran research in some neotropical countries, such as Chile, Peru, Costa Rica, and Panama. This gap is unrelated to lack of studies, but is related to lack of contact with local researchers, since the literature reports xenarthran data on those areas (Suutari 2010, Peery and Pauli 2012, Ruiz-Aravena and 2012),

We highlight that the data come from different studies, and consequently, the records have different sampling efforts, methods, taxonomic scope, and collection date (including some records without the collection date). Therefore, we strongly recommend the use of the data to be carried out with a confiable selection criteria. The lack of quantitative data and the prevalence of occurrence (presence-absence and presence-only) data reflect the challenges involved when working with this group. A xenarthran survey may be complex and require alternative methods and significant efforts. In some cases, it may be necessary to use two or three different methods if questions aside from the presence of the species (e.g., abundance or habitat use) are to be investigated.

Despite these limitations, we compiled the largest and most-complete dataset of xenarthran species of the Neotropical region to date. The merit belongs to the researchers who have provided us with a great deal of information from different kinds of studies. With this data-paper, we are providing data often hidden in the gray literature, or in databases inaccessible to the public. We hope that the public who will use the database will be able to answer questions, such as: 1) general patterns of distribution, 2) gaps in xenarthran studies and which species deserve more attention, 3) poorly studied regions and where to focus more surveys.

Class III - Data set Status and Accessibility

A. Status

Latest update

December 2018.

Latest Archive date

December 2018.

Metadata Status

Latest update December 2018, which refers to the submitted version of revision process

B. Accessibility

Original NEOTROPICAL XENARTHRANS dataset can be accessed on the ECOLOGY repository. All the data – in its updated version and complementary material – are fully available for both public use and research purposes.

Storage location and medium:

The dataset can be accessed on the GitHub Inc. repository (https://github.com/LEEClab/Neotropical_Xenarthans) in .CSV format. A mirror of this repository will also be available at https://github.com/LEEClab/Neotropical_series, where all the other data-papers of NEOTROPICAL SERIES will be available.

Contact persons:

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Copyright restrictions:

None

Proprietary restrictions:

Please cite this data-paper when using its data in publications. We also request that researchers and teachers inform us of how they are using this data.

Costs:

None

Class IV - Data Structural Descriptors

A. Data set File

Identity:

NEOTROPICAL_XENARTHRANS_QUANTITATIVE.csv;

NEOTROPICAL_XENARTHRANS_QUALITATIVE.csv;

NEOTROPICAL_XENARTHRANS_REFERENCES.csv.

Size:

NEOTROPICAL_XENARTHRANS_QUANTITATIVE.csv, 2,585 records, 1, 169KB;

NEOTROPICAL_XENARTHRANS_QUALITATIVE.csv, 39,943 records, 14,631 KB;

NEOTROPICAL_XENARTHRANS_REFERENCES.csv, 1,669 references, 302 KB.

Format and storage mode:

comma-separated values (.csv).

Header Information:

See column descriptors in section B.

Alphanumeric attributes:

Mixed.

Data anomalies:

If no information is available for a given record, this is indicated as 'NA'.

B. Variable Information

1) Table 4. Reference Information

2) Table 5. Quantitative information

3) Table 6. Qualitative information

Class V - Supplemental Descriptors

A. Data acquisition

1. Data request history: None

2. Data set updates history: None

3. Data entry/verification procedures

B. History of dataset usage

Acknowledgements

This paper is part of the Neotropical, Amazonia, Atlantic, and Brazil series of data-papers. We thank the NeoXen team, that made this work possible and to Abigail Feuka and Emma Hanslowe (Colorado State University, USA) for proof reading the manuscript.We thank the companies that provided sources and the colleagues that offered any kind of field assistance: Daniel Martíne Nambo, Cristina López Fuerte, Ricardo Gaudarrama, Juína villages, Cintia Brazão, Luiz Gustavo, Carolina Potter, ICMBio workers from Sena Madureira, Parque Nacional Chapada do Guimarães, Reserva Biológica das Araucárias and Parque Nacional dos Campos Gerais, RESEX Cazumbá-Iracema landowners, Tayanna Mendonça da Silva Godim, Fernanda Guedes da Silva, Marcela Alvares Oliveira, Marcela Alvares Oliveira, Armando Muniz Calouro, Associação de Defesa Etnoambiental Kanindé, Felipe B. R. Gomes, Rodolfo A. Salm, Thiago Cavalcante, Ricardo P. Souza José Ricardo Falconi, Fabio Nunes dos Santos from Fazenda Cambuhy, Nambiquara Indians from Alantesu, Comissão Executiva do Plano da Lavoura Cacaueira (CEPLAC), Área Particular de Preservação Ambiental São Francisco, Programa de Pesquisa em Biodiversidade (PPBio), o Instituto Nacional de Pesquisas da Amazônia (INPA), Biolaw Consultoria Ambiental, National Council of Science and Technology of Mexico, The National Council of Protected Areas of Guatemala and Wildlife Conservation Society Guatemala Program, Ministry of Ecology of Misiones province, the National Parks Administration of Argentina, Fundación Vida Silvestre Argentina, National Institute of Agricultural Technology (INTA), Cataratas del Iguazú International Airport, Argentine Army, Conservation Land Trust, Fundación Amado Bonpland, and property owners, especially ARAUCO S.A., Forestal Bosques del Plata S.A, EVASA, Masisa Forestal S.A., GMF Latinoamericana S.A., Forestal Las Marías, Altinia S.A. and the several farmers and landowners that provided support and allowed us to conduct camera trap surveys on their properties, Estação Ambiental de Volta Grande, MG, Valdênio Marques, Fernando de Miranda Ramos, FLONA de São Francisco de Paula workers. Companhia Paranaense de Energia (COPEL), Hugo C. M. Costa, Leandro A. Abade, Frederico Souza, Daniel G. Rocha, Caio F. M. Lima, Mr. Lenilson, Botanical Garden Benjamin Maranhão staff, UFAL staff, Adriana Ribeiro de Oliveira, Paula Vianna, RPPN SESC Pantanal, Instituto Estadual de Florestas de Minas Gerais, (IEF) for their support during fieldwork at Rio Doce State Park, the management of the Chandless State Park and the Extractive Reserve of Cazumbá Iracema, AMATA S.A, Floresta Nacional do Jamari, Rondônia, Brazil, Agência de Transporte do Estado de São Paulo (ARTESP), Dr. Ramachrisna Teixeira and Mr. Sisinho Paes de Santana, Institute of Astronomy, Geophysics and Atmospheric Sciences of the University of São Paulo (IAG-USP), Instituto de Desenvolvimento Sustentável Mamirauá (IDSM), the owners and workers of Fazenda San Francisco, Fernando Alvarenga Reis from EMBRAPA Gado de Corte, Lerrane de Fatima Cunha, Fundação de Amparo à Pesquisa do Estado de Minas Gerais – FAPEMIG, Novo Colégio – SP, the Parque Nacional Sierra de las Quijadas- APN/ARG park guards, especially Daniel Figueroa, volunteers and students from PROICO 2-2314: Mamíferos del Parque Nacional Sierra de las Quijadas- UNSL-Arg, the Instituto Geográfico Cartográfico do Estado de São Paulo for providing the orthophoto mosaic images; the University of São Paulo, the Instituto Florestal, and the Fundação Florestal for logistical support, the whole team of Tijuca National Park, the Laboratory of Ecology and Conservation of Forests - LECF/UFRRJ, in particular to Thayssa and AS Pires, and of Laboratory of Ecology and Conservation of Populations – LECP / UFRJ, especially to César, Raíssa, Marcelo, FAS Fernandez, and all who directly or indirectly contributed to the Neotropical Xenarthrans data-paper. Most of the Mexican records were kindly made available by the Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. 2016. EncicloVida (Online database: http://www.enciclovida.mx). CONABIO. Mexico. All co-authors from the Bolivian medium to large sized mammal volume and associated database, especially Heidy Lopez-Strauss, Nohelia Mercado and Zulia Porcel. We dedicate this work to G. Gene Montgomery, M.E. Sunquist, Laurenz Pinder, and all the great names associated with Xenarthrans, that certainly contributed and inspired all current research with this incredible group. We also appreciate all the comments and suggestions from the reviewers and editor. We dedicate this work to the National Museum of Rio de Janeiro, which strongly contributes to research, education, and science not only in Brazil, but for the entire Neotropic realm and for the whole world.

TABLES

Table 1. Species information. Family, IUCN conservation status and number of records of the armadillos, anteaters and sloth species reported in the NEOTROPICAL XENARTHRANS dataset. Species without confirmed identification (sp.; excluding *Cyclopes* sp.) were not included in the species counting. DD=Data Deficient, NE=Not Evaluated, LC=Least Concern, NT=Near Threatened, VU=Vulnerable, CR=Critically Endangered.

Group	**Familly**	**Species***	**IUCN status**	**Number of records**
Armadillos	Chlamyphoridae	*Cabassous centralis*	DD	189
		Cabassous chacoensis	NT	30
		Cabassous tatouay	LC	585
		*Cabassous unicinctus**	LC	562
		Calyptophractus retusus	DD	33
		Chaetophractus vellerosus	LC	372
		Chaetophractus villosus	LC	1,473
		Chlamyphorus truncatus	DD	95
		Euphractus sexcinctus	LC	7,325
		Priodontes maximus	VU	1,678
		Tolypeutes matacus	NT	1,044

		Tolypeutes tricinctus	VU	194
		Zaedyus pichiy	NT	195
	Dasypodidae	*Dasypus beniensis*	NE	278
		*Dasypus kappleri***	LC	94
		*Dasypus mazzai****	DD	26
		Dasypus novemcinctus	LC	11,588
		Dasypus pastasae	NE	217
		Dasypus sabanicola	NT	44
		*Dasypus septemcinctus hybridus***	NT	707
		Dasypus septemcinctus septemcinctus **	LC	477
Anteaters	Cyclopedidae	*Cyclopes* sp.**	NT*	240
	Myrmecophagidae	*Myrmecophaga tridactyla*	VU	5,941
		Tamandua mexicana	LC	319
		Tamandua tetradactyla	LC	5,089
Sloths	Bradypodidae	*Bradypus pygmaeus*	CR	12
		Bradypus torquatus	VU	638
		Bradypus tridactylus	LC	222
		Bradypus variegatus	LC	962
	Megalonychidae	*Choloepus didactylus*	LC	268
		Choloepus hoffmanni	LC	137

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*Including the registers of the subspecies.

**A re-evaluation is required because of recent taxonomic changes.

*** Taxonomic synonym *Dasypus yepesi*.

Table 2: List of species registered in the data paper, the synonym (If applicable), reference we use to confirm the record and justification of why we corrected the species (If applicable). - means “no information”.

Species	Synonyms	Reference	Justification
Bradypus pygmaeus	-	Anderson and Handley 2001, Pauli 2018	-
Bradypus torquatus	-	Hirsch and Chiarello 2012, Gardner 2008, Pauli 2018	-
Bradypus tridactylus	-	Moraes-Barros et al 2010, Gardner 2008, Pauli 2019	Some records of *Bradypus tridactylus* were corrected to *B.variegatus*, since *B.tridactylus* occurs only north of the Amazon River and east of the Rio Negro, and some points were well outside the known distribution for the species
Bradypus variegatus	-	Moraes-Barros et al 2010, Gardner 2008, Pauli 2020	-
Cabassous centralis	-	Abba and Superina 2010	-
Cabassous chacoensis	-	Abba and Superina 2010	-

Cabassous tatouay	-	Abba and Superina 2010, Feijó and Langguth 2013	-
Cabassous unicinctus	-	Abba and Superina 2010, Feijó and Langguth 2013	The genus *Cabassus* is represented by *C. tatouay* in northeastern Brazil. Historically these records were erroneously applied to *C.unicinctus.* Thus, all the records from northeastern Brazil were classified as *C. tatouay*
Calyptophractus retusus	*Chlamyphorus retusus; Burmeisteria retusa*	Abba and Superina 2010, Delsuc 2009	-
Chaetophractus vellerosus	*Chaetophractus nationi; Dasypus vellerosus*	Abba and Superina 2010, Abba et al. 2015	All the records of *Chaetophractus nationi* were considered as *C. vellerosus*
Chaetophractus villosus	*Dasypus villosus*	Abba and Superina 2010	-
Chlamyphorus truncatus	-	Abba and Superina 2010	-
Choloepus didactylus	-	Chiarello and Plese 2014, Moraes-Barros 2018	-
Choloepus hoffmanni	-	Plese and Chiarello 2014, Moraes-Barros 2018	-

Cyclopes sp.	*Cyclopes didactylus*	Miranda et al. 2017	All the records were considered as *Cyclopes* sp., due to the recent taxonomic review
Dasypus beniensis	*Dasypus kappleri*	Feijó and Cordeiro-Estrela 2016	The records south of the Amazon River were considered *Dasypus beniensis*
Dasypus kappleri	-	Feijó and Cordeiro-Estrela 2017	*Dasypus kappleri* was divided into three species. With the new arrangement, *D. kappleri* is restricted to the region of the Guiana shield. The records south of the Amazon River refer to *D. beniensis*, and to the west of the Guiana shield and north of the Amazon River refer to *D. pastasae*.
Dasypus mazzai	*Dasypus yepesi*	Feijó and Cordeiro-Estrela 2014	-
Dasypus novemcinctus	-	Abba and Superina 2010, Feijó et al. 2018	-
Dasypus pastasae	*Dasypus kappleri*	Feijó and Cordeiro-Estrela 2016	The records of west Guiana shield and north Amazon River were considered *Dasypus pastasae*
Dasypus sabanicola	-	Abba and Superina 2010, Feijó et al. 2018	-

Dasypus septemcinctus hybridus	*Dasypus hybridus*	Abba and Superina 2010, Feijó et al. 2018	All the records of *Dasypus hybridus* were re-classified as *D. septemcinctus hybridus* due to recent taxonomic changes, which considered *D. hybridus* as a subspecies of *D. septemcinctus*
Dasypus septemcinctus septemcinctus	*Dasypus septemcinctus*	Abba and Superina 2010, Feijó et al. 2018	For all records of *D. septemcinctus* we added the subspecies *D. septemcinctus septemcinctus*, due to the recent taxonomic review
Euphractus sexcinctus	-	Abba and Superina 2010	-
Myrmecophaga tridactyla	-	Miranda et al. 2014, Bertassoni 2018	-
Priodontes maximus	*Priodontes giganteus*	Abba and Superina 2010	All the records of *Priodontes giganteus* were considered as *P. maximus*, since the name *P. giganteus* is not used anymore, according to specialists.
Tamandua mexicana	-	Ortega et al. 2014, Bertassoni 2018	-
Tamandua tetradactyla	-	Miranda et al. 2014. Bertassoni 2018	-
Tolypeutes matacus	-	Abba and Superina 2010, IUCN 2018	-

Tolypeutes tricinctus	-	Abba and Superina 2010, Feijó et al. 2015	-
Zaedyus pichiy	-	Abba and Superina 2010	-

Table 3. Method information. All the methods identified, their absolute frequency and percentage.

Method	**Frequency**	**Percentage**
Camera trap	13,783	32.4
Road kill	6,225	14.6
Opportunistic	4,339	10.2
Line transect	2,551	6
Active search and interview	2,141	5.03
Bibliographical survey	1,609	3.78
Monitoring	1,358	3.19
Museum scientific collection	780	1.83
Vestige	673	1.58
Active search	624	1.47
Interview	523	1.23
Telemetry	343	0.81
Active search and vestige	243	0.57
Capture	238	0.56
Tracks plot	99	0.23
Car monitoring	74	0.17

Line transect and camera trap	74	0.17
Line transect and live trap	74	0.17
Data base	65	0.15
Burrows sampling	60	0.14
Apprehension	46	0.11
Active search and opportunistic	41	0.1
Live trap	39	0.09
Interview and vestige	21	0.05
Active search, vestige and interview	11	0.03
Live trap and vestige	11	0.03
Interview and bibliographical survey	9	0.02
Active search and roadkill	4	0.01
Camera trap and vestige	4	0.01
Interview, museum scientific collection and bibliographical survey	4	0.01
Vestige and road kill	4	0.01
Active search and camera trap	3	0.01
Active search and live trap	3	0.01
Line transect and vestige	3	0.01

Active search, vestige and camera trap	2	0
Capture and interview	2	0
Active search and bibliographical survey	1	0
Active search and roadkill collection	1	0
Active search, bibliographical survey and interview	1	0
Interview and museum scientific collection	1	0
Interview, museum scientific collection and vestige	1	0
Sand plot	1	0
Vestige and museum scientific collection	1	0
NA*	6,438	15.1
Total	42,528	100

*No information

1497 **Table 4. Reference information.** Description of the fields related to references.

Type of information	**Field**	**Description**	**Levels**	**Example**
REFERENCE INFORMATI-ON	REF_ID	Reference identification that links the references to a specific record in the dataset.	NEOXEN_1001 – NEOXEN_2669	NEOXEN_1703
	REF_TYPE	Type of the publication: “Thesis” refers to theses, dissertations and monographs; “Technical document” refer to reports and wildlife management programs.	Abstract Book Book chapter Database In prep In press Management plan Personnal Report Scientific paper Submitted Thesis Unpublished	Scientific paper

	REFERENCE	Study reference in *Ecology* style.	1554 references	Santos, P. M., A. G. Chiarello, M. C. Ribeiro, J. W. Ribeiro, and A. P. Paglia. 2016. Local and landscape influences on the habitat occupancy of the endangered maned sloth *Bradypus torquatus* within fragmented landscapes. Mammalian Biology - Zeitschrift für Säugetierkunde 81:447–454.
	Ref_STATUS	Located and unlocated references	Located Not Located	Located
	CITATION_in_text	Citation format in text: author and year		Santos et al. 2016

Table 5. Quantitative information. Description of the fields related to NEOTROPICAL XENARTHRANS abundance data.

Field	Description	Levels	Example
ORDEMBD	Identification code of each species record. Each code is exclusive and represents the record in the sampling area and the dataset of origin. Records made in the same area in different studies received different codes.	ABBA_00001 - ABBA_02128; ACSA_00001 - ACSA_00060; PAMS_00001 - PAMS_00033	ACSA0001
REFERENCE	Study reference for the published records.		Carrillo-Bilbao G, Cuircama V, Ruíz R, Martin-Solano S (2016) Área de vida, dieta, preferência de estrato vertical y uso del tiempo de Bradypus variegatus, liberados
STUDY_AIM	Information about the objective of the study.		ABD-COMM
DATA_TYPE	Type of collected data.	Presence only Presence-absence Abundance	Abundance
SPECIES	The name of the registered species according to the current taxonomy.	See Table 1	*Bradypus torquatus*

GENUS	The name of the genus according to the current taxonomy.		*Bradypus*
FAMILY	The name of the family according to the current taxonomy.		Bradypodidae
ORDER	The name of the ORDER according to the current taxonomy.		Pilosa
IUCN_STATUS	Information about the threatened status according to IUCN red list.	NE DD LC NT VU EN CR EW EX	VU
SP_ORIGIN	Information about the origin of that species in that sampling area.	Native Potentially introduced Introduced	Native
SITE	Name of the sampling area.		La Estación Científica Agroecológica Fátima
AREA_HA	Area of the sampling site in hectares.	0.05 - 5.400.000	3096
MUNICIPALITY	Municipality of the sampling site.		Fatima

STATE	State or province of the sampling site.		Pastaza
COUNTRY	Country of the sampling site.		Ecuador
LONG_X	Longitude corrected and transformed into decimal degrees (datum WGS84).	Decimal Degree	-56.11345
LAT_Y	Latitude corrected and transformed into decimal degrees (datum WGS84).	Decimal Degree	-19.566064
PRECISION	Coordinate precision, in meters, of the sampling site.	3 - 290000	30
UC	Information about the protection of the sampling area. Yes: if the area is a conservation unit or is within a conservation unit; No: If the area is outside a conservation unit.	Yes - No	Yes
VEG_TYPE	Vegetation type of the sampling area location, as described in the reference paper, or described by the data collector.		Amazon forest
ANNUAL_RAIN	Annual rainfall WorldClim v. 1.4., in mm, available in http://www.worldclim.org/version1. Access on August 2nd, 2018.		164
ANNUAL_TEMP	Average annual temperature WorldClim v. 1.4., in Celsius degrees, available in http://www.worldclim.org/version1. Access on August 2nd, 2018.		25.1

ALTITUDE	Altitude in meters above sea level, from the Hydro-1K dataset (United States Geological Survey – USGS, 2001. HYDRO 1K: Elevation Derivative Database. Available from: <http://edc.usgs.gov/products/elevation/gtopo30/hydro/namerica.html>). Access on August 2nd, 2018.		469
Olsoneconame	ECO_NAME column of the shapefile wwf_terr_ecos available in WWF website (Olson et al. 2001).		Caatinga
OlsonG200r	Olson bioregion (Olson et al. 2001), represented by G200_REGIO column of the shapefile wwf_terr_ecos		Cerrado Woodlands and Savannas
METHOD	Sampling method described in the reference paper or by the data collector.		Line transect
N_POINTS	Number of sampling points.	1 - 1401	500
D_POINTS	Distance, in kilometers, between the sampling points.	0 - 1.6	1.2
LTR_EFF	Effort in kilometers walked on transects in the sampling area.	0.5 – 5000	618
LTR_ABD_10KM	Abundance of individuals registered on transects. Calculated as the number of individuals/10km.	0 – 25.71	0.32

CAM_EFF	Survey effort in the sampling area using camera traps. Measured in hours.	1.03 - 36000	3600
CAM_ABD	Number of records registered on camera traps.	0 - 94	25
SURV_EFF	Survey effort in the sampling area. Measured in days, hours and kilometers.	8.8h – 24.3h	24.1h
SURV_ABD	Number of records registered on survey. Calculated as the number of counts/day.	0 - 85	33
COL_STRT_MO	Month when data collection started	January - December	May
COL_STRT_YR	Year when data collection started.	1896- 2018	1996
COL_END_MO	Month when data collection ended.	January - December	December
COL_END_YR	Year when data collection ended.	1855- 2018	1996

Table 6. Qualitative information. Description of the fields related to NEOTROPICAL XENARTHRANS occurrence data.

Field	**Description**	**Levels**	**Example**
ORDEMBD	Identification code of each species record. Each code is exclusive and represents the record in the sampling area and the dataset of origin. Records made in the same area in different studies received different codes.	ABBA_00001 - ABBA_02128; ACSA_00001 - ACSA_00060; PAMS_00001 - PAMS_00033	PAMS_0001
REFERENCE	Study reference for the published records.		Carrillo-Bilbao G, Cuircama V, Ruíz R, Martin-Solano S (2016) Área de vida, dieta, preferência de estrato vertical y uso del tiempo de Bradypus variegatus, liberados
STUDY_AIM	Information about the objective of the study.		Occur
DATA_TYPE	Type of collected data.	Presence only Presence-absence	Presence-absence
SPECIES	The name of the registered species according to the current taxonomy.	See Table 1	*Bradypus variegatus*
GENUS	The name of the genus according to the current taxonomy.		*Bradypus*

FAMILY	The name of the family according to the current taxonomy.		Bradypodidae
ORDER	The name of the ORDER according to the current taxonomy.		Pilosa
IUCN_STATUS	Information about the threatened status according to IUCN red list.	NE DD LC NT VU EN CR EW EX	LC
SP_ORIGIN	Information about the origin of that species in that sampling area.	Native Potentially introduced	Native
SITE	Name of the sampling area.		La Estación Científica Agroecológica Fátima
AREA_HA	Area of the sampling site in hectares.	0.05 - 5.400.000	3096
MUNICIPALITY	Municipality of the sampling site.		Fatima
STATE	State or province of the sampling site.		Pastaza
COUNTRY	Country of the sampling site.		Ecuador
LONG_X	Longitude corrected and transformed into decimal degrees (datum WGS84).	Decimal Degree	-56.11345

LAT_Y	Latitude corrected and transformed into decimal degrees (datum WGS84).	Decimal Degree	-19.566064
PRECISION	Coordinate precision, in meters, of the sampling site.	3 - 290000	30
UC	Information about the protection of the sampling area. Yes: if the area is a conservation unit or is within a conservation unit; No: If the area is outside a conservation unit.	Yes - No	Yes
VEG_TYPE	Vegetation type of the sampling area location, as described in the reference paper, or described by the data collector.		Amazon forest
ANNUAL_RAIN	Annual rainfall WorldClim v. 1.4., in mm, available in http://www.worldclim.org/version1. Access on August 2nd, 2018.		164
ANNUAL_TEMP	Average annual temperature WorldClim v. 1.4., in Celsius degrees, available in http://www.worldclim.org/version1. Access on August 2nd, 2018.		25.1
ALTITUDE	Altitude in meters above sea level, from the Hydro-1K dataset (United States Geological Survey – USGS, 2001. HYDRO 1K: Elevation Derivative Database. Available from: <http://edc.usgs.gov/products/elevation/gtopo30/hydro/namerica.html>) Access on August 2nd, 2018.		469

Olsoneconame	ECO_NAME column of the shapefile wwf_terr_ecos available in WWF website (Olson et al. 2001).		Uruguayan savanna
OlsonG200r	Olson bioregion (Olson et al. 2001), represented by G200_REGIO column of the shapefile wwf_terr_ecos		Cerrado Woodlands and Savannas
METHOD	Sampling method described in the reference paper or by the data collector.		Line transect
N_POINTS	Number of sampling points.	1 - 1401	500
D_POINTS	Distance, in kilometers, between the sampling points.	0 - 1.6	1.2
LTR_EFF	Effort in kilometers walked on transects in the sampling area.	0.5 – 5000	618
CAM_EFF	Survey effort in the sampling area using camera traps. Measured in hours.	1.03 - 36000	3600
SURV_EFF	Survey effort in the sampling area. Measured in days, hours and kilometers.	8.8h – 24.3h	24.1h
COL_STRT_MO	Month when data collection started	January - December	May
COL_STRT_YR	Year when data collection started.	1896- 2018	1996
COL_END_MO	Month when data collection ended.	January - December	December

COL_END_YR	Year when data collection ended.	1855- 2018	1996

Literature Cited

Abba, A. M., and M. Superina. 2010. The 2009 / 2010 Armadillo Red List Assessment. Edentata 11:135–184**.**

Abba, A. M., G. H. Cassini, G. Valverde, M. K. Tilak, S. F. Vizcaíno, M. Superina, and F. Delsuc. 2015. Systematics of hairy armadillos and the taxonomic status of the andean hairy armadillo (*Chaetophractus nationi*). Journal of Mammalogy 96:673–689.

Abreu-Júnior, E. F., P. G. de G. Brennand, and A. R. Percequillo. 2017. Diversidade de mamíferos do baixo Rio Jufari, Roraima, Brazil. Papéis Avulsos de Zoologia 57:37–55.

Abreu-Júnior, E. F., and A. Köhler. 2009. Mastofauna de médio e grande porte na RPPN da UNISC, RS, Brazil. Biota Neotropica 9:169 - 174.

Acosta, J. C., and F. Murúa. 1999. Lista preliminar y estado de conservación de la mastofauna del Parque Natural Ischigualasto, San Juan-Argentina. Multequina 8:121–129.

Administración de Parques Nacionales. 1993. Plan General de Manejo del Parque Nacional Laguna Blanca. Page Buenos Aires, Argentina. Delegación Técnica Regional Patagónica, Administración de Parques Nacionales. Resolución.

Agüero, J. A., J. D. Díaz, and D. González. 2003. Presencia y características del hábitat asociadas a *Tamandua tetradactyla* en las Sierras de los Llanos de La Rioja. Page 81 Resúmenes XVIII Jornadas Argentinas de Mastozoología. SAREM, La Rioja.

Agüero, J. A., T. G. Rogel, A. R. Bamba, P. C. Paez, C. E. Pellegrini, and E. M. Virlanga. 2005. Diversidad y distribución de dasipódidos en el chaco árido de la provincia de La Rioja. Page 98 XX Jornadas Argentinas de Mastozoología. Sociedad Argentina para el Estudio de los Mamíferos, Mendoza.

Aldana, N. J., M. D. Porres, A. Feijoo M, and M. C. Zuñiga. 2006. Valoración del uso de la fauna silvestre en el municipio de Alcalá, Valle Del Cauca. Scientia et technica 2.

Allen, J. D. 1905. Mammalia of Southern Patagonia. Princeton University, Princeton, New Jersey.

Altamirano González Ortega, M. A., and P. Ramos Rivera. 2017. Vertebrados terrestres del parque nacional Cañón del Sumidero, Chiapas, México. Comisión nacional para el conocimiento y uso de la biodiversidad.

Alves, L. C. P. de S., and A. Andriolo. 2005. Camera traps used on the mastofaunal survey of Araras Biological Reserve, IEF-RJ. Revista Brasileira de Zoociências 7:231-246.

Amorim, M. J. A. A. L., A. A. de Amorim Júnior, J. B. Messias, V. A. de Silva Júnior, and K. de Melo Berinson. 2004. Anatomical aspects of the placenta of the sloth, *Bradypus variegatus*, Schinz, 1825. International Journal of Morphology 22:9–18.

Anderson, R. P., and J. C. O. Handley. 2001. A new species of three-toed sloth (Mammalia: Xenarthra) from Panamá, with a review of the genus Bradypus. Proceedings of the Biological Society of Washington 114:1–33.

Andrade-Núñez, M. J., and T. M. Aide. 2010. Effects of habitat and landscape characteristics on medium and large mammal species richness and composition in northern Uruguay. Zoologia (Curitiba) 27:909–917.

Araújo, R. M. de, M. B. de Souza, and C. R. Ruiz-Miranda. 2008. Densidade e tamanho populacional de mamíferos cinegéticos em duas Unidades de Conservação do Estado do Rio de Janeiro, Brazil. Iheringia. Série Zoologia 98:391–396.

Araújo Xavier, G. A., M. A. Borstelmann de Oliveira, A. Alves Quirino, and R. Aparecido Mota. 2010a. Albinismo total em preguiças-de-garganta-marrom *Bradypus variegatus* (Schinz, 1825) no Estado de Pernambuco, Brazil. Edentata 11:1–3.

Araújo Xavier, G. A., R. A. Mota, and M. A. Borstelmann de Oliveira. 2010b. Marcação Ungueal em Preguiças-de-Garganta-Marrom *Bradypus variegatus* (Schinz, 1825) de Vida livre na Estação Ecológica de Caetés, Paulista-PE, Brazil. Edentata 11:18–21.

Arcos Delgado, R. 2011. Áreas prioritarias para la conservación de mamíferos y análisis de vacíos en la provincia de Pichincha y Santo Domingo de los Tsáchilas (Ecuador). Universidad Internacional de Andalucía, España.

Arevalo, J. E., W. Honda, A. Arce-Arias, and A. Häger. 2017. Spatio-temporal variation of roadkills show mass mortality events for amphibians in a highly trafficked road adjacent to a national park, Costa Rica. Revista de Biología Tropical 65:1261.

Arimoro, O. A. S., A. C. R. Lacerda, W. M. Tomas, S. Astete, H. L. Roig, and J. Marinho-Filho. 2017. Artillery for Conservation: The Case of the Mammals Protected by the Formosa Military Training Area, Brazil. Tropical Conservation Science 10:1–13.

Arriagada, A., L. Baessolo, C. Saucedo, J. E. Crespo, J. Cerda, L. Parra, D. Aldridge, J. Ojeda, and A. Hernández. 2017. Hábitos alimenticios de poblaciones periféricas de Zaedyus pichiy y Chaetophractus villosus (Cingulata, Chlamyphoridae) en la Patagonia chilena. Iheringia. Série Zoologia 107:1–8.

Arroyo Cabrales, J., O. J. Polaco, and E. Johnson. 2005. La mastofauna del cuaternario tardío de México. Instituto Nacional de Antropología e Historia, Ciudad de México, México.

Ascensao, F., A. L. J. Desbiez, E. P. Medici, and A. Bager. 2017. Spatial patterns of road mortality of medium–large mammals in Mato Grosso do Sul, Brazil. Wildlife Research 44:135.

Atalah, A. G. 1975. Presencia de Chaetophractus villosus (Edentata, Dasypodidae), nueva especie para la región de Magallanes, Chile. Anal. Inst. Patagonia, Punta Arenas (Chile) VI:4–6.

Attias, N. 2017. Ecologia espaço-temporal de duas espécies de tatus (Ordem Cingulata) no Pantanal Brasileiro. Universidade Federal de Mato Grosso do Sul, Mato Grosso do Sul, Brazil.

Attias, N., L. G. R. Oliveira-Santos, W. F. Fagan, and G. Mourão. 2018. Effects of air temperature on habitat selection and activity patterns of two tropical imperfect homeotherms. Animal Behaviour 140:129–140.

Aximoff, I. A., C. Cronemberger, F. de A. Pereira, and F. de A. Pereira. 2015a. Amostragem de longa duração por armadilhas fotográficas dos mamíferos terrestres em dois parques nacionais no estado do Rio de Janeiro. Oecologia Australis 19.

Aximoff, I. A., C. Spencer, and S. M. Vaz. 2015b. Mamíferos de médio e grande porte no Parque Nacional do Itatiaia. Boletim de Pesquisa do Parque Nacional do Itatiaia 19:1–56.

Aya-Cuero, C., A. Rodríguez-Bolaños, and M. Superina. 2017. Population density, activity patterns, and ecological importance of giant armadillos (*Priodontes maximus*) in Colombia. Journal of Mammalogy 98:770–778.

Azurduy, H. F., F. A. Aguanta, and L. Acosta. 2005. Nota sobre los registros y distribución de *Chlamyphorus retusus* en Bolivia. Kempffiana 1:58–62.

Balabusic, A., and L. Ruiz. 2001. Parque Nacional Talampaya - Plano de Manejo Fase II.

Balaguera-Reina, S. A., J. F. González-Maya, and P. Acero. 2010. Fauna nocturna asociada a los manglares y otros humedales en la Vía Parque Isla de Salamanca, Departamento del Magdalena, Caribe colombiano. Boletín de Investigaciones Marinas y Costeras-INVEMAR 39:191–199.

Ballesteros, C., C. Reyes, and C. Racero. 2009. Estructura poblacional y etología de Bradypus variegatus en fragmento de bosque seco tropical, Córdoba-Colombia. Revista MVZ Córdoba 14:1812–1819.

Baltensperger, A. P., and C. L. Brown. 2015. Mammalian Biodiversity Conservation at Two Biological Stations in Nicaragua and Costa Rica. Pages 351–389 Central American Biodiversity. Springer, New York.

Barahona Cáceres, J. F. 2006. Caracterización paisajística y definición de lineamientos de manejo de “montaña grande”: zona de recarga de las microcuencas de La Soledad, Las Cañas y El Cobre, Valle de Ángeles y Santa Lucia. Universidad Nacional de Agricultura, Catacamas, Olancho, Honduras.

Barbarán, F. 2004. Estado del hábitat y registros de la presencia del tigre (*Panthera onca*) en el área de influencia de la Reserva Provincial Acambuco (Provincia de Salta, Argentina). Revista Ecosistemas 13.

Bard, S. A. 1855. Waikna, or, Adventures on the Mosquito shore. Harper & Brothers, New York.

Barnnet, A. A., and A. C. Cunha. 1994. Notes on the small mammals of Ilha de Maracá, Roraima State, Brazil. Mammalia 58:131–138.

Barros, R. S. M. 2008. Levantamento e estimativas populacionais de mamíferos de médio e grande porte num fragmento de Mata Atlântica em área urbana no sudeste do Brasil. Universidade Federal de Juiz de Fora, Juiz de Fora, Brazil.

Bartrina, L., M. D. C. Fleytas, A. Brusquetti, L. Macoritto, J. L. Cartes, E. García, and F. Mereles. 2010. Plan de manejo 2006-2010 Reserva Natural Privada Tapyta (Paraguay).

Batista, G. O. 2015. O javali -Sus scrofa Linnaeus, 1758- na região do Parque Nacional das Araucarias: percepções humanas e relação com regeneração de *Araucaria angustifolia* -Bertol.- Kuntze. Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brazil.

Bauni, V., V. Capmourteres, M. A. Homberg, and G. A. Zuleta. 2013. Distribution and Status of the Extant Xenarthrans (Mammalia: Xenarthra) in the Southern cone Mesopotamian Savanna, Argentina. Edentata 14:35–50.

Beca, G., M. H. Vancine, C. S. Carvalho, F. Pedrosa, R. S. C. Alves, D. Buscariol, C. A. Peres, M. C. Ribeiro, and M. Galetti. 2017. High mammal species turnover in forest patches immersed in biofuel plantations. Biological Conservation 210:352–359.

Bello, C., M. Galetti, D. Montan, M. A. Pizo, T. C. Mariguela, L. Culot, F. Bufalo, F. Labecca, F. Pedrosa, R. Constantini, C. Emer, W. R. Silva, F. R. da Silva, O.

Ovaskainen, and P. Jordano. 2017. Atlantic frugivory: a plant–frugivore interaction data set for the Atlantic Forest. Ecology 98:1729.

Benchimol, M., and C. A. Peres. 2015. Predicting local extinctions of Amazonian vertebrates in forest islands created by a mega dam. Biological Conservation 187:61–72.

Bernardo, V. M. 2016. O Parque Estadual da Serra Furada. Pages 33–44 *in* R. Santos, V. C. Zanette, G. A. Elias, and P. T. Padilha, editors. Biodiversidade em Santa Catarina: Parque Estadual da Serra Furada. EdiUnesc, Criciuma.

Bertassoni, A., G. Mourão, R. C. Ribeiro, C. S. Cesário, J. P. de Oliveira, and R. de C. Bianchi. 2017. Movement patterns and space use of the first giant anteater (*Myrmecophaga tridactyla*) monitored in São Paulo State, Brazil. Studies on Neotropical Fauna and Environment 52:68–74.

Bertassoni, A., N. L. Xavier Filho, F. A. Rabelo, and G. Porfírio. 2012. Mamíferos da Reserva Particular do Patrimônio Natural Engenheiro Eliezer Batista. Pages 264–288 *in* P. C. Angelo, F. A. Rabelo, V. F. Moreira, A. Bertassoni, and C. Aoki, editors. Descobrindo o Paraíso. Instituto Homem Pantaneiro, Rio de Janeiro.

Bertassoni, A. 2018. Family Myrmecophagidae. *in*: D. D. Wilson and , D. D., R. A. Mittermeier, editors. 2018. Handbook of the Mammals of the World, volume 8:: 8.Insectivores, Sloths and Colugos. Lynx Edicions, Barcelona, Spain, 710p.

Bezerra, B. M., A. da Silva Souto, L. G. Halsey, and N. Schiel. 2008. Observation of brown-throated three-toed sloths: mating behaviour and the simultaneous nurturing of two young. Journal of Ethology 26:175–178.

BIOLAW. 1998a. Estudo de Impacto Ambiental da rodovia RST 471, que liga os municípios de Encruzilhada do Sul e Canguçu, RS. Diagnóstico da fauna.

BIOLAW. 1998b. Estudo de Impacto Ambiental da rodovia RST 711, Mariana Pimentel, RS - Diagnóstico da fauna.

BirdLife International. 2014. Important Bird Areas factsheet: Tonchigue-Mompiche.

Di Bitetti, M. S., Y. E. Di Blanco, J. A. Pereira, A. Paviolo, and I. J. Pírez. 2009. Time Partitioning Favors the Coexistence of Sympatric Crab-Eating Foxes (*Cerdocyon thous*) and Pampas Foxes (*Lycalopex gymnocercus*). Journal of Mammalogy 90:479–490.

Di Blanco, Y. E., I. J. Pérez, P. Díaz, and Y. K. Spørring. 2012. Cinco Años de Radiomarcaje de Osos Hormigueros (*Myrmecophaga tridactyla*): Mejoras Implementadas y Lecciones Aprendidas. Edentata 13:49–55.

Boada, C. E., and H. Román. 2005. Evaluación ecológica rápida de la mastofauna en dos localidades de bosque seco en el occidente de la provincia de Loja. Pages 73–90 *in* M. A. Vázquez, J. F. Freile, and L. Suárez, editors. Biodiversidad en los bosques secos de la zona de Cerro Negro-Cazaderos, occidente de la provincia de Loja: un reporte de las evaluaciones ecológicas y socioeconómicas rápidas. EcoCiencia, Ministerio del Ambiente y Proyecto Bosque Seco, Quito.

Bogoni, J. A. 2014. Associações entre besouros escarabeíneos e mamíferos de médio e grande porte da Mata Atlântica em Santa Catarina, Brazil. Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brazil.

Bogoni, J. A., T. C. Bogoni, M. E. Graipel, and J. R. Marinho. 2013. The Influence of Landscape and Microhabitat on the Diversity of Large- and Medium-Sized Mammals in

Atlantic Forest Remnants in a Matrix of Agroecosystem and Silviculture. ISRN Forestry 2013:1–13.

Bogoni, J. A., J. J. Cherem, E. L. Hettwer Giehl, L. G. Oliveira-Santos, P. V. de Castilho, V. Picinatto Filho, F. M. Fantacini, M. A. Tortato, M. R. Luiz, R. Rizzaro, and M. E. Graipel. 2016a. Landscape features lead to shifts in communities of medium- to large-bodied mammals in subtropical Atlantic Forest. Journal of Mammalogy 97:713–725.

Bogoni, J. A., M. E. Graipel, P. V. de Castilho, F. M. Fantacini, V. V. Kuhnen, M. R. Luiz, T. B. Maccarini, C. B. Marcon, C. de Souza Pimentel Teixeira, M. A. Tortato, F. Z. Vaz-de-Mello, and M. I. M. Hernández. 2016b. Contributions of the mammal community, habitat structure, and spatial distance to dung beetle community structure. Biodiversity and Conservation 25:1661–1675.

Bolkovi, M. L., S. M. Caziani, and J. J. Protomastro. 1995. Food Habits of the Three-Banded Armadillo (Xenarthra: Dasypodidae) in the Dry Chaco, Argentina. Journal of Mammalogy 76:1199–1204.

Bolkovic, M. L. 1999. Usos de fauna silvestre de pobladores de las cercanías de la Reserva Provincial Copo, Santiago del Estero, Argentina. Pages 117–124 Manejo y conservación de fauna silvestre en America Latina. Instituto de Ecología La Paz Bolivia.

Bôlla, D. A. S., K. Ceron, F. Carvalho, D. L. De Matia, M. R. Luiz, K. A. Panatta, D. D. Pavei, R. Á. Mendonça, and J. J. Zocche. 2017. Mastofauna terrestre do sul de Santa Catarina: mamíferos de médio e grande porte e voadores. Tecnologia e Ambiente 23:61.

Bonjorne, L. 2012. Levantamento de mamíferos de médio e grande porte em fragmentos de Mata Atlântica dos municípios de São Tomás de Aquino, MG e Itirapuã, SP. Page 6o. Congresso Brasileiro de Mastozoologia. Embrapa Pantanal.

Bordignon, M. O., N. C. Caceres, A. O. Franca, J. Casella, and C. F. Vargas. 2006. Biodiversidade do Complexo Aporé-Sucuriú: subsídios à conservação e ao manejo do Cerrado. UFMS Campo Grande, Campo Grande, Mato Grosso do Sul.

Borges, L. H. M., A. M. Calouro, A. L. M. Botelho, and M. Silveira. 2014. Diversity and habitat preference of medium and large-sized mammals in an urban forest fragment of southwestern Amazon. Iheringia. Série Zoologia 104:168–174.

Borges, L. H. M., A. M. Calouro, and J. R. D. De Sousa. 2015. Large and medium-sized mammals from Chandless State Park, Acre, Brazil. Mastozoología Neotropical 22:265–277.

Botelho, A. L. M., A. M. Calouro, L. H. M. Borges, and W. A. Chaves. 2012. Large and medium-sized mammals of the Humaitá Forest Reserve, southwestern Amazonia, state of Acre, Brazil. Check List 8:1190.

Botello, F., M. Aranda, and V. Sanchez-Cordero. 2010. Fortalecimiento de la Colección de fotocolectas biológicas -CFB-: una propuesta del uso de la imagen digital al servicio del conocimiento de la biodiversidad. Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad de México, México.

Bovendorp, R. S., and M. Galetti. 2007. Density and population size of mammals introduced on a land-bridge island in southeastern Brazil. Biological Invasions 9:353–357.

Bovendorp, R. S., N. Villar, E. F. de Abreu-Junior, C. Bello, A. L. Regolin, A. R. Percequillo, and M. Galetti. 2017. Atlantic small-mammal: a dataset of communities of rodents and marsupials of the Atlantic forests of South America. Ecology 98:2226.

Bowen-Jones, E. 2001. Belize Lodge Excursions Biodiversity Assessment 44. Fauna & Flora International, Cambridge, UK.

Bradley, J. 2018. UWBM Mammalogy Collection (Arctos). University of Washington Burke Museum. https://doi.org/10.15468/qziy3w.

Braga, C., L. C. L. Pinto, M. B. Mateus, and M. R. S. Pires. 2018. Ethnozoology as complementary method to inventory medium and large-bodied mammals: the case study of Serra do Ouro Branco, Brazil. Oecologia Australis 22:28–40.

Braga, F. G. 2003. Tamanduá-bandeira (*Myrmecophaga tridactyla*), espécie criticamente em perigo: uma preocupação no Estado do Paraná. Acta Biológica Paranaense 33:193–194.

Braga, F. G. 2010. Ecologia e Comportamento de tamanduá-bandeira (*Myrmecophaga tridactyla* Linnaeus, 1758) no município de Jaguariaíva, Paraná. Universidade Federal do Paraná, Curitiba, Paraná, Brazil.

Braga, F. G., R. E. F. Santos, and A. C. Batista. 2010. Marking behavior of the giant anteater *Myrmecophaga tridactyla* (Mammalia: Myrmecophagidae) in Southern Brazil. Zoologia (Curitiba) 27:07–12.

Braga, F. G., N. J. Souza, A. C. Batista, and P. P. dos S. Lima. 2014. Consumo de formigas cortadeiras por tamanduá-bandeira *Myrmecophaga tridactyla* (Linnaeus, 1758) em plantios de Pinus spp. no Paraná, Brazil. Edentata 15:1–8.

Braun, J., and P. King. 2018. Mammals Specimens. Sam Noble Oklahoma Museum of Natural History.

Brito, D., L. C. Oliveira, and M. A. R. Mello. 2004. An overview of mammalian conservation at Poço das Antas Biological Reserve, southeastern Brazil. Journal for Nature Conservation 12:219–228.

Brocardo, C. R., and J. F. Cândido Júnior. 2012. Persistência de mamíferos de médio e grande porte em fragmentos de floresta ombrófila mista no estado do Paraná, Brazil. Revista Árvore 36:301–310.

Brooks, D. M. 1995. Distribution and limiting Factors of edentates in the Paraguayan Chaco. Edentata 2:10–15.

Brown, D. D., R. A. Montgomery, J. J. Millspaugh, P. A. Jansen, C. X. Garzon-Lopez, and R. Kays. 2014. Selection and spatial arrangement of rest sites within northern tamandua home ranges. Journal of Zoology 293:160–170.

Bruna, E. M., J. F. Guimarães, C. T. Lopes, P. Duarte, A. C. L. Gomes, S. C. S. Belentani, R. Pacheco, K. G. Facure, F. G. Lemos, and H. L. Vasconcelos. 2010. Mammalia, Estação Ecológica do Panga, a Cerrado protected area in Minas Gerais state, Brazil. Check List 6:668–675.

Buchholtz, E. A., and C. C. Stepien. 2009. Anatomical transformation in mammals: Developmental origin of aberrant cervical anatomy in tree sloths. Evolution and Development 11:69–79.

Cabral, R., M. Zanin, G. Porfírio, and D. Brito. 2017. Medium-sized to large mammals of Serra do Tombador, Cerrado of Brazil. Check List 13:2129.

Cabrera, J. 2012. Los mamíferos terrestres de la cuenca del río Buritaca, sierra nevada de Santa Marta, Colombia. Pages 46–62*in* N. J. Bayly, H. Arias, J. A. Cabrera, L. Saboya, and M. A. Murcia, editors. Biodiversidad de la cuenca del río Buritaca, Sierra Nevada de Santa Marta, Colombia. SELVA: Investigación para la conservación en el Neotropico y Panthera Colombia, Bogota, Colombia.

Cáceres, N. C., M. R. Bornschein, W. H. Lopes, and A. R. Percequillo. 2007. Mammals of the Bodoquena Mountains, southwestern Brazil: an ecological and conservation analysis. Revista Brasileira de Zoologia 24:426–435.

Cadena, A., R. P. Anderson, and P. Rivas-Pava. 1998. Colombian mammals from the chacoan slopes of Nariño. Occasional Papers Mus. Tex. Tech. Univ. 180:1–15.

Calouro, A. M. 1999. Riqueza de mamíferos de grande e médio porte do Parque Nacional da Serra do Divisor (Acre, Brazil). Revista Brasileira de Zoologia 16:195–213.

Camilo-Alves, C. S. P., and G. Mourão. 2006. Responses of a Specialized Insectivorous Mammal (*Myrmecophaga tridactyla*) to Variation in Ambient. Biotropica 38: 52-56.

Campos, B. A. T. P., A. Feijó, P. G. de G. Brennand, and A. R. Percequillo. 2018a. Mammals of a restinga forest in Mataraca, Paraíba, northeastern Brazil, and its affinities to restinga areas in Brazil. Biota Neotropica 18.

Campos, B. A. T. P., M. A. S. Silva, N. F. Canassa, E. M. Vilar, H. Fernandes-Ferreira, N. M. Gurgel-Filho, and A. Feijó. 2018b. Mastofauna da Serra de Santa Catarina, Paraíba Brazil. Pages 240–269 *in* H. F. P. Araújo and A. H. Vieira-Filho, editors.

Biodiversidade na Serra de Santa Catarina, Paraíba: uma proposta de criação do Parque Estadual Serra das Águas Sertanejas. UFPB, Governo do Estado da Paraíba, Paraíba.

Canon, S., and F. Trujillo. 2014. Mastofauna de Cerrejón. Pages 150–169 *in* L. Báez and F. Trujillo, editors. Biodiversidad en Cerrejón. Fundación Omacha, Carbones de Cerrejón, Fondo para la Acción Ambiental y la Ninez, Bogota, Colombia.

Capllonch, P., A. Autino, M. Díaz, R. M. Barquez, and M. Goytia. 1996. Los mamíferos del Parque Biológico Sierra de San Javier, Tucumán, Argentina: observaciones sobre su sistemática y distribución. Mastozoología Neotropical 4:49–71.

Cardich, E. 1988. Informe sobre la conservación integrada del patrimonio natural y cultural del Parque Nacional Los Cardones y valles Calchaquíes (Argentina). Page Intercambio TÚcnico.

Caro, T. M., M. J. Kelly, N. Bol, and S. Matola. 2001. Inventorying Mammals at Multiple Sites in the Maya Mountains of Belize. American Society of Mammalogists.

Carrillo-Jiménez, E., and G. Wong-Reyes. 1992. Registro y medidas de restos de un *Cabassous centralis* (Edentata: Dasypodidae) en el Parque Nacional Manuel Antonio, Quepos, Costa Rica. Record and body measurement of Cabassous centralis (Edentata: Dasypodidae) in the Manuel Antonio National Park, Quepos. Brenesia. 38:153–154.

Carrizo, L. V., M. S. Sánchez, M. I. Mollerach, and R. M. Barquez. 2005. Nuevo registro de *Chaetophractus nationi* (Thomas, 1894) para Argentina; Comentários sobre su identidad sistemática y distribución. Mastozoología Neotropical 12:233–236.

Carvalho, A. S., F. D. Martins, F. M. Dutra, D. Gettinger, F. Martins-Hatano, and H. D. G. Bergallo. 2014. Large and medium-sized mammals of Carajás National Forest, Pará state, Brazil. Check List 10:1.

Cassano, C. R., and M. C. M. Kierulff. 2009. Diversidade de mamíferos não voadores no Complexo de Serra das Lontras. Pages 33–38 *in* I. e B. I. SAVE Brazil, editor. Complexo de Serras das Lontras e Una, Bahia: Elementos naturais e aspectos de sua conservação. SAVE Brazil, São Paulo.

Castaño, J. H., and J. D. Corrales. 2010. Mammals Of The La Miel River Basin (Caldas): Diversity And Cultural Use. Boletín Científico. Centro de Museos. Museo de Historia Natural 14:56–75.

Castaño, J. H., Y. Muñoz-Saba, and J. E. Botero. 2003. Mamíferos del departamento de Caldas - Colombia. Biota Colombiana 4.

CATIE, PNUMA, and Asdi. 2005. Plan de Manejo Integrado. Microcuenca del Río Las Escobas. Proyecto Planificación de la Rehabilitación, Manejo Ambiental y Desarrollo Costero en Nicaragua, Honduras y Guatemala después del Huracán Mitch. Guatemala.

Catzeflis, F., and B. de Thoisy. 2012. Xenarthrans in French Guiana: A Brief Overview of Their Distribution and Conservation Status. Edentata 13:29–37.

Ceballos, G. 2002. Actualización de la base de datos del Atlas Mastozoologico de México. Instituto de Ecología, Universidad Nacional Autónoma de México, Ciudad de México, México.

Ceballos González, G. J., and P. Ramos Rivera. 2017. Censo nacional del jaguar y sus presas (1a etapa). Versión 1.4. Comisión nacional para el conocimiento y uso de la biodiversidad.

Cepeda-D, J. C., and J. Chacón Pacheco. 2017. Confirmed record of *Cyclopes Didactylus* (Pilosa: Cyclopedidae) for the Department of Risaralda, Colombia. Boletín Científico. Centro de Museos. Museo de Historia Natural 21:90–95.

Cervantes Reza, F. A., and P. Ramos Rivera. 2017. Actualización de la base de datos del estado de Morelos de la Colección Nacional de Mamíferos del Instituto de Biología, UNAM. Version 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/adskni.

Chacón Pacheco, J., J. Figel, C. Rojano, J. Racero-Casarrubia, E. Humanez-López, and H. Padilla. 2017. Actualización de la distribución e identificación de áreas prioritarias para la conservación de una especie olvidada: el hormiguero gigante en Colombia. Edentata:in press.

Chacón Pacheco, J., E. Humanez-López, and O. Barrios De Ávila. 2012. Vertebrados asociados con sistemas de ganadería extensiva en el departamento de Córdoba, Colombia. Revista Biodiversidad Neotropical 2:45.

Chacón Pacheco, J., J. Racero-Casarrubia, and E. Rodríguez-Ortiz. 2013. Nuevos Registros de *Cyclopes didactylus* Linnaeus, 1758 para Colombia. Edentata 14:78–84.

Chalukian, S., S. de Bustos, M. Saravia, R. L. Lizárraga, R. Serapio, M. F. Sola, and M. Romano. 2002. Recategorización de áreas protegidas en el corredor transversal sur, Salta, Argentina. Salta: Secretaría de Medio Ambiente y Desarrollo Sustentable de la Provincia de Salta (SeMADeS) and Wildlife Conservation Society (WCS).

Chassot, O., A. Mata, and G. Monge. 2006. Evaluación ambiental del Refugio Nacional del Vida Silvestre Mixto Maquenque -No. 333.782097286 E92. Centro Cientifico Tropical, San José, Costa Rica.

Chavez-Leon, G. 2006. Inventario Floristico y Faunistico del Parque Nacional Barranca del Cupatitzio, Michoacan. Fondo Sectorial de Investigacion Ambiental SEMARNAT-CONACYT, CONABIO, INIFAP, Ciudad de México, México.

Cherem, J. J. 2005. Registros de mamíferos não voadores em estudos de avaliação ambiental no sul do Brazil. Biotemas 18:169–202.

Cherem, J. J., and S. L. Althoff. 2015. Mamíferos de uma área de estepe ombrófila nos estados do Paraná e Santa Catarina, sul do Brazil. Boletim da Sociedade Brazileira de Mastozoologia 73:42–50.

Cherem, J. J., S. L. Althoff, and R. Reinicke. 2008. Mamíferos. Pages 151–178 *in* J. J. Cherem and M. Kammers, editors. A Fauna das áreas de influência da Usina Hidrelétrica Quebra Queixo. Habilis, Erechim.

Cherem, J. J., M. E. Graipel, M. A. Tortato, S. L. Althoff, F. Brüggemann, J. Z. Matos, J. C. Voltolini, R. R. de Freitas, R. Illenseer, F. Hoffmann, I. R. Ghizoni-Jr., A. Bevilacqua, R. Reinicke, C. H. S. de Oliveira, A. Filippini, N. Furnari, K. Abati, M. Moraes, T. T. Moreira, L. G. R. Oliveira-Santos, V. V. Kuhnen, T. B. Maccarini, F. V. B. Goulart, H. B. Mozerle, F. M. Fantacini, D. Dias, R. Penedo-Ferreira, B. P. Vieira, and P. C. Simões-Lopes. 2011. Mastofauna terrestre do Parque Estadual da Serra do Tabuleiro, Estado de Santa Catarina, sul do Brasil. Biotemas 24:73.

Cherem, J. J., M. Kammers, I. R. Ghizoni-Jr, and A. Martins. 2007. Mamíferos de médio e grande porte atropelados em rodovias do Estado de Santa Catarina, sul do Brasil. Biotemas 20:81–96.

Cherem, J. J., and D. M. Perez. 1996. Mamíferos terrestres de floresta de araucária no município de Três Barras, Santa Catarina, Brazil. Biotemas 9:29–46.

Cherem, J. J., P. C. Simões-Lopes, S. L. Althoff, and M. E. Graipel. 2004. Lista dos mamíferos do estado de Santa Catarina, sul do Brasil. Mastozoología neotropical 11:151–184.

Chiarello, A. G. 1999. Effects of fragmentation of the Atlantic forest on mammal communities in south-eastern Brazil. Biological Conservation 89:71–82.

Chiarello, A. G. 2008. Sloth Ecology: An overview of field studies. Pages 269–279 in S. F. Vizcaino and W. J. Loughry, editors. The Biology of the Xenarthra. First edition. University Press of Florida, Gainesville, Florida.

Chiarello, A. & Moraes-Barros, N. 2014. Bradypus torquatus. The IUCN Red List of Threatened Species (http://www.iucnredlist.org/details/3036/0). Version 2017–2.

Chiarello, A. and Plese, T. 2014. Choloepus didactylus. The IUCN Red List of Threatened Species 2014. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T4777A47439542.en. Downloaded on 11 July 2018;

Chiquito, E. A., and A. R. Percequillo. 2009. *Myrmecophaga tridactyla* Linnaeus, 1758. Page 45 *in* P. M. Bressan, M. C. M. Kierulff, and A. M. Sugieda, editors. Mamíferos Ameaçados de extinção no estado de São Paulo. FPZ-SP, SMA, São Paulo.

Cisneros, X. 2006. Evaluación de la mastofauna gran Reserva Chachi-Esmeraldas, Ecuador. Pages 29–47 *in* EcoCiencia, editor. Componente de monitoreo biológico. Proyecto incentivos para la conservación, Gran Reserva Chachi - Esmeraldas. Quito, Ecuador.

Clozato, C. L., C. J. Mazzoni, N. Moraes-Barros, J. S. Morgante, and S. Sommer. 2015. Spatial pattern of adaptive and neutral genetic diversity across different biomes in the lesser anteater (*Tamandua tetradactyla*). Ecology and Evolution 5:4932–4948.

Clozato, C. L., N. Moraes-Barros, F. R. Santos, and J. S. Morgante. 2014. Historical and non-invasive samples: a study case of genotyping errors in newly isolated microsatellites for the lesser anteater (*Tamandua tetradactyla* L., Pilosa). Molecular Ecology Resources 14:531–540.

CONABIO - National Commission for the Knowledge and Use of Biodiversity. 2010. *Cabassous centralis* (armadillo centroamericano). Distribución conocida, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. Datos obtenidos del Sistema Nacional de Información sobre Biodiversidad (SNIB), registros comprendidos entre los años de 1986 y 1993 (registros no continuos), México.

Corpoguajira, C. A. R. de L. G., Biocolombia, and C. I. Colombia. 2011. Estudio de factibilidad para la declaración de un área natural protegida en el Corregimiento de cañaverales Municipio de San Juan del Cesar. Riohacha, Colombia.

Correa, J. D., and E. Ortiz. 2006. Plan de Manejo Integrado de los Humedales del bajo y Medio Atrato: Municipios de Carmen del Darién, Riosucio, Bojayá y Unguía en el departamento del Chocó, y Vigía del Fuerte, Turbo y Murindó en Antioquia. Fondo de Compensación Ambiental (FCA), Corporación para el Desarrollo Sostenible del Uraba

(Corpouraba), Corporación Autónoma regional para el Desarrollo Sostenible del Choco (Codechoco), Apartadó, Antioquia, Colombia.

Corrêa, L. L. C., D. E. Silva, D. M. M. Pazinato, S. V. de Oliveira, and A. L. da R. Seixas. 2013. Medium and large mammals found in the central country of Rio Grande do Sul, Brazil. Caderno de Pesquisa 25:41–48.

Corredor-Carrillo, D. A., and Y. Muñoz-Saba. 2007. Mamíferos de la alta montaña de Perijá. Pages 221–233 *in* J. O. Rangel, editor. Colombia, diversidad biótica V, la alta montaña de la Serranía de Perijá. Universidad Nacional de Colombia, Bogotá, Colombia.

Corredor, G. G., L. A. Peralta, J. H. Castaño, J. S. Zuluaga, B. Henao, M. Arango, A. M. Tabares, D. R. Matute, J. G. McEwen, and A. Restrepo. 2005. The naked-tailed armadillo *Cabassous centralis* (Miller 1899): a new host to *Paracoccidioides Braziliensis*. Molecular identification of the isolate. Medical Mycology 43:275–280.

Costa, R. F. 2014. Distribuição e monitoramento de mamíferos de médio e grande porte em áreas protegidas na Floresta Atlântica Costeira, estado do Paraná, sul do Brazil. Universidade Federal do Paraná, Curitiba, Paraná, Brazil.

Crespo, J. A. 1974. Comentarios sobre nuevas localidades para mamíferos de Argentina y de Bolivia. Rev. Mus. Argentino Cien. Nat. “Bernardino Rivadavia” 11:1–31.

Crespo, J. A. 1982. Ecología de la comunidad de mamíferos del Parque Nacional Iguazú, Misiones. Revista del Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” 3:1–162.

Cruz-Rodríguez, C. A., L. Larrotta, J. F. González-Maya, D. Zárrate-Charry, A. A. Cepeda, S. A. Balaguera-Reina, C. Ange-Jaramillo, A. Zamora, and Y. C. Castaño-Uribe. 2011. New records for the northern naked-tailed armadillo *Cabassous centralis* (Cingulata: Dasypodidae) in tropical dry forests of the Department of Sucre, Colombian Caribbean. Revista Mexicana de Mastozoología 15:39–45.

Cuaron, A. D., I. J. March, and P. M. Rockstroh. 1989. A Second Armadillo (*Cabassous centralis*) for the Faunas of Guatemala and Mexico. Journal of Mammalogy 70:870–871.

Cuarón Orozco, A. D., and P. Ramos Rivera. 2017. Determinantes ambientales de la abundancia de vertebrados terrestres en la región Lacandona: Primera fase. Version 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/03zcii.

Cuervo-Maya, A., E. Rodriguez, H. Restrepo Cano, O. L. Ruiz, P. Quinto Trujillo, and R. Walker. 2000. Diagnóstico ambiental preliminar de la zona del Alto Ure en la cuenca Alta del río San Jorge, zona amortiguadora del PNN-Paramillo.

Cullen, L., R. E. Bodmer, and C. Valladares Pádua. 2000. Effects of hunting in habitat fragments of the Atlantic forests, Brazil. Biological Conservation 95:49–56.

Culot, L., Pereira, L.A., Agostini, I., Marco Antônio Barreto de Almeida, Alves, R.S.C., Izar Aximoff, Alex Bager, Celia, M., Baldovino, Bella, T.R., Júlio César Bicca-Marques, Carlo, C.B., Nilmara Cristina da Silva, Bitetti, M.S. Di, Aluane Silva Ferreira, Ferreira, P.C.R., Marcos de S. Fialho, Lisieux Franco Fuzessy, Garbino, Terra, G.S., Garcia, F. de O., Cassiano A. F. R. Gatto, Gestich, C.C., Pablo Rodrigues Gonçalves, Gontijo, N.R.C., Maurício Eduardo Graipel, Guidorizzi, C.E., Hack, R.O.E., Gabriela

Pacheco Hass, Hilário, R.R., Hirsch, A., Ingrid Holzmann, Homem, D.H., Júnior, H.E., Gilberto Sabino-Santos Júnior, Cecília, M., Kierulff, M., Christoph Knogge, Fernando Lima, Lima, E.F. de, Cristiana Saddy Martins, Lima, A.A. de, Alexandre Martins, Martins, W.P., Fabiano R. de Melo, Melzew, R., João Marcelo Deliberador Miranda, Flávia Miranda, Moraes, A.M., Tainah Cruz Moreira, Maria Santina de Castro Morini, Nagy-Reis, M.B., Oklander, L., Leonardo de Carvalho Oliveira, Paglia, A.P., Pagoto, A., Passamani, M., Passos, F. de C., Peres, C.A., Perine, M.S. de C., Pinto, M.P., Pontes, A.R.M., Port-Carvalho, M., Prado, B.H.S. do, Regolin, A.L., Serra, L. La, Setz, E., Silva, A.S. de A., Silva, L.H., Silva, P.B.E. da, Silveira, M., Smith, R.L., Souza, S.M. de, Srbek-Araujo, A.C., Trevelin, L.C., Valladares-Padua, C., Marques, L.Z.E., Ferrari, S.F., Beltrão-Mendes, R., Henz, D.J., Costa, F.E. da V. da, Ribeiro, I.K., Quintilha, L.L.T., Dums, M., Lombardi, P.M., Bonikowski, R.T.R., Age, S.G., Souza-Alves, J.P., Chagas, R., Cunha, R.G., Valença-Montenegro, M.M., Ludwig, G., Jerusalinsky, L., Buss, G., Azevedo, R.B. de, Filho, R.F., Bufalo, F., Milhe, L., Santos, M.M. dos, Sepulvida, R., Ferraz, D. da S., Faria, M.B., Ribeiro, M.C., Galetti, M. 2018. ATLANTIC-PRIMATES: A dataset of communities and occurrences of primates in the Atlantic Forests of South America. Ecology: 10.1002/ecy.2525.

Cunha, A. A. 2004. Conservação de mamíferos na Serra dos Órgãos: passado, presente e futuro. Pages 213–224 IV Congresso Brazileiro de Unidades de Conservação. Anais do... Unidades de Conservação. FBPN e Rede PróUC.

Cuyckens, G. A. E., L. S. Mochi, M. Vallejos, P. G. Perovic, and F. Biganzoli. 2016. Patterns and Composition of Road-Killed Wildlife in Northwest Argentina. Environmental Management 58:810–820.

Daciuk, J., A. C. Cicchino, R. Mauri, and J. J. Capri. 1981. Notas faunísticas y ecológicas de Península Valdés y Patagonia. XXIV. Artrópodos ectoparásitos de mamíferos y aves colectados en la Península Valdés y alrededores (Provincia de Chubut, Argentina). Physis (Buenos Aires), Secc. C 39:41–48.

Dantas-Torres, F., D. R. A. Ferreira, L. M. de Melo, P.-A. C. P. Lima, D. B. Siqueira, L. C. Rameh-de-Albuquerque, A. V. de Melo, and J. A. C. Ramos. 2010. Ticks on captive and free-living wild animals in northeastern Brazil. Experimental and Applied Acarology 50:181–189.

Darwin, C. 1842. The Zoology of the Voyage of HMS Beagle, Under the Command of Captain Fitzroy, RN, During the Years 1832 to 1836: Fish. Smith, Elder and Company.

David Lopez, D. 2016. Mamíferos asociados al sistema cenagoso de Ayapel y su relación con las poblaciones humanas, Córdoba Colombia. Universidad de Antioquia, Medellín, Colombia.

D`Bastiani, E., M. D`Bastiani, A. D. Pereira, R. S. Bovendorp, H. F. Júnior, J. L. de A. Marques, and S. Bazilio. 2018. Inventory of medium and large mammals in the Biological Reserve of Araucárias, Paraná , Brazil Inventário de mamíferos de médios e grande porte na Reserva Biológica de Araucárias, Paraná , Brasil. Acta Biologica Paranaense 47:15–31.

Deffaci, A. C., V. P. Silva, M. T. Hartmann, and P. A. Hartmann. 2016. Diversidade de aves, mamíferos e répteis atropelados em região de floresta subtropical no sul do Brasil. Ciência e Natura 38:1205.

Delciellos, A. C., R. L. M. Novaes, M. F. de C. Loguercio, L. Geise, R. T. Santori, R. D. F. Souza, B. S. Papi, D. Raíces, N. R. Vieira, S. Felix, N. Detogne, C. C. S. Silva, H.

D. G. Bergallo, and O. Rocha-Barbosa. 2012. Mammals of Serra da Bocaina National Park, state of Rio de Janeiro, southeastern Brazil. Check List 8:675.

Desbiez, A. L. J., and D. Kluyber. 2013. The Role of Giant Armadillos (*Priodontes maximus*) as Physical Ecosystem Engineers. Biotropica 45:537–540.

Delsuc, F., M. Scally, O. Madsen, M. J. Stanhope, W. W. De Jong, F. M. Catzeflis, M. S. Springer, and E. J. P. Douzery. 2002. Molecular phylogeny of living xenarthrans and the impact of character and taxon sampling on the placental tree rooting. Molecular Biology and Evolution 19:1656–1671.

Delsuc, F., and E. J. P. Douzery. 2008. Recent advances and future prospects in xenarthran molecular phylogenetics. Pages 11-23 *in* S. F. Vizcaino and W. J. Loughry, editors. The Biology of the Xenarthra. First edition. University Press of Florida, Gainesville, Florida.

Delsuc, F. 2009. The role of molecular data in xenar- thran conservation. Page 49 *in*: 10th International Mammalogical Congress. IADIZA, Mendoza, Argentina.

Dias, D. D. M., P. G. Guedes, S. S. P. Silva, and L. M. M. Sena. 2017a. Diversity of nonvolant mammals in a Caatinga area in northeastern Brazil. Neotropical Biology and Conservation 12:200–208.

Dias, D. de M., and A. Bocchiglieri. 2015a. Mamíferos silvestres recolhidos em áreas urbanas de Sergipe, nordeste do Brasil. Revista Nordestina de Zoologia, Recife 9:1–15.

Dias, D. de M., L. M. de C. Mendonça, N. M. de Albuquerque, R. F. de C. Terra, S. M. Silvestre, V. S. Moura, R. Beltrão, P. Adriano, and S. F. Ferrari. 2017b. Preliminary survey of the nonvolant mammals of a remnant of coastal restinga habitat in eastern Sergipe, Brazil. Natureza Online 15:32–41.

Dias, D. M., and A. Bocchiglieri. 2015b. Riqueza e uso do habitat por mamíferos de médio e grande porte na Caatinga, nordeste do Brasil. Neotropical Biology and Conservation 11:38–46.

Díaz-N, J. F., and C. Sánchez-Giraldo. 2008. Notable altitudinal range extension of the northern naked-tailed armadillo *Cabassous centralis* (Cingulata: Dasypodidae) in Colombia. Brenesia 69:75–76.

Díaz-Pulido, A., A. Benítez, D. A. Gómez-Ruiz, C. A. Calderón-Acevedo, A. Link, A. Pardo, F. Forero, A. G. De Luna, E. Payán, and S. Solari. 2014. Mamíferos del bosque seco, una mirada al Caribe colombiano. Pages 128–165 *in* C. Pizano and H. Garcia, editors.El bosque seco tropical en Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH), Bogotá, Colombia.

Diaz, M. M. 2000. Key to the native mammals of Jujuy Province, Argentina. Occasional Papers of the Sam Noble Oklahoma Museum of Natural History 7:1:29.

Díaz, M. M. 1999. Mamíferos de la provincia de Jujuy: sistemática, distribución y ecología. Universidad Nacional de Tucumán, San Miguel de Tucumán, Argentina.

Diniz, M. F., and D. Brito. 2012. The charismatic giant anteater (*Myrmecophaga tridactyla*): a famous John Doe? Edentata 13:76–83.

Dirzo Minjarez, R., and P. Ramos Rivera. 2017. Análisis de los efectos ecológicos del aprovechamiento forestal en el Corredor Biológico Mesoamericano: mamíferos, plantas y sus interacciones. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/wrj9s5.

DPNVS. 1999. Evaluacion Ecologica Rapida, Isabel Gamarra de Fox. Page 34-38 in: 1065 Motivos iniciales para proteger el Parque Nacional Defensores del Chaco.

Eaton, D. P., A. Keuroghlian, M. do C. A. Santos, A. L. J. Desbiez, and D. W. Sada. 2017. Citizen scientists help unravel the nature of cattle impacts on native mammals and birds visiting fruiting trees in Brazil's southern Pantanal. Biological Conservation 208:29–39.

Ecofuturo, I. 2016. Plano de manejo da reserva natural Sesc em Bertioga. Instituto Ecofuturo, São Paulo.

Escobar-Lasso, S., J. Cerón-Cardona, and J. H. Castaño-Salazar. 2013. Los mamíferos de la cuenca del río Chinchiná, en la región andina de Colombia. Therya 4:139–155.

Escobar Ocampo, M. C., J. E. Morales Pérez, E. Hernández García, J. Guzmán Hernández, A. Riechers Pérez, and E. E. Espinoza Medinilla. 2006. Sistematización de las colecciones científicas del Instituto de Historia Natural y ecología (IHNE), Chiapas. Ciudad de México, México.

Esquivel, E. 2001. Mamíferos de la Reserva Natural del Bosque Mbaracayú. Asunción, Paraguay: Fundación Moisés Bertoni

Esselstyn, J. 2017. LSUMZ Mammals Collection. Louisiana State University Museum of Natural Science. https://doi.org/10.15468/wxiqf6.

Fabian, M. E., D. A. S. Souza, F. Carvalho, and C. Lima. 2011. Mamíferos de áreas de restinga no Rio Grande do Sul. Pages 209–224 *in* L. M. Pessoa, W. C. Tavares, and S.

Siciliano, editors. Mamíferos de restingas e manguezais do Brasil. Sociedade Brasileira de Mastozoologia, Museu Nacional, Rio de Janeiro.

Falconi, N., E. M. Vieira, J. Baumgarten, D. Faria, and G. A. Fernandez Giné. 2015. The home range and multi-scale habitat selection of the threatened maned three-toed sloth (Bradypus torquatus). Mammalian Biology - Zeitschrift für Säugetierkunde 80:431–439.

Fariña, R. A. 1996. Trophic relationships among Lujanian mammals. Evolutionary Theory 11:125–134.

FATMA - Environmental Foundations of Santa Catarina. 2007. Plano de Manejo do Parque Estadual Rio Canoas - Encarte 3 -Análise da Unidade de Conservação. Fundação do Meio Ambiente de Santa Catarina / Socioambiental Consultores Associados.

FATMA - Environmental Foundations of Santa Catarina. 2009. Plano de Manejo Reserva Biológica Aguaí, Volume 4 -Relatórios Temáticos do Meio Biótico. Fundação do Meio Ambiente de Santa Catarina / Socioambiental Consultores Associados.

FATMA - Environmental Foundations of Santa Catarina. 2010a. Plano de Manejo do Parque Estadual da Serra Furada. Fundação do Meio Ambiente de Santa Catarina / Socioambiental Consultores Associados.

FATMA - Environmental Foundations of Santa Catarina. 2010b. Plano de Manejo da Reserva Biológica Sassafras. Fundação do Meio Ambiente de Santa Catarina / Socioambiental Consultores Associados.

FATMA - Environmental Foundations of Santa Catarina. 2016. Plano de Manejo do Parque Estadual das Araucárias - Fase II. Fundação do Meio Ambiente de Santa Catarina / Apremavi.

Feeney, R. 2018. LACM Vertebrate Collection. Version 18.2. Natural History Museum of Los Angeles County. https://doi.org/10.15468/77rmwd.

Feijó, A., and A. Langguth. 2013. Mamíferos de Médio e Grande Porte do Nordeste do Brasil: Distribuição e Taxonomia, com Descrição de Novas Espécies. Revista Nordestina de Biologia 22:3–225.

Feijó, A., and P. Cordeiro-Estrela. 2014. The correct name of the endemic *Dasypus* (Cingulata: Dasypodidae) from northwestern Argentina. Zootaxa 3887:88.

Feijó, A., G. S. T. Garbino, B. A. T. P. Campos, P. A. Rocha, S. F. Ferrari, and A. Langguth. 2015. Distribution of *Tolypeutes* Illiger, 1811 (Xenarthra: Cingulata) with Comments on Its Biogeography and Conservation. Zoological Science 32:77–87.

Feijó, A., and P. Cordeiro-Estrela. 2016. Taxonomic revision of the *Dasypus kappleri* complex, with revalidations of *Dasypus pastasae* (Thomas, 1901) and *Dasypus beniensis* Lönnberg, 1942 (Cingulata, Dasypodidae). Zootaxa 4170:271.

Feijó, A., B. D. Patterson, and P. Cordeiro-Estrela. 2018. Taxonomic revision of the long-nosed armadillos, Genus *Dasypus* Linnaeus, 1758 (Mammalia, Cingulata). PloS ONE 13:e0195084.

Fernandes-Ferreira, H., N. M. Gurgel-Filho, A. Feijó, S. V. Mendonça, R. R. da N. Alves, and A. Langguth. 2015. Non-volant mammals from Baturité Ridge, Ceará state, Northeast Brazil. Check List 11:1630.

Fernandez, A. C. A. 2003. Censo de mamíferos em alguns fragmentos de Floresta Atlântica no nordeste do Brasil. Universidade Federal de Pernambuco, Recife, Brazil.

Figueroa-De-León, A., E. J. Naranjo, and A. Santos-Moreno. 2016. Registros de Cabassous centralis (Cingulata: Dasypodidae) en la Reserva de la Biosfera Montes Azules y sitios aledaños, Chiapas, México. Edentata 17:46–50.

Fischer, W. A., M. B. Ramos-Neto, L. Silveira, and A. T. A. Jacomo. 2004. Human transportation network as ecological barrier for wildlife on Brazilian Pantanal Cerrado corridors. Pages 182–194 Proceedings of the 2003 International Conference on Ecology and Transportation.

FMB - Fundación Moisés Bertoni para la Conservación de la Naturaleza. 2005. Reserva Natural del Bosque MBaracayu. Asunción.

Fountain, E. D., J. koo Kang, D. J. Tempel, P. J. Palsbøll, J. N. Pauli, and M. Zachariah Peery. 2018. Genomics meets applied ecology: Characterizing habitat quality for sloths in a tropical agroecosystem. Molecular Ecology 27:41–53.

Fornitano, L., T. Angeli, R. T. Costa, N. Olifiers, and R. de C. Bianchi. 2017. Medium to large-sized mammals of the biological reserve “Augusto Ruschi”, São Paulo State, Brazil. Oecologia Australis 19.

Freitas, C. H., C. S. Justino, and E. Z. F. Setz. 2014. Road-kills of the giant anteater in south-eastern Brazil: 10 years monitoring spatial and temporal determinants. Wildlife Research 41:673.

Fundación Jatun Sacha. 2013. Producto 4 - Plan de Manejo Ambiental. Reserva El Encuentro. Quito, Ecuador.

Gaia, F. 1998a. Projeto Biodiversidade - Monitoramento do meio biótico no Horto Florestal Santo Amaro, General Câmara, RS, vol. 5.

Gaia, F. 1998b. Projeto Biodiversidade - Monitoramento do meio biótico no Horto Florestal Mariana, Mariana Pimentel, RS, vol. 2.

Gaia, F. 1998c. Projeto Biodiversidade - Monitoramento do meio biótico no Horto Florestal Ramos, São Jerônimo, RS, vol. 4.

Gall, L. 2018. Vertebrate Zoology Division - Mammalogy, Yale Peabody Museum. Yale University Peabody Museum. https://doi.org/10.15468/4mm6uc.

Galván-Guevara, S. 2010. Mamíferos y aves silvestres registrados en una zona de los montes de María, Colosó, Sucre, Colombia. Revista Colombiana de Ciencia Animal 2:45–57.

Galvis-Peñuela, P. A., A. Mejia-Tobon, and J. V. Rueda-Almonacid. 2011. Fauna silvestre de la Reserva Forestal Protectora Montes de Oca, La Guajira. Corpoguajira, Riohacha, Colombia.

Garcés-Restrepo, M. F., M. Z. Peery, B. Reid, and J. N. Pauli. 2017. Individual reproductive strategies shape the mating system of tree sloths. Journal of Mammalogy 98:1417–1425.

Garcés-Restrepo, M. F., J. N. Pauli, and M. Z. Peery. 2018. Natal dispersal of tree sloths in a human-dominated landscape: Implications for tropical biodiversity conservation. Journal of Applied Ecology 55:2253–2262.

Gardner, A. L. 2008. Mammals of South America, volume 1: marsupials, xenarthrans, shrews, and bats. University of Chicago Press.

Garmendia, A., V. Arroyo-Rodríguez, A. Estrada, E. J. Naranjo, and K. E. Stoner. 2013. Landscape and patch attributes impacting medium- and large-sized terrestrial mammals in a fragmented rain forest. Journal of Tropical Ecology 29:331–344.

George, T. K., S. A. Marques, M. de Vivo, L. C. Branch, N. Gomes, and R. Rodriguez. 1988. Levantamento de mamíferos do Parque Nacional da Amazônia (Tapajós). Brazil Florestal 63:33–41.

Geraldo Júnior, E., C. Henrique Geraldo, C. Persel, and P. L. Cazella. 2013. Levantamento da mastofauna em fragmento florestal localizado na cidade de Cascavel - Paraná. Cascavel 6:175–183.

Giai, A. G. 1950. Notas de viajes. El Hornero 1 9:121–164.

Gibb, G. C., F. L. Condamine, M. Kuch, J. Enk, N. Moraes-Barros, M. Superina, H. N. Poinar, and F. Delsuc. 2016. Shotgun mitogenomics provides a reference phylogenetic framework and timescale for living xenarthrans. Molecular Biology and Evolution 33:621–642.

Gil, G., and S. Heinonen. 2003. Lista comentada de los mamíferos del Parque Nacional Baritú (Salta, Argentina). Acta Zoológica Lilloana 47:117–135

Gilmore, D. P., C. P. Da Costa, and D. P. F. Duarte. 2001. Sloth biology: An update on their physiological ecology, behavior and role as vectors of arthropods and arboviruses. Brazilian Journal of Medical and Biological Research 34:9–25..

Giné, G. A. F., C. R. Cassano, S. S. de Almeida, and D. Faria. 2015. Activity budget, pattern and rhythm of maned sloths (*Bradypus torquatus*): Responses to variations in ambient temperature. Mammalian Biology - Zeitschrift für Säugetierkunde 80:459–467.

Gomez, C., and N. J. Bayly. 2010. Las Aves de Quebrada Valencia. SELVA: Investigación para la conservación en el Neotrópico, Bogota, Colombia.

Gonçalves, F., R. S. Bovendorp, G. Beca, C. Bello, R. Costa-Pereira, R. L. Muylaert, R. R. Rodarte, N. Villar, R. Souza, M. E. Graipel, J. J. Cherem, D. Faria, J. Baumgarten, M. R. Alvarez, E. M. Vieira, N. C. Cáceres, R. Pardini, Y. L. R. Leite, L. P. Costa, M. A. R. Mello, E. Fischer, F. D. C. Passos, L. H. Varzinczak, J. A. Prevedello, A. P. Cruz-Neto, F. Carvalho, A. R. Percequillo, A. Paviolo, A. Nava, J. M. B. Duarte, N. U. de la Sancha, E. Bernard, R. G. Morato, J. F. Ribeiro, R. G. Becker, G. Paise, P. S. Tomasi, F. Vélez-Garcia, G. L. Melo, J. Sponchiado, F. Cerezer, M. A. S. Barros, A. Q. S. de Souza, C. C. dos Santos, G. A. F. Giné, P. Kerches-Rogeri, M. M. Weber, G. Ambar, L. V Cabrera-Martinez, A. Eriksson, M. Silveira, C. F. Santos, L. Alves, E. Barbier, G. C. Rezende, G. S. T. Garbino, É. O. Rios, A. Silva, A. T. A. Nascimento, R. S. de Carvalho, A. Feijó, J. Arrabal, I. Agostini, D. Lamattina, S. Costa, E. Vanderhoeven, F. R. de Melo, P. de Oliveira Laroque, L. Jerusalinsky, M. M. Valença-Montenegro, A. B. Martins, G. Ludwig, R. B. de Azevedo, A. Anzóategui, M. X. da Silva, F. D. M. Marcela, A. Vogliotti, A. Gatti, T. Püttker, C. S. Barros, T. K. Martins, A. Keuroghlian, D. P. Eaton, C. L. Neves, M. S. Nardi, C. Braga, P. R. Gonçalves, A. C. Srbek-Araujo, P. Mendes, J. A. de Oliveira, F. A. M. Soares, P. A. Rocha, P. Crawshaw, M. C. Ribeiro, and M. Galetti. 2018a. ATLANTIC MAMMAL TRAITS: a data set of morphological traits of mammals in the Atlantic Forest of South America. Ecology 99:498–498.

Gonçalves, F., W. Hannibal, M. N. Godoi, F. I. Martins, R. F. Oliveira, V. V. Figueiredo, J. Casella, and É. F. G. G. de Sá. 2018b. Non-volant mammals from the Upper Paraná River Basin: a data set from a critical region for conservation in Brazil. Ecology 99:499–499.

González-Zamora, A., V. Arroyo-Rodríguez, A. María, G.-D. Pierro, R. Lombera, E. De La Peña-Cuéllar, J. L. Peña-Mondragón, O. Hernández-Ordoñez, C. Muench, A. Garmendia, and K. E. Stoner. 2011. The northern naked-tailed armadillo in the Lacandona rainforest, Mexico: new records and potential threats Armadillo de cola desnuda en la selva lacandona, México: nuevos registros y amenazas potenciales. Revista Mexicana de Biodiversidad 82:581–586.

González Cózatl, F. X., and P. Ramos Rivera. 2017. Computarización de la colección de mamíferos del Centro de Educación Ambiental e Investigación Sierra de Huautla (CEAMISH) de la Universidad Autónoma del Estado de Morelos (UAEM).

Goulart, F. V. B., N. C. Cáceres, M. E. Graipel, M. A. Tortato, I. R. Ghizoni, and L. G. R. Oliveira-Santos. 2009. Habitat selection by large mammals in a southern Brazilian Atlantic Forest. Mammalian Biology - Zeitschrift für Säugetierkunde 74:182–190.

Graipel, M. E., J. J. Cherem, and A. Ximenez. 2001. Mamíferos terrestres não voadores da Ilha de Santa Catarina, sul do Brazil. Biotemas 14:109–140.

Grilo, C., M. R. Coimbra, R. C. Cerqueira, P. Barbosa, R. A. P. Dornas, L. O. Gonçalves, F. Z. Teixeira, I. P. Coelho, B. R. Schmidt, D. L. K. Pacheco, G. Schuck, I. B. Esperando, J. A. Anza, J. Beduschi, N. R. Oliveira, P. F. Pinheiro, A. Bager, H. Secco, M. Guerreiro, C. F. Carvalho, A. C. Veloso, A. E. I. Custódio, O. Marçal, G. Ciocheti, J. Assis, M. C. Ribeiro, B. S. S. Francisco, J. J. Cherem, T. C. Trigo, M. M. A. Jardim, I. C. Franceschi, C. Espinosa, F. P. Tirelli, V. J. Rocha, M. L. Sekiama, G. P. Barbosa, H. R. Rossi, T. C. Moreira, M. Cervini, C. A. Rosa, L. G. Silva, C. M. M. Ferreira, A. César, J. Casella, S. L. Mendes, J. Zina, D. F. O. Bastos, R. A. T. Souza, P. A. Hartmann, A. C. G. Deffaci, J. Mulinari, S. C. Luzzi, T. Rezzadori, C. Kolcenti, T. X. Reis, V. S. C. Fonseca, C. F. Giorgi, R. P. Migliorini, C. B. Kasper, C. Bueno, M.

Sobanski, A. P. F. G. Pereira, F. A. G. Andrade, M. E. B. Fernandes, L. L. C. Corrêa, A. Nepomuceno, A. Banhos, W. Hannibal, R. Fonseca, L. A. Costa, E. P. Medici, A. Croce, K. Werther, J. P. Oliveira, J. M. Ribeiro, M. de Santi, A. E. Kawanami, L. Perles, C. do Couto, D. S. Figueiró, E. Eizirik, A. A. Correia, F. M. Corrêa, D. Queirolo, A. L. Quagliatto, B. H. Saranholi, P. M. Galetti, K. G. Rodriguez-Castro, V. S. Braz, F. G. R. França, G. Buss, J. A. Rezini, M. B. Lion, C. C. Cheida, A. C. R. Lacerda, C. H. Freitas, F. Venâncio, C. H. Adania, A. F. Batisteli, C. G. Z. Hegel, J. A. Mantovani, F. H. G. Rodrigues, T. Bagatini, N. H. A. Curi, L. Emmert, R. H. Erdmann, R. R. G. F. Costa, A. Martinelli, C. V. F. Santos, and A. Kindel. 2018. BRAZIL ROAD-KILL: a data set of wildlife terrestrial vertebrate road-kills. Ecology 0:1420508.

Gual Díaz, M., and P. Ramos Rivera. 2017. Bosque Mesófilo de Montaña de México. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/7rwxkh.

Hack, R. O. E. 2012a. Mastofauna. Pages 61–66*in* Institutos Lactec, editor.RAS LT 230 kV Umuarama-Guaira. Curitiba, Paraná.

Hack, R. O. E. 2012b. Mastofauna. Pages 70–74 *in* I. Lactec, editor. RAS LT 138 kV Barbosa Ferraz São Pedro do Ivaí. Curitiba, Paraná.

Hack, R. O. E. 2014. Mastofauna. Pages 480–514*in* I. Lactec, editor. EIA/RIMA Complexo Eólico-Elétrico -CEE- Campos Gerais. Curitiba, Paraná.

Hack, R. O. E. 2017. Censo, tamanho populacional, composição e classificação sexo-etária. Pages 1–8 O muriqui-do-sul -*Brachyteles arachnoides*- como espécie chave para a conservação da biodiversidade do vale do rio Ribeira de Iguape, Paraná. Relatório técnico não publicado, Curitiba, Paraná.

Hack, R. O. E., and F. A. Krüger. 2013. No Title. Edentata 14:70–73.

Hack, R. O. E., and J. J. S. Santos. 2014. Mastofauna. Page *in* I. Lactec, editor. Programa de Monitoramento de Fauna Silvestre da PCH Cavernoso II. Curitiba, Paraná.

Hannibal, W. 2014. Mammals of medium and large size from a fragmented seasonal forest landscape in Mato Grosso do Sul state, central-western Brazil. Check List 10:1430.

Hannibal, W., N. L. Cunha, G. Dalponti, S. R. Oliveira, and K. R. F. Pereira. 2018. Roadkill and new records for giant armadillo (*Priodontes maximus*) in Central-Western Brazil. Mastozoología Neotropical.

Hannibal, W., V. V Figueiredo, H. W. P. Claro, A. C. Carvalho, G. P. Cabral, R. F. Oliveira, H. F. Aquino, F. V Viana, T. F. Silveiro, and J. J. Silva Filho. 2015. Mamíferos não voadores em fragmentos de Cerrado no sul do estado de Goiás, Brazil. Boletim da Sociedade Brasileira de Mastozoologia 74:103–109.

Hannibal, W., and M. Neves-Godoi. 2015. Non-volant mammals of the Maracaju Mountains, southwestern Brazil: Composition, richness and conservation. Revista Mexicana de Biodiversidad 86:217–225.

Hasui, E., J. P. Metzger, R. G. Pimentel, L. F. Silveira, A. A. d. A. Bovo, A. C. Martensen, A. Uezu, A. L. Regolin, A. Bispo de Oliveira, C. A. F. R. Gatto, C. Duca, C. B. Andretti, C. Banks-Leite, D. Luz, D. Mariz, E. R. Alexandrino, F. M. de Barros, F. Martello, I. M. d. S. Pereira, J. N. da Silva, K. M. P. M. d. B. Ferraz, L. N. Naka, L. dos Anjos, M. A. Efe, M. A. Pizo, M. Pichorim, M. S. S. Gonçalves, P. H. C. Cordeiro, R. A. Dias, R. d. L. Muylaert, R. C. Rodrigues, T. V. V. da Costa, V. Cavarzere, V. R.

Tonetti, W. R. Silva, C. N. Jenkins, M. Galetti, and M. C. Ribeiro. 2018. ATLANTIC BIRDS: a data set of bird species from the Brazilian Atlantic Forest. Ecology 99:497.

Heinonen, S., and A. Bosso. 1994. Nuevos aportes para el conocimiento de la mastofauna del Parque Nacional Calilegua (Provincia de Jujuy, Argentina). Mastozoología Neotropical 1:51–60.

Heinonen Fortabat, S., and J. C. Chebez. 1997. Los mamíferos de los parques nacionales de la Argentina. Monografía LOLA, Buenos Aires 14:1–70.

Hendges, C. D., C. H. Salvador, and M. A. Nichele. 2015. Mamíferos de médio e grande porte de remanescentes de Floresta Estacional Decidual no Parque Estadual Fritz Plaumann e em áreas adjacentes, Sul do Brasil. Biotemas 28:121.

Hervas, J. M., A. Gallo, and F. Villafañe. 2004. Registro ocasional de especies en el PN Talampaya Nº 2.

Higginbotham, S., W. R. Wong, R. G. Linington, C. Spadafora, L. Iturrado, and A. E. Arnold. 2014. Sloth hair as a novel source of fungi with potent anti-parasitic, anti-cancer and anti-bacterial bioactivity. PLoS ONE 9.

Hirsch, A., and A. G. Chiarello. 2012. The endangered maned sloth Bradypus torquatus of the Brazilian Atlantic forest: a review and update of geographical distribution and habitat preferences. Mammal Review 42:35–54.

Horváth, A., and P. Ramos Rivera. 2017. Mamíferos de los Parques Nacionales Lagunas de Montebello y Palenque, Chiapas. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/g811qi.

Huertas, B. C., and T. M. Donegan. 2006. Proyecto YARÉ: Investigación y Evaluación de las Especies Amenazadas de la Serranía de los Yariguíes, Santander, Colombia. BP Conservation Programme. Informe Final. Colombian EBA Project Report Series 7.

Hurtado, C. M., and V. Pacheco. 2015. Nuevos registros de mamíferos en el Parque Nacional Cerros de Amotape, noroeste de Perú. Revista Peruana de Biología 22:077–086.

IBGE - Brazilian Institute of Geography and Statistics. 2013. Atlas do censo demográfico 2010. IBGE, Rio de Janeiro, Brazil.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2004. Plano de Manejo do Parque Nacional de Aparados da Serra e Serra Geral.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2005. Plano de Manejo da Reserva Biológica de Poço das Antas. Rio de Janeiro.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2006. Plano de Manejo da Reserva Biológica do Tinguá. Brasilia, DF.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2007. Plano de Manejo Parque Nacional da Restinga de Jurubatiba- Contextualização da Unidade de Conservação. Rio de Janeiro.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2008a. Plano de Manejo da Reserva Biológica União. Rio de Janeiro.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2008b. Plano de Manejo do Parque Nacional da Tijuca. Brasília, DF.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2008c. Plano de Manejo Floresta Nacional de Ibirama - Santa Catarina - Volume I - Informações Gerais. Brasília, DF.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2009. Plano de Manejo Parque Nacional da Serra do Itajaí. Brasília, DF.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2010. Plano de Manejo do Parque Nacional das Araucárias. Brasília, DF.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2011a. Plano de Manejo Floresta Nacional de Passo Fundo - Volume I - Diagnóstico. Florianópolis, SC.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2011b. Plano de Manejo da RPPN Caetezal - Joinville - Santa Catarina. Brasília, DF.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2012a. Plano de Manejo da Estação Ecológica da Guanabara.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2012b. Plano de Manejo Reserva Biológica das Perobas. Brasília, DF.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2013a. Plano de Manejo Floresta Nacional de Chapecó, Santa Catarina - Volume I - Diagnóstico. Florianópolis, SC.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2013b. Plano de Manejo do Parque Nacional do Itatiaia.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2013c. Plano de Manejo RPPN Fazenda Palmital.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2015. Avaliação do Risco de Extinção dos Xenartros Brasileiros. Série Estado de Conservação da Fauna Brasileira - No 2. Brasília.

ICMBio - Chico Mendes Institute for Biodiversity Conservation. 2016. Plano de Manejo da Floresta Nacional de Piraí do Sul Volume I - Diagnóstico. Piraí do Sul, Paraná.

Iezzi, M. E., P. Cruz, D. Varela, C. De Angelo, and M. S. Di Bitetti. 2018. Tree monocultures in a biodiversity hotspot: Impact of pine plantations on mammal and bird assemblages in the Atlantic Forest. Forest Ecology and Management 424:216–227.

INEA, I. E. do A. 2009. Plano de Manejo Parque Estadual dos Três Picos - Versão Integral. Rio de Janeiro.

INEA, I. E. do A. 2010. Plano de Manejo Estação Ecológica Estadual Guaxindiba - EEEG. Rio de Janeiro.

INEA, I. E. do A. 2011a. Plano de Manejo (Fase 2) Parque Estadual da Ilha Grande – PEIG. Rio de Janeiro.

INEA, I. E. do A. 2011b. Plano de Manejo Parque Estadual da Pedra Branca. Rio de Janeiro.

INEA, I. E. do A. 2015a. Plano de Manejo do Parque Estadual do Cunhambebe. Rio de Janeiro.

INEA, I. E. do A. 2015b. Plano de Manejo Fase 1 Parque Estadual da Serra da Tiririca. Rio de Janeiro.

INEFAN/GEF, I. E. F. y de A. N. y V. S. 1998. Plan de Manejo de la Reserva Ecológica Manglares Cayapas - Mataje. Direccion Nacional de Areas Naturales y. Vida Silvestre. Proyecto INEFAN/GEF, Quito, Ecuador.

Instituto Ambiental do Paraná. 2002a. Plano de Manejo do Parque Estadual do Monge. Curitiba, Paraná.

Instituto Ambiental do Paraná. 2002b. Plano de Manejo do Parque Estadual do Guartelá. Curitiba, Paraná.

Instituto Ambiental do Paraná. 2004. Plano de Manejo do Parque Estadual de Vila Velha - 2004. Curitiba, Paraná.

Instituto Ambiental do Paraná. 2006a. Plano de Manejo do Parque Estadual da Cabeça do Cachorro. Curitiba, Paraná.

Instituto Ambiental do Paraná. 2006b. Plano de Manejo do Refúgio de Vida Silvestre do Pinhão. Curitiba, Paraná.

Instituto Ambiental do Paraná. 2015a. Plano de Manejo Parque Estadual Mata São Francisco - Volume 1 Levantamentos Temáticos. Curitiba, Paraná.

Instituto Ambiental do Paraná. 2015b. Plano de Manejo - Parque Estadual de Amaporã. Curitiba, Paraná.

Instituto Ambiental do Paraná. 2015c. Plano de Manejo do Parque Estadual de Ibiporã - PR. Curitiba, Paraná.

Instituto de Biologia. 2005. “Cabassous centralis - IBUNAM:CNMA:IB26620”. UNIBIO: Colecciones Biológicas.

Instituto de Investigaciones Ambientales del Pacífico (IIAP). 2010. Caracterización ecológica del componente faunístico en los bosques relictuales de Córdoba – Nororiente del Choco Biogeográfico, Colombiano. Quibdó.

IUCN - International Union for Conservation of Nature. 2014. The IUCN Red List of Threatened Species. Version 2015.2. Available at: www.iucnredlist.org. (Accessed: 07 July 2018).

IUCN - International Union for Conservation of Nature. 2018. The IUCN Red List of Threatened Species. Version 2018-2. http://www.iucnredlist.org. (Accessed: 07 July 2018).

Iwanaga, S. 2004. Levantamento de mamíferos diurnos de médio e grande porte no Parque Nacional do Jaú: resultados preliminares. Pages 195–210 *in* Janelas para a Biodiversidade no Parque Nacional do Jaú: uma estratégia para o estudo da biodiversidade na Amazônia. Fundação Vitória Amazônica, Manaus.

Janzen, D. H. 1991. Historia Natural de Costa Rica. Editorial de la Universidad de Costa Rica, San José, Costa Rica.

Jayat, J. P., and P. E. Ortiz. 2010. Mamíferos del Pedemonte de Yungas de la Alta Cuenca del Río Bermejo en Argentina: una Línea de Base de Diversidad. Mastozoología Neotropical 17:69–86.

Jerez, S. D. V., and M. Halloy. 2003. El oso hormiguero, *Myrmecophaga tridactyla*: crecimiento e independización de una cría. Mastozoología Neotropical 10:323–330.

Jiménez-Alvarado, J. S., C. Moreno-Díaz, G. Olarte, D. Zárrate-Charry, I. M. Vela-Vargas, A. Pineda-Guerrero, and J. F. González-Maya. 2015. Inventory of flying, medium and large mammals from Parque Nacional Natural Tayrona, Magdalena, Colombia. Mammalogy Notes | Notas Mastozoológicas 2:36–39.

Johnson, W. E., W. L. Franklin, and J. A. Iriarte. 1992. The mammalian fauna of the northern chilean patagonia: A biogeographical dilemma. Mammalia 56:445–458.

Jones, C. B., and J. Young. 2004. Hunting Restraint by Creoles at the Community Baboon Sanctuary, Belize: A Preliminary Survey. Journal of Applied Animal Welfare Science 7:127–141.

Juárez-López, R., M. Pérez-López, Y. B. la Cruz, A. J. la Cruz, F. M. Contreras-Moreno, D. Thornton, and M. G. Hidalgo-Mihart. 2017. Range Extension of the Northern Naked-Tailed Armadillo (*Cabassous centralis*) in Southern Mexico. Western North American Naturalist 77:398–403.

Juliá, J. P., E. Richard, and J. Samaniego. 1994. Nota sobre la distribución geográfica del Oso melero (*Tamandua tetradactyla*, Xenarthra, Myrmecophagidae) en el noroeste argentino. Nótulas Faunísticas 66:1–4.

Juraszek, A., S. Bazilio, and C. Golec. 2014. Levantamento de mamíferos de médio e grande porte na RPPN Federal Corredor do Iguaçu na região Centro-oeste do Paraná. Acta Iguazu 3:113–123.

Kasper, C. B., F. D. Mazim, J. B. G. Soares, T. G. de Oliveira, and M. E. Fabián. 2007. Composição e abundância relativa dos mamíferos de médio e grande porte no Parque Estadual do Turvo, Rio Grande do Sul, Brazil. Revista Brasileira de Zoologia 24:1087–1100.

Koenemann, J. G. 2009. Mamíferos nativos atropelados em uma área no bioma Pampa: variação sazonal e efeito do tipo hábitat. Universidade Vale do Rio dos Sinos - UNISINOS.

Kreutz, K., F. Fischer, and K. E. Linsenmair. 2009. Observations of intraspecific Aggression in Giant Anteaters (*Myrmecophaga tridactyla*). Edentata 8–10:6–7.

De La Ossa, J., and S. Galván-Guevara. 2016. Registro de mortalidad de fauna silvestre por colisión vehicular en la carretera Toluviejo – ciénaga La Caimanera, Sucre, Colombia. Biota colombiana 16:69–79.

De La Ossa Lacayo, A., and J. De La Ossa. 2015. Apuntes Etnozoológicos: Montes de María, Sucre, Colombia. Revista Colombiana de Ciencia Animal - RECIA 7:191–196.

de la Torre, J. A., M. Rivero, G. Camacho, and L. A. Álvarez-Márquez. 2018. Assessing occupancy and habitat connectivity for Baird's tapir to establish conservation priorities in the Sierra Madre de Chiapas, Mexico. Journal for Nature Conservation 41:16–25.

Lahille, F. 1899. Ensayo sobre la distribución geográfica de los mamíferos en la República Argentina. Pages 1–262 Primera Reunión Congreso Latinoamericano.

Landmann, A., C. Walder, A. Vorauer, and T. Emser. 2008. Mammals of the Piedras Blancas National Park, Costa Rica: species composition, habitat associations and efficiency of research - a preliminary overview. Stapfia 88:409–422.

Lara-Ruiz, P., and A. C. Srbek-Araujo. 2006. Comportamento Potencialmente Reprodutivo da Preguiça-comum, *Bradypus variegatus* (Xenarthra, Bradypodidae): Observações de Campo. Edentata 7:44.

Laurindo, R. D. S., R. L. M. Novaes, R. D. F. Souza, V. F. Souza, F. Felix, T. M. Souto, R. G. T. Cunha, and R. Gregorin. 2017. Mammals in forest remnants of an ecotonal Atlantic Forest-Cerrado area from southeastern Brazil. Neotropical Biology and Conservation 12:19–29.

Lemos, F. G., A. N. Costa, F. C. Azevedo, C. E. Fragoso, M. C. Freitas Junior, and E. C. Rocha. (in press). Sampling intensification in highly-modified landscapes to accurately estimate threatened species? Occurrence: a study case with giant armadillos in Central Brazil. Oryx.

León Cortés, J. L., and P. Ramos Rivera. 2017. Patrones de diversidad florística y faunística del área focal Ixcan, selva Lacandona, Chiapas. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/i7cj9c.

León Paniagua, L., and P. Ramos Rivera. 2017a. Distribución geográfica de las aves y los mamíferos de las zonas montanas de los estados de San Luis Potosí e Hidalgo circundantes de la Sierra Gorda. Comisión nacional para el conocimiento y uso de la biodiversidad.

León Paniagua, L., and P. Ramos Rivera. 2017b. Actualización de la base de datos de la Colección de mamíferos del Museo de Zoología “Alfonso L. Herrera”. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad.

Leuchtenberger, C., Ê. S. de Oliveira, L. P. Cariolatto, and C. B. Kasper. 2018. Activity pattern of medium and large sized mammals and density estimates of Cuniculus paca (Rodentia: Cuniculidae) in the Brazilian Pampa. Brazilian Journal of Biology:0.

Lima, F. 2009. Estimativas de abundância e densidade populacional da jaguatirica através de modelos de marcação-recaptura: estudo de caso nos remanescentes florestais do Pontal do Paranapanema, São Paulo. Pontifícia Universidade Católica de Minas Gerais.

Lima, F., G. Beca, R. L. Muylaert, C. N. Jenkins, M. L. L. Perilli, A. M. O. Paschoal, R. L. Massara, A. P. Paglia, A. G. Chiarello, M. E. Graipel, J. J. Cherem, A. L. Regolin, L. G. R. Oliveira-Santos, C. R. Brocardo, A. Paviolo, M. S. Di Bitetti, L. M. Scoss, F. L. Rocha, R. Fusco-Costa, C. A. da Rosa, M. X. Da Silva, L. Hufnagel, P. M. Santos, G. T. Duarte, L. N. Guimarães, L. L. Bailey, F. H. G. Rodrigues, H. M. Cunha, F. M. Fantacini, G. O. Batista, J. A. Bogoni, M. A. Tortato, M. R. Luiz, N. Peroni, P. V De Castilho, T. B. Maccarini, V. P. Filho, C. De Angelo, P. Cruz, V. Quiroga, M. E. Iezzi, D. Varela, S. M. C. Cavalcanti, A. C. Martensen, E. V Maggiorini, F. F. Keesen, A. V Nunes, G. M. Lessa, P. Cordeiro-Estrela, M. G. Beltrão, A. C. F. De Albuquerque, B. Ingberman, C. R. Cassano, L. C. Junior, M. C. Ribeiro, and M. Galetti. 2017. ATLANTIC-CAMTRAPS: a dataset of medium and large terrestrial mammal communities in the Atlantic Forest of South America. Ecology 98:2979–2979.

Lopes, M. A., and S. F. Ferrari. 2000. Effects of Human Colonization on the Abundance and Diversity of Mammals in Eastern Brazilian Amazonia. Conservation Biology 14:1658–1665.

López, C. E., and U. Hernández, editors. 2009. Diálogos entre Saberes, Ciencias e Ideologías en Torno a lo Ambiental. Universidad Tecnológica de Pereira, Facultad de Ciencias Ambientales, Risaralda, Colombia.

López González, C., and P. Ramos Rivera. 2017. Mamíferos silvestres de la cuenca del río Mezquital-San Pedro, Durango-Nayarit. Versión 1.4. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/6xlqcs.

López Wilchis, R., and P. Ramos Rivera. 2017. Base de datos de mamíferos de México depositados en colecciones de Estados Unidos y Canadá. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/.

Lorenzutti, R., and A. P. Almeida. 2006. A coleção de mamíferos do Museu Elias Lorenzutti em Linhares, Estado do Espírito Santo, Brazil. Boletim do Museu de Biologia Mello Leitão 19:59–74.

Loughry, W. J., M. Superina, C. M. Mcdonough, and A. M. Abba. 2015. Research on armadillos: A review and prospectus. Journal of Mammalogy 96:635–644.

Luna, R. B. de, A. F. A. Reyes, L. R. R. de Lucena, and A. R. Mendes Pontes. 2017. Terrestrial mammal assemblages in protected and human impacted areas in Northern Brazilian Amazonia. Nature Conservation 22:147–167.

Macedo, L. S. M., R. B. Azevedo, and F. Pinto. 2010. Área de vida, uso do habitat e padrão de atividade do Tamanduá-bandeira na savana de Boa Vista, Roraima. Pages 585–602 *in* R. I. Barbosa and V. F. Melo, editors. Homem, Ambiente e Ecologia. FEMACT, Boa Vista, Roraima.

Madsen, O., M. Scally, C. J. Douady, D. J. Kao, R. W. DeBry, R. Adkins, H. M. Amrine, M. J. Stanhope, W. W. De Jong, and M. S. Springer. 2001. Parallel adaptive radiations in two major clades of placental mammals. Nature 409:610–614.

Magioli, M., K. de B. Ferraz, and M. G. Rodrigues. 2014. Medium and large-sized mammals of an isolated Atlantic Forest remnant, southeast São Paulo State, Brazil. Check List 10:850–856.

Magioli, M., K. M. P. M. de Ferraz, E. Z. F. Setz, A. R. Percequillo, M. V. de S. S. Rondon, V. V. Kuhnen, M. C. da S. Canhoto, K. E. A. dos Santos, C. Z. Kanda, G. de L. Fregonezi, H. A. do Prado, M. K. Ferreira, M. C. Ribeiro, P. M. S. Villela, L. L. Coutinho, and M. G. Rodrigues. 2016. Connectivity maintain mammal assemblages functional diversity within agricultural and fragmented landscapes. European Journal of Wildlife Research 62:431–446.

Manzatti, L., and I. M. Franco. 2012. Mamíferos de médio de grande porte da Serra do Itapeti. Page *in* M. S. C. Morini and V. Miranda, editors. Serra do Itapeti: aspectos históricos, sociais e naturalísticos. Editora Canal.

Mares, M. A., R. M. Barquez, J. K. Braun, and R. A. Ojeda. 1996. Observations on the mammals of Tucuman Province, Argentina. 1. Systematics, distribution, and ecology of the Didelphimorphia, Xenarthra, Chiroptera, Primates, Carnivora, Perissodactyla, Artiodactyla, and Lagomorpha. Annals of Carnegie Museum 65:89–152.

Mares, M. A., R. A. Ojeda, and M. P. Kosco. 1981. Observations on the distribution and ecology of the mammals of Salta Province, Argentina. Carnegie Museum of Natural History.

Marques-Aguiar, S. A., C. C. S Melo, G. F. Souza Aguiar, and J. L. Alberto Queiróz. 2002. Levantamento preliminar da mastofauna da região de Anajás-Muaná, Ilha de Marajó, Pará, Brazil. Revista Brasileira de Zoologia 19:841–854.

Marques, R. V., C. Vargas, and S. Missel. 2011. Mastofauna no Planalto das Araucárias, Rio Grande do Sul, Brazil. Revista Brasileira de Biociências 9:278–288.

Márquez, J., C. Chebez, E. Haene, A. Flores, and E. Sánchez. 1991. Sistema Provincial de Áreas Naturales Protegidas. Page Provincia de San Juan, República Argentina, 65 pp.

Martins, R., M. R. F. Borges, R. Iartelli, and G. Puorto. 2012. Fauna da Reserva Legal da Pedreira Itapeti. Pages 231–258 *in* M. S. de C. Morini and V. F. O. de Miranda, editors. Serra do Itapeti: Aspectos Históricos, Sociais e Naturalísticos. Canal 6, Bauru, SP.

Martins, T. D. O., S. P. Bunhuolo, H. Ortencio-Filho, and T. E. Lacher Jr. 2016. Large and medium-sized mammals in the urban park Cinturão Verde, Cianorte, northwestern Paraná. Check List 12:1851.

Mascarenhas, B. M., and G. Puorto. 1988. Nonvolant mammals rescued at the Tucuruí Dam in the Brazilian Amazon. Primate Conservation 9:91–93.

Massocato, G. F., E. Arnaud, and L. J. Desbiez. 2017. Presença e importância do tatu-canastra, *Priodontes maximus* (Kerr, 1792), na maior área protegida do leste do Estado de Mato Grosso do Sul, Brazil. Edentata 18:26–33.

Massoia, E., and J. C. Chebez. 1985. Hallazgo del "cabasú" *Cabassous tatouay* (Cingulata, Dasypodidae) en Corrientes y nuevos datos sobre su distribución en Misiones. IDIA (441-444):56–58.

Massoia, E., J. C. Chebez, A. Bosso, and A. Chiappe. 2012. Los mamíferos silvestres de la provincia de Misiones, Argentina. Fundación de Historia Natural Félix de Azara.

McCain, C. M. . 2001. First Evidence of the Giant Anteater (*Myrmecophaga tridactyla*) in Honduras. The Southwestern Naturalist 46:252–254.

McCarthy, T. J. 1982. *Chironectes, Cyclopes, Cabassous* and probably *Cebus* in southern Belize. Museum Nat Hist Naturelle, Paris.

Mccarthy, T. J., D. L. Anderson, and G. A. C. D. 1999. Southwestern Association of Naturalists Tree Sloths (Mammalia: Xenarthra) in Nicaragua and Honduras, Central America Author (s): Timothy J. McCarthy, David L. Anderson and Gustavo A. Cruz D. Published by: Southwestern Association of Naturalist. The Southwestern Naturalist 44:410–414.

McDonough C. M. and W. J. Loughry. 2008. Behavioral ecology of armadillos. Pages 281–293 *in* S. F. Vizcaino and W. J. Loughry, editors. The Biology of the Xenarthra. First edition. University Press of Florida, Gainesville, Florida.

McNab, B. K. 1984. Physiological convergence amongst ant-eating and termite-eating mammals. Journal of Zoology 203:485–510.

Meave del Castillo, J. A., and P. Ramos Rivera. 2017. Caracterización biológica del Monumento Natural Yaxchilán como un elemento fundamental para el diseño de su plan rector de manejo. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad.

Medri, Í. M., G. de M. Mourão, and A. Y. Harada. 2003. Dieta de Tamanduá-Bandeira (*Myrmecophaga tridactyla*) no Pantanal da Nhecolândia, Brazil. Edentata 5:29–34.

Mejía-Correa, S., and J. A. Díaz-Martínez. 2009. Primeros registros e inventario de mamíferos grandes y medianos en el Parque Nacional Munchique, Colombia. Mesoamericana 13:7–22.

Melo, É. R. de A., J. R. Gadelha, M. de N. D. da Silva, A. P. da S. Júnior, and A. R. M. Pontes. 2015. Diversity, abundance and the impact of hunting on large mammals in two contrasting forest sites in northern amazon. Wildlife Biology 21:234–245.

Mendes Pontes, A. R. 2004. Ecology of a community of mammals in a seasonally dry forest in Roraima, Brazilian Amazon. Mammalian Biology - Zeitschrift für Säugetierkunde 69:319–336.

Mendes Pontes, A. R., A. C. M. Beltrão, I. C. Normande, A. de J. R. Malta, A. P. da Silva Júnior, and A. M. M. Santos. 2016. Mass Extinction and the Disappearance of Unknown Mammal Species: Scenario and Perspectives of a Biodiversity Hotspot. PLoS ONE 11:e0150887.

Mendes Pontes, A. R., C. M. Brazil, I. C. Normande, and P. H. A. L. Peres. 2005. Mamíferos. Pages 303–321*in* K. C. Pôrto, J. S. Almeida-Cortez, and M. Tabarelli, editors. Diversidade Biológica e Conservação da Floresta Atlântica ao Norte do Rio São Francisco (Biodiversidade 14). Ministério do Meio Ambiente, Brasília, DF.

Millen, B., and B. Lim. 2017. Mammalogy Collection - Royal Ontario Museum. Version 11.4. Royal Ontario Museum. https://doi.org/10.15468/2rlrvh.

Miller, G. S. J. 1899. Notes on the naked-tailed armadillos. Proceedings of the Biological Society of Washington 13:18.

Minoprio, J. D. L. 1945. Sobre el *Chalmyphorus truncatus* Harlan. Acta Zoológica Lilloana 3:5–58.

Miranda, F., and M. Superina. 2010. New distribution records of the silky anteater *Cyclopes didactylus* (Pilosa, Cyclopedidae) in coastal northeastern Brazil. Mastozoología Neotropical 17:381–384.

Miranda, F., Bertassoni, A. & Abba, A.M. 2014. Myrmecophaga tridactyla. The IUCN Red List of Threatened Species 2014 (http://www.iucnredlist.org/details/14224/0). Version 2017–2 .

Miranda, F., Fallabrino, A., Arteaga, M., Tirira, D.G., Meritt, D.A. and Superina, M. 2014. Tamandua tetradactyla. The IUCN Red List of Threatened Species 2014: e.T21350A47442916. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T21350A47442916.en. Downloaded on 12 July 2018.

Miranda, F. R., D. M. Casali, F. A. Perini, F. A. Machado, and F. R. Santos. 2017. Taxonomic review of the genus Cyclopes Gray, 1821 (Xenarthra: Pilosa), with the revalidation and description of new species. Zoological Journal of the Linnean Society 1821:1–35.

Miranda, J. M. D., R. F. M. Rios, and F. D. C. Passos. 2008. Contribuição ao conhecimento dos mamíferos dos Campos de Palmas, Paraná, Brazil. Biotemas 21:97–103.

Miranda, J. M. D., R. F. Moro-Rios, J. E. Silva-Pereira, and F. C. Passos. 2009. Mamíferos da Serra de São Luiz do Purunã, Paraná, Brazil. USEB, Pelotas.

Miranda Júnior, J. F., and A. Bertassoni. 2014. Potential agonistic courtship and mating behavior between two adult giant anteaters (*Myrmecophaga tridactyla*). Edentata 15:69–72.

Miretzki, M., and F. G. Braga. 2014. Distribuição histórica e recente de *Myrmecophaga tridactyla* Linnaeus, 1758 (Pilosa, Myrmecophagidae) no Estado do Paraná, Brazil. Edentata 15:16–26.

Mittermeier, R. A., W. R. Turner, and F. W. Larsen. 2011. Biodiversity Hotspots. Pages 3–21 in F. E. Zachos and J. C. Habel, editors. Biodiversity Hotspots. First edition. Springer-Verlag Berlin Heidelberg 2011, New York.

Modesto, T. C., F. S. Pessôa, M. C. Enrici, N. Attias, T. Jordão-Nogueira, L. de M. Costa, H. G. Albuquerque, and H. de G. Bergallo. 2008a. Mamíferos do Parque Estadual do Desengano, Rio de Janeiro, Brazil. Biota Neotropica 8:153–159.

Modesto, T. C., F. S. Pessôa, T. Jordão-Nogueira, M. C. Enrici, L. de M. Costa, N. Attias, J. Almeida, D. S. L. Raíces, H. G. Albuquerque, B. C. Pereira, C. E. L. Esbérard, and H. D. G. Bergallo. 2008b. Mammals, Serra da Concórdia, state of Rio de Janeiro, Brazil. Check List 4:341.

Monguillot, J. 2006. La fauna de vertebrados del Parque Nacional Talampaya. Page Actualización y lista comentada. Delegación Regional Centro. Inédito. Buenos Aires.

Monterrubio, C. L., L. E. C. Lara, E. J. N. Piñera, and F. B. Torres. 2012. Uso y conservación de mamíferos silvestres en una comunidad de las cañadas de la Selva Lacandona, Chiapas, México. Etnobiología 5:101.

Monterrubio, C. L., and P. Ramos Rivera. 2017. Actualización de la base de datos de la colección mastozoológica de El Colegio de la Frontera Sur, San Cristóbal de las Casas. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/4hov8v.

Montgomery, G. G. 1986. The evolution and ecology of armadillos, sloths, and vermilinguas. Smithsonian Institution Press, Washington.

Montgomery, G. G., and M. E. Sunquist. 1978. Habitat Selection and Use by Two-toed and Three-toed Sloths. Pages 329–359 in G. G. Montgomery, editor. The Ecology of the arboreal folivores. First edition. Smithsonian Institution Press, Washington D.C.

Mora, H. M. V. 2006. Evaluación del Recurso Faunístico Cuenca del Río Carbón, Fila Carbón, Talamanca, Limón, Costa Rica. Heredia.

Moraes-Barros, N. de, A. P. Giorgi, S. Silva, and J. S. Morgante. 2010. Reevaluation of the Geographical Distribution of *Bradypus tridactylus* Linnaeus, 1758 and *B. variegatus* Schinz, 1825. Edentata 11:53–61.

Moraes-Barros, N. 2018. Family Megalonychidae. *in:* D. D. Wilson and , D. D., R. A. Mittermeier, editors. 2018. Handbook of the Mammals of the World, volume 8:: 8.Insectivores, Sloths and Colugos. Lynx Edicions, Barcelona, Spain, 710p.

Morales Pérez, J. E., and P. Ramos Rivera. 2017. Vertebrados terrestres del Corredor Biológico Sierra Madre del Sur, Chiapas, México. Comisión nacional para el conocimiento y uso de la biodiversidad.

Morato, R. G., J. J. Thompson, A. Paviolo, J. A. de La Torre, F. Lima, R. T. McBride, R. C. Paula, L. Cullen, L. Silveira, D. L. Z. Kantek, E. E. Ramalho, L. Maranhão, M. Haberfeld, D. A. Sana, R. A. Medellin, E. Carrillo, V. Montalvo, O. Monroy-Vilchis, P. Cruz, A. T. Jacomo, N. M. Torres, G. B. Alves, I. Cassaigne, R. Thompson, C. Saens-Bolanos, J. C. Cruz, L. D. Alfaro, I. Hagnauer, X. M. da Silva, A. Vogliotti, M. F. D. Moraes, S. S. Miyazaki, T. D. C. Pereira, G. R. Araujo, L. C. da Silva, L. Leuzinger, M. M. Carvalho, L. Rampin, L. Sartorello, H. Quigley, F. Tortato, R. Hoogesteijn, P. G.

Crawshaw, A. L. Devlin, J. A. May, F. C. C. de Azevedo, H. V. B. Concone, V. A. Quiroga, S. A. Costa, J. P. Arrabal, E. Vanderhoeven, Y. E. Di Blanco, A. M. C. Lopes, C. E. Widmer, and M. C. Ribeiro. 2018. Jaguar movement database: a GPS-based movement dataset of an apex predator in the Neotropics. Ecology 99:1691.

Moreira-Ramírez, J. F. 2017. Movimientos del pecarí de labios blancos en relación con la disponibilidad de agua y cacería en la Selva Maya de Guatemala y México. El Colegio de la Frontera Sur, Campeche, Mexico.

Moreira-Ramírez, J., R. B. McNab, R. García-Anleu, V. Méndez, M. Barnes, G. Ponce-Santizo, and M. Córdova. 2008. Densidad de Jaguares dentro de la Concesión Comunitaria de Carmelita y de la Asociación Forestal Integral San Andrés Petén. Wildlife Conservation Society.

Moreira, J. C., E. G. Manduca, P. R. Gonçalves, R. Stumpp, C. G. C Pinto, and G. Lessa. 2008. Mammals, Volta Grande Environmental Unity, Triângulo Mineiro, states of Minas Gerais and São Paulo, Southeastern Brazil. Check List 4:349–357.

Moreira De Lima, E., I. Conceição, M. Muniz, J. Abílio, B. Ohana, J. De Sousa, and S. Júnior. 2009. Ocorrência de Euphractus sexcinctus (Xenarthra: Dasypodidae) na Região do Médio Rio Amazonas. Edentata 8:58–60.

Moreno-Bejarano, L. M., and R. Álvarez-León. 2003. Fauna asociada a los manglares y otros humedales en el delta-estuario del Río Magdalena, Colombia. Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales 27:517–534.

Moura, R. T. 2003. Distribuição e ocorrência de mamíferos na Mata Atlântica do sul da Bahia. Page *in* P. I. Prado, E. C. Landau, R. T. Moura, L. P. S. Pinto, G. A. B. Fonseca, and K. N. Alger, editors. Corredor de Biodiversidade da Mata Atlântica do Sul da Bahia. Ilhéus.

Mourão, G., and I. M. Medri. 2007. Activity of a specialized insectivorous mammal (*Myrmecophaga tridactyla*) in the Pantanal of Brazil. Journal of Zoology 271: 187-192.

Mourthé, Í. 2013. How much effort should be employed for surveying a low-diversity Amazonian mammal assemblage using line-transects? Zoologia (Curitiba) 30:119–124.

Mourthé, Í., and A. A. Barnett. 2014. Crying tapir: The functionality of errors and accuracy in predator recognition in two neotropical high-canopy primates. Folia Primatologica 85:379–398.

Muñoz-Saba, Y. 2010. Diversidad de mamíferos en áreas del departamento de Córdoba, Colombia. Pages 381–398 *in* C. O. Rangel, editor. Colombia diversidad biótica IX Ciénagas de Córdoba: biodiversidad, ecología y manejo ambiental. Instituto de Ciencias Naturales, Bogotá, Colombia.

Muñoz-Saba, Y. 2012. Mamíferos del Complejo Cenagoso de Zapatosa. Pages 599–606 *in* J. O. Rangel, editor. Colombia. Diversidad biótica XIII: complejo cenagoso Zapatosa y ciénagas del Sur del Cesar: Biodiversidad, Conservación y Manejo. Universidad Nacional de Colombia, CORPOCESAR, Bogotá, Colombia.

Muñoz Alonso, L. A., and P. Ramos Rivera. 2017. Actualización y enriquecimiento de las bases de datos del proyecto de evaluación y análisis geográfico de la diversidad faunística de Chiapas. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/kndvje.

Muylaert, R. d. L., R. D. Stevens, C. E. L. Esbérard, M. A. R. Mello, G. S. T. Garbino, L. H. Varzinczak, D. Faria, M. d. M. Weber, P. Kerches Rogeri, A. L. Regolin, H. F. M. d. Oliveira, L. d. M. Costa, M. A. S. Barros, G. Sabino-Santos, M. A. Crepaldi de Morais, V. S. Kavagutti, F. C. Passos, E. L. Marjakangas, F. G. M. Maia, M. C. Ribeiro, and M. Galetti. 2017. ATLANTIC BATS: a data set of bat communities from the Atlantic Forests of South America. Ecology 98:3227.

Myers, N., R. A. Mittermeier, C. G. Mittermeier, G. A. B. da Fonseca, and J. Kent. 2000. Biodiversity hotspots for conservation priorities. Nature 403:853–858.

Naranjo, E. J., M. M. Guerra, R. E. Bodmer, and J. E. Bolanos. 2004. Subsistence hunting by three ethnic groups of the Lacandon Forest, Mexico. Journal of Ethnobiology 24:233–253.

Nascimento, J. L., and I. B. Campos, editors. 2011. Atlas da fauna Brasileira ameaçada de extinção em unidades de conservação federais. ICMBio, Brasília, DF.

Navarro Sigüenza, A. G., and P. Ramos Rivera. 2017. Inventario de la biodiversidad de vertebrados terrestres de los Chimalapas, Oaxaca. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/dmv5os.

Navone, G. T. 1987. Estudios parasitológicos en edentados argentinos. III. Trichostrongylid, *Macielia elongat*a sp. nov; *Moennig virilis* sp. nov. y *Trichohelix tuberculata* (Parona y Stossich, 1901) Ortlepp, 1922 (Molineidae-Anoplostrongylinae) parásitos de Chaetophractus . Neotropica (La Plata) 33:105–117.

Navone, G. T. 1988. Estudios parasitológicos en edentados Argentinos. IV. Cestodes pertenecientes a la familia Anoplocephalidae Cholodkovsky, 1902, parásitos de Dasypópidos. Neotropica (La Plata) 34:51–61.

NEA, D. T. R. 1995. Plan operativo: Parque Nacional Río Pilcomayo y Reserva Natural Formosa 1996-1997. Page Administración de Parques Nacionales.

Notarnicola, J., and G. T. Navone. 2003. Systematic and distribution of Orihelia anticlava (Molin, 1858) (Nematoda, Onchocercidae) from dasypodids of South America. Acta Parasitologica 48:00–00.

Nunes, A. V., L. M. Scoss, M. R. Prado, and G. M. Lessa. 2013. Survey of large and medium-sized terrestrial mammals in the Serra do Brigadeiro State Park, Minas Gerais, Brazil. Check List 9:240.

Núñez-Regueiro, M. M., L. Branch, R. J. Fletcher, G. A. Marás, E. Derlindati, and A. Tálamo. 2015. Spatial patterns of mammal occurrence in forest strips surrounded by agricultural crops of the Chaco region, Argentina. Biological Conservation 187:19–26.

Ojeda, R. A., and M. A. Mares. 1989. A biogeographic analysis of the mammals of Salta Province, Argentina. Page Special Publication 27, The Museum. Texas Tech University Press, Lubbock.

Oliveira, L. de C., S. M. Mendel, D. Loretto, J. de S. Silva Júnior, and G. W. Fernandes. 2006. Edentates of the Saracá-Taquera National Forest, Pará, Brazil. Edentata 7:3–7.

Oliveira, R. F., and W. Hannibal. 2017. Effects of patch attributes on the richness of medium- and large-sized mammals in fragmented semi-deciduous forest. Mastozoología Neotropical 24:401–408.

Oliveira, S. V., L. L. C. Corrêa, F. B. Peters, F. D. Mazim, F. M. Garcias, J. P. Santos, and C. B. Kasper. 2015. Occurrence of *Cabassous tatouay* (Cingulata, Dasypodidae) in

Rio Grande do Sul and its potential distribution in southern Brazil. Iheringia. Série Zoologia 105:235–241.

Oliveira, S. V. de, F. M. Quintela, and E. R. Secchi. 2013a. Medium and large sized mammal assemblages in coastal dunes and adjacent marshes in southern Rio Grande do Sul State, Brazil. Acta Scientiarum. Biological Sciences 35:55–61.

Oliveira, T. G., F. Michalski, A. L. M. Botelho, L. J. Michalski, A. M. Calouro, and A. L. J. Desbiez. 2016. How rare is rare? Quantifying and assessing the rarity of the bush dog Speothos venaticus across the Amazon and other biomes. Oryx:1–10.

Oliveira, V. B. de, A. M. Linares, G. L. Castro-Corrêa, and A. G. Chiarello. 2013b. Inventory of medium and large-sized mammals from Serra do Brigadeiro and Rio Preto State Parks, Minas Gerais, southeastern Brazil. Check List 9:912.

Olrog, C. C. 1976. Sobre mamíferos del noroeste Argentino. Acta Zoológica Lilloana 32:5–12.

Olrog, C. C. 1979. Los Mamíferos de la Selva Húmeda, Cerro Calilegua, Jujuy. Acta Zoológica Lilloana 33:9–14.

Olson, D. M., and E. Dinerstein. 1998. The Global 200: A Representation Approach to Conserving the Earth ’s Most Biologically Valuable Ecoregions. Conservation Biology 12:502–515.

Olson, D. M., E. Dinerstein, E. D. Wikramanayake, N. D. Burgess, G. V. N. Powell, E. C. Underwood, J. A. D’amico, I. Itoua, H. E. Strand, J. C. Morrison, C. J. Loucks, T. F. Allnutt, T. H. Ricketts, Y. Kura, J. F. Lamoreux, W. W. Wettengel, P. Hedao, and K. R.

Kassem. 2001. Terrestrial Ecoregions of the World: A New Map of Life on Earth. BioScience 51:933.

Orcés, V., and L. Albuja. 1976. Nueva especie de armadillo *Cabassous*: Dasypodidae, para el Ecuador y nuevos registros de armadillo gigante. Revista Politécnica 10:35–43.

Ortega Reyes, J., Tirira, D.G., Arteaga, M. & Miranda, F. 2014. Tamandua mexicana. The IUCN Red List of Threatened Species 2014. http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T21349A47442649.en. Downloaded on 12 July 2018.

Osto, E. V. C., E. F. D. E. M. Odalidades, D. E. A. P. Al, D. E. I. Nfantil, D. E. L. S. Istema, and D. E. P. R. A. La. 2004. Informe Final del Proyeto PRODECHACO.

Padilla, D., and V. Pérez. 2012. Mamíferos en los alrededores de las ciénagas del sur del Departamiento del Cesar. Pages 607–618 *in* J. O. Rangel, editor.Colombia. Diversidad biótica XIII: complejo cenagoso Zapatosa y ciénagas del Sur del Cesar: Biodiversidad, Conservación y Manejo. Universidad Nacional de Colombia, CORPOCESAR, Bogotá, Colombia.

Parker, T. A., A. H. Gentry, R. B. Foster, L. H. Emmons, and J. V Remsen. 1993. The Lowland Dry Forests of Santa Cruz, Bolivia: A Global Conservation Priority.

Passos, F. D. C., M. C. H. Mello, E. Isasi-Catalá, R. C. Mello, I. P. Bernardi, L. H. Varzinczak, and C. S. Lima. 2017. The Vulnerable giant anteater *Myrmecophaga tridactyla*: new records from the Atlantic Forest highlands and an overview of its occurrence in protected areas in Brazil. Oryx 51:564–566.

Pauli, J. 2018. Family Bradypodidae. *in:* D. D. Wilson and R. A. Mittermeier, editors. 2018. Handbook of the Mammals of the World, volume 8:: 8.Insectivores, Sloths and Colugos. Lynx Edicions, Barcelona, Spain, 710p.

Pauli, J. N., M. Z. Peery, and M. Festa-Bianchet. 2012. Unexpected Strong Polygyny in the Brown-Throated Three-Toed Sloth. PLoS ONE 7.

Pauli, J. N., J. E. Mendoza, S. A. Steffan, C. C. Carey, P. J. Weimer, and M. Z. Peery. 2014. A syndrome of mutualism reinforces the lifestyle of a sloth. Proceedings of the Royal Society.

Pautasso, A. A., G. Pérez-Jimeno, V. B. Raimondi, and C. Medrano. 2009. Revisión de la situación del oso hormiguero gigante (*Myrmecophaga tridactyla*) en la provincial de Santa Fe, Argentina: estado de conocimiento actual y medidas de conservación adoptadas y propuestas. Biológica 10:17–27.

Pavé, R., and M. L. Calderón. 2006. Catálogo de mamíferos autóctonos pertenecientes al Museo de Ciencias Naturales y Antropológicas “Prof. Antonio Serrano”, Paraná, Entre Ríos, Argentina. Page Museo de Ciencias Naturales y Antropológicas “Prof. Antonio Serrano” Serie Catálogos.

Paviolo, A. 2010. Densidad de yaguareté (*Panthera onca*) en la Selva Paranaense: su relación con la disponibilidad de presas, presión de caza y coexistencia con el puma (Puma concolor). Universidad Nacional de Córdoba, Córdoba, Argentina.

Paviolo, A., C. De Angelo, K. M. P. M. B. Ferraz, R. G. Morato, J. Martinez Pardo, A. C. Srbek-Araujo, B. de M. Beisiegel, F. Lima, D. Sana, M. Xavier da Silva, M. C. Velázquez, L. Cullen, P. Crawshaw, M. L. S. P. Jorge, P. M. Galetti, M. S. Di Bitetti, R. C. de Paula, E. Eizirik, T. M. Aide, P. Cruz, M. L. L. Perilli, A. S. M. C. Souza, V.

Quiroga, E. Nakano, F. Ramírez Pinto, S. Fernández, S. Costa, E. A. Moraes Jr, and F. Azevedo. 2016. A biodiversity hotspot losing its top predator: The challenge of jaguar conservation in the Atlantic Forest of South America. Scientific Reports 6:37147.

Pazio, D. D. 2013. Inventariamento de mamíferos terrestres de médio e grande porte em áreas de recuperação do Parque Estadual Lago Azul, Paraná, Brazil. UTFPR, Paraná.

Penido, G., and A. C. S. Zanzini. 2012. Checklist of large and medium-sized mammals of the Estação Ecológica Mata do Cedro, an Atlantic forest remnant of central Minas Gerais, Brazil. Check List 8:712–717.

Penter, C., E. Pedó, M. E. Fabián, and S. M. Hartz. 2008. Inventário Rápido da Fauna de Mamíferos do Morro Santana, Porto Alegre, RS. Revista Brasileira de Biociências 6:117–125.

Pereira, A. D., and S. Bazilio. 2014. Caracterização faunística de mamíferos de médio e grande porte na Floresta Nacional de Irati, Paraná, Brazil. Acta Iguazu 3:57–68.

Pereira, J., M. Di Bitetti, N. Fracassi, A. Paviolo, C. De Angelo, and Y. E. Di Blanco. 2008. Estimación de la abundancia de los pequeños felinos silvestres del Parque Nacional Lihué Calel y alrededores, La Pampa.

Pereira, S. N., D. Dias, I. P. de Lima, A. C. S. Maas, M. A. Martins, D. P. Bolzan, D. de S. França, M. B. de Oliveira, A. L. Peracchi, M. de F. S. Ferreira, I. P. de Lima, A. C. S. Maas, M. A. Martins, D. P. Bolzan, D. de S. França, M. B. de Oliveira, A. L. Peracchi, and M. de F. S. Ferreira. 2013. Mamíferos de um fragmento florestal em volta redonda, estado do Rio de Janeiro. Bioscience Journal 29:1017–1027.

Peres, C. A., J. Barlow, and T. Haugaasen. 2003. Vertebrate responses to surface wildfires in a central Amazonian forest. Oryx 37:97–109.

Pérez-Jimeno, G., and L. L. Amaya. 2004. Contribución al Conocimiento de la Distribución del Oso Hormiguero Gigante (*Myrmecophaga tridactyla*) en Argentina. Edentata 8–10:8–12.

Pérez Jimeno, G., and L. Llarín Amaya. 2009. Contribución al Conocimiento de la Distribución del Oso Hormiguero Gigante (*Myrmecophaga tridactyla*) en Argentina. Edentata 8:8–12.

Perovic, P. G. 2002. Ecología de la comunidad de félidos en las selvas nubladas del noroeste argentino. Universidad Nacional de Córdoba, Córdoba, Argentina.

Peery, M. Z., and J. N. Pauli. 2012. The mating system of a “lazy” mammal, Hoffmann’s two-toed sloth. Animal Behaviour 84:555–562.

Peery, M. Z., and J. N. Pauli. 2014. Shade-grown cacao supports a self-sustaining population of two-toed but not three-toed sloths. Journal of Applied Ecology 51:162–170.

Pessôa, F. S., T. C. Modesto, H. G. Albuquerque, N. Attias, and H. D. G. Bergallo. 2009. Non-volant mammals, Reserva Particular do Patrimônio Natural (RPPN) Rio das Pedras, municipality of Mangaratiba, state of Rio de Janeiro, Brazil. Check List 5:577.

Plese, T. and Chiarello, A. 2014. Choloepus hoffmanni. The IUCN Red List of Threatened Species 2014: http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T4778A47439751.en. Downloaded on 11 July 2018;

Polisar, J., B. De Thoisy, D. I. Rumiz, F. D. Santos, R. B. Mcnab, and R. Garcia-Anleu. 2017. Using certified timber extraction to benefit jaguar and ecosystem conservation. Ambio 46:588–603.

Porras, L. P., L.-B. Vazquez, R. Sarmiento-Aguilar, D. Douterlungne, and D. Valenzuela-Galván. 2016. Influence of human activities on some medium and large-sized mammals’ richness and abundance in the Lacandon Rainforest. Journal for Nature Conservation 34:75–81.

Pozo de la Tijera, M. D. C., and P. Ramos Rivera. 2017a. Elaboración del banco de datos de las colecciones del Museo de Zoología-CIQRO. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad.

Pozo de la Tijera, M. D. C., and P. Ramos Rivera. 2017b. Formación de las colecciones de referencia de aves y mamíferos de la Reserva de la Biosfera de Sian Ka’an, Quintana Roo, México. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/515sex.

Prada, C. S. 2004. Atropelamento de vertebrados silvestres em uma região fragmentada do nordeste do estado de São Paulo: quantificação do impacto e análise de fatores envolvidos. Universidade Federal de São Carlos, São Carlos, São Paulo, Brazil.

Prado, M. R. do, E. C. Rocha, and G. M. L. del Giudice. 2008. Mamíferos de médio e grande porte em um fragmento de mata atlântica, Minas Gerais, Brazil. Revista Árvore 32:741–749.

Prado, P. I., E. C. Landau, R. T. Moura, L. P. S. Pinto, G. A. B. Fonseca, and K. Alger. 2003. Corredor de Biodiversidade da Mata Atlântica do sul da Bahia. Page Publicação em CD-ROM. IESB/CI/CABS/UFMG/UNICAMP, Ilhéus.

Preuss, J. F., G. B. Pfeifer, J. B. Toral, and S. F. Bressan. 2016. Levantamento rápido de mamíferos terrestres em um remanescente de Mata Atlântica do Sul do Brasil. Unoesc & Ciência - ACBS 7:89–96.

Printes, R. C., M. V. A. Liesenfeld, and L. Jerusalinsky. 2001. *Alouatta guariba clamitans* (Cabrera, 1940): a new southern limit for the species and for Neotropical Primates. Neotropical Primates 9:118–121.

Pujalte, J. C., A. R. Reca, A. Balabusic, P. Canevari, L. Cusato, and V. P. Fleming. 1995. Unidades ecológicas del Parque Nacional Río Pilcomayo. Page 185 Anales de Parques Nacionales XVI. Administración de Parques Nacionales, Buenos Aires, Argentina.

Queirolo, D. 2016. Diversidade e Padrões de Distribuição de Mamíferos dos Campos do Uruguai e Sul do Brasil. Boletín de la Sociedad Zoológica del Uruguay 25:92–246.

Quiroga, V. A. 2013. Ecología y Conservación del yaguareté (*Panthera onca*) y el puma (*Puma concolor*) en el Chaco semiárido argentino: su relación con la disponibilidad de presas y la presencia humana en la región. Universidad Nacional de Córdoba, Córdoba, Argentina.

Racero-Casarrubia, J., and J. F. González-Maya. 2014. Inventario preliminar y uso de mamíferos silvestres por comunidades campesinas del sector oriental del cerro Murrucucú, municipio de Tierralta, Córdoba, Colombia. Mammalogy Notes | Notas Mastozoológicas 1:25–28.

Ramírez-Chaves, H. E., and E. A. Noguera-Urbano. 2010. Lista preliminar de los mamíferos (Mammalia: Theria) del departamento de Nariño, Colombia. Biota Colombiana 11.

Ramírez-Mejía, A. F., and F. Sánchez. 2015. Non-volant mammals in a protected area on the Central Andes of Colombia: new records for the Caldas department and the Chinchiná River basin. Check List 11:1582.

Rao, M. 2000. Variation in leaf - cutter ant (*Atta* sp) densities in forest isolates : the potential role of predation. Journal of Tropical Ecology 16:209–225.

Reis, N. R., A. L. Peracchi, H. Fandiño-Mariño, and V. J. Rocha. 2006. Mamíferos da Fazenda Monte Alegre, Paraná. Londrina.

Ressl, R., and P. Ramos Rivera. 2017. Proyecto interno ejecutado por la CONABIO: Sistema de información sobre Bosque Mesófilo de Montaña de México para apoyo en programas de restauración (Fase 1). Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/dalkhf.

Reyes-Amaya, N., D. R. Gutiérrez-Sanabria, Y. Castillo-Navarro, R. A. Rodríguez, and T. Plese. 2015. Información demográfica de *Bradypus variegatus*, *Choloepus hoffmanni* y *Cyclopes didactylus* (Xenarthra: Pilosa) en un bosque húmedo tropical secundario de Santander, Colombia. Mastozoología Neotropical 22:409–415.

Rezini, J. A. 2010. Atropelamento de mamíferos em rodovias do leste dos Estados do Paraná e Santa Catarina, Sul do Brazil. Universidade Federal do Paraná, Curitiba, Paraná, Brazil.

Rocha, A. 2013. Sensibilidade ambiental fluvial a derrames de óleo e biocombustível: vulnerabilidade e impactos à mastofauna. Universidade Estadual Paulista, Rio Claro, Brazil.

Rocha, A., D. H. Homem, and E. F. Lima. 2013. Monitoramento de mamíferos de médio e grande porte em fragmento de Mata Atlântica de Interior em restauração. Page V Simpósio de Restauração Ecológica. São Paulo.

Rocha, E. C., and J. C. Dalponte. 2006. Composição e caracterização da fauna de mamíferos de médio e grande porte em uma pequena reserva de cerrado em Mato Grosso, Brazil. Revista Árvore 30:669–677.

Rocha, E. C., and E. Silva. 2009. Composição da mastofauna de médio e grande porte na reserva indígena “Parabubure”, Mato Grosso, Brazil. Revista Árvore 33:451–459.

Rocha, E. C., E. Silva, J. C. Dalponte, and G. M. L. del Giúdice. 2012. Efeito das atividades de ecoturismo sobre a riqueza e a abundância de espécies de mamíferos de médio e grande porte na região do Cristalino, Mato Grosso, Brazil. Revista Árvore 36:1061–1072.

Rocha, E. C., K. L. Soares, and I. M. Pereira. 2015. Medium- and large-sized mammals in Mata Atlântica State Park, southeastern Goiás, Brazil. Check List 11:1802.

Rodrigues, F. H. G., G. H. B. de Miranda, Í. M. Medri, F. V. dos Santos, G. de M. Mourão, A. Hass, P. S. T. Amaral, and F. L. Rocha. 2003. Fitting Radio Transmitters to Giant Anteaters (Myrmecophaga tridactyla). Edentata 5:37–40.

Rodríguez-Mahecha, J. V., J. V. Rueda-Almonacid, and T. D. Gutiérrez-Hinojosa. 2008. Guía ilustrada de la fauna del Santuario de Vida Silvestre Los Besotes, Valledupar, Cesar, Colombia. Page (C. Internacional-Colombia, Ed.) Serie de guias tropicales de campo No. 7. Editorial Panamericana, Formas e Impresos, Bogota, Colombia.

Rodríguez, F. J., and F. A. Chinchilla. 1996. Lista de mamíferos de Costa Rica. Revista de Biologia Tropical 44:877–890.

Roig, V. 1965. Elenco sistemático de los mamíferos y aves de la provincia de Mendoza y notas sobre su distribución geográfica. Boletín de Estudios geográficos 12:175–222.

Rojano, C., J. C. Pacheco, and A. F. Polo. 2016. El oso melero (*Tamandua mexicana*) en el Caribe colombiano: aportes sobre su ecología y amenazas. Edentata 17:17–24.

Rojano, C., H. Padilla, E. Almentero, and G. Alvarez. 2013. Percepciones y usos de los Xenarthra e implicaciones para su conservación en Pedraza, Magdalena, Colombia. Edentata 14:58–65.

Rood, J. P. 1970. Notes on the behavior of the pygmy armadillo. Journal of Mammalogy 51:179.

Rosa, C. A. da, Q. Hobus, and A. Bager. 2010. Mammalia, Pilosa, Myrmecophagidae, *Tamandua tetradactyla* (Linnaeus, 1758): distribution extension. Check List 6:52.

Rosa, C. A. da, and A. C. Souza. 2017. Large and medium-sized mammals of Nova Baden State Park, Minas Gerais, Brazil. Check List 13:2141.

Ruiz, C. 2006. Plan Maestro de la Reserva Protectora de Manantiales Cerro San Gil, 2006-2010. Consejo Nacional de Áreas Protegidas - CONAP, Fundación para el Ecodesarrollo y la Conservación -FUNDAECO, The Nature Conservancy - TNC, Izabal, Guatemala.

Ruiz-Aravena, M. I. A. 2012. Distribución espacial de las estrategias de forrajeo del armadillo Chaetophractus villosus (Desmarest 1804), en la Patagonia Chilena. Universidad Austral de Chile.

Sáenz-Bolaños, C., and E. Carrillo-Jiménez. 2009. Registro de *Cabassous centralis* (Cingulata: Dasypodidae) en la Reserva Forestal Pacuare y Reserva Indígena Nairi Awari, Siquirres, Costa Rica. Brenesia.:69–70.

Sáenz-Bolaños, C., V. Montalvo, Eduardo Carillo, and T. Fuller. 2018. Tayra (Eira barbara) predation of a brown-throated three-toed sloth (Bradypus variegatus) in Costa Rica. Edentata:1–4.

Salvador, C. H. 2012. Ecologia e manejo de javali (*Sus scrofa* L.) na América do Sul. Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil.

Sampaio, R., A. P. Lima, W. E. Magnusson, and C. A. Peres. 2010. Long-term persistence of midsized to large-bodied mammals in Amazonian landscapes under varying contexts of forest cover. Biodiversity and Conservation 19:2421–2439.

Sampaio, R., F. Rohe, and A. B. Rylands. (in press). Diversity of Primates and Other Mammals in the Middle Purus Basin in the Brazilian Amazon. Mammalia.

Sanabria, E. A., and L. B. Quiroga. 2002. *Zaedyus pichiy* (Xenarthra, Dasypodidae) para la Provincia de San Juan, Argentina. Nótulas Faunísticas, Segunda Serie 8.

Sánchez, F. 2000. Inventario de mamíferos en un bosque andino del departamento de Caldas Colombia. Boletín Científico Museo de Historia Natural Universidad de Caldas 4:19–25.

Sánchez, F., P. Sánchez-Palomino, and A. Cadena. 2004. Inventario de mamíferos en un bosque de los Andes Centrales de Colombia. Caldasia 26:291–309.

Sánchez Cordero Dávila, V., and P. Ramos Rivera. 2017. Estado actual del conocimiento biológico de algunas especies de roedores de las familias Muridae, Geomyidae, Heteromyidae y Sciuridae (Rodentia: Mammalia) incluidas en el PROY-NOM-059-ECOL-2000. Comisión nacional para el conocimiento y uso de la biodivers. https://doi.org/10.15468/ocflzh.

Sanderson, J., and L. Silveira. 2003. Observations of Xenarthra in the Brazilian Cerrado and Guyana. Edentata 5:40–44.

Sandoval-Gómez, V. E., V. E. Sandoval-Gómez, H. E. Ramírez-Chaves, and D. Marín. 2012. Registros de hormigas y termitas presentes en la dieta de osos hormigueros (Mammalia: Myrmecophagidae) en tres localidades de Colombia. Edentata 13:1–9.

Santos-Filho, M. dos, and M. N. F. da Silva. 2009. Uso de habitats por mamíferos em área de Cerrado do Brasil Central: um estudo com armadilhas fotográficas. Revista Brasileira de Zoociências 4:57–73.

Santos, F. da S., and A. C. Mendes-Oliveira. 2012. Diversidade de mamíferos de médio e grande porte da região do rio Urucu, Amazonas, Brazil. Biota Neotropica 12:282–291.

Santos, P. M., A. G. Chiarello, M. C. Ribeiro, J. W. Ribeiro, and A. P. Paglia. 2016. Local and landscape influences on the habitat occupancy of the endangered maned sloth B*radypus torquatus* within fragmented landscapes. Mammalian Biology - Zeitschrift für Säugetierkunde 81:447–454.

Santos, T. G. dos, M. R. Spies, K. Kopp, R. Trevisan, and S. Z. Cechin. 2008. Mamíferos do campus da Universidade Federal de Santa Maria, Rio Grande do Sul, Brasil. Biota Neotropica 8:125–131.

Sierpe, V., J. Cárcamo, and I. Ramirez. 2013. Alcances sobre la presencia de Chaetophractus villosus (Dasypodidae) en el Parque Nacional Torres del Paine, magallanes, chile. Anales Instituto Patagonia, Chile, 41:23–28.

Silva, A. P., and A. R. Mendes Pontes. 2008. The effect of a mega-fragmentation process on large mammal assemblages in the highly-threatened Pernambuco Endemism Centre, north-eastern Brazil. Biodiversity and conservation 17:1455–1464.

Silva, C. R. 2008. Inventários rápidos de mamíferos não-voadores no Parque Nacional Montanhas do Tumucumaque: Resultados das Expedições I a V e Síntese. Page 151 Inventários biológicos rápidos no Parque Nacional Montanhas do Tumucumaque, Amapá, Brazil. Conservation International.

Silva, C. R., A. C. M. Martins, I. J. Castro, E. Bernard, E. M. Cardoso, D. Santos Lima, R. Gregorin, R. V. Rossi, A. R. Percequillo, and K. Cruz Castro. 2013a. Mammals of Amapá State, Eastern Brazilian Amazonia: a revised taxonomic list with comments on species distributions. Mammalia 77:409–424.

Silva, D. E., L. L. C. Corrêa, S. V. Oliveira, and L. H. Cappellari. 2013b. Monitoramento De Vertebrados Atropelados Em Dois Trechos De Rodovias Na Região Central Do Rio Grande Do Sul - Brazil. Revista de Ciências Ambientais 7:27–36.

Silva, S. M., C. L. Clozato, N. Moraes-Barros, and J. Morgante. 2013c. Towards a standard framework to describe behaviours in the common-sloth (*Bradypus variegatus* Schinz, 1825): novel interactions data observed in distinct fragments of the Atlantic forest, Brazil. Brazilian Journal of Biology 73:527–531.

Silva, S. M., J. A. Dávila, B. Voirin, S. Lopes, N. Ferrand, and N. Moraes-Barros. 2017. The curious case of Bradypus variegatus sloths: populations in threatened habitats are biodiversity components needing protection. Biodiversity and Conservation:1–18.

Smith, P. 2008. FAUNA Paraguay Handbook of the Mammals of Paraguay Number 20 Calyptophractus retusus.

Soares, C. A., and R. S. Carneiro. 2002. Social behavior between mothers× young of sloths *Bradypus variegatus* SCHINZ, 1825 (Xenarthra: Bradypodidae). Brazilian Journal of Biology 62:249–252.

South Australian Museum. 2017. South Australian Museum Australia provider for OZCAM. https://doi.org/10.15468/wz4rrh.

SPVS, S. de P. em V. S. e E. A. 2012. Revisão dos Planos de Manejo das Reservas Naturais Morro da Mina, Rio Cachoeira e Serra Itaqui - Paraná. Curitiba, Paraná.

Srbek-Araujo, A. C., and A. G. Chiarello. 2005. Is camera-trapping an efficient method for surveying mammals in Neotropical forests? A case study in south-eastern Brazil. Journal of Tropical Ecology 21:121–125.

Srbek-Araujo, A. C., and A. G. Chiarello. 2013. Influence of camera-trap sampling design on mammal species capture rates and community structures in southeastern Brazil. Biota Neotropica 13:51–62.

Srbek-Araujo, A. C., L. M. Scoss, A. Hirsch, and A. G. Chiarello. 2009. Records of the giant-armadillo *Priodontes maximus* (Cingulata: Dasypodidae) in the Atlantic Forest: are Minas Gerais and Espírito Santo the last strongholds of the species? Zoologia (Curitiba) 26:461–468.

Stallings, J. R., G. A. B. Fonseca, L. P. de S. Pinto, L. M. de S. Aguiar, and E. L. Sábato. 1990. Mamíferos do Parque Florestal Estadual do Rio Doce, Minas Gerais, Brazil. Revista Brasileira de Zoologia 7:663–677.

Suare, V., M. L. Bolkovic, and G. T. Navone. 1998. Helmintos parásitos de dasipódidos del departamento de Copo, Provincia de Santiago del Estero, Argentina. Pages 152–153 Libro de resúmenes XIII Jornadas Argentinas de Mastozoología. Puerto Iguazú, Misiones.

Superina, M., A. A. Guglielmone, A. J. Mangold, S. Nava, and M. Lareschi. 2004. New distributional and host records for Amblyomma pseudoconcolor Aragao, 1908 (Acari: Ixodidae: Amblyomminae). Systematic and Applied Acarology 9:41–43.

Superina, M., N. Pagnutti, and A. M. Abba. 2014. What do we know about armadillos? An analysis of four centuries of knowledge about a group of South American mammals, with emphasis on their conservation. Mammal Review 44:69–80.

Superina, M., and W. J. Loughry. 2015. Why do xenarthrans matter? Journal of Mammalogy Suutari, M., M. Majaneva, D. P. Fewer, B. Voirin, A. Aiello, T. Friedl, A. G. Chiarello, and J. Blomster. 2010. Molecular evidence for a diverse green algal community growing in the hair of sloths and a specific association with Trichophilus welckeri (Chlorophyta, Ulvophyceae). BMC evolutionary biology 10:86.96:617–621.

Tabeni, M. S. 2000. Catálogo de mamíferos autóctonos. Museo Provincial de Ciencias Naturales "Florentino Ameghino," Santa Fé, Argentina.

Tabeni, M. S. 2001. Catálogo de mamíferos autóctonos. Museo Provincial de Ciencias Naturales "Florentino Ameghino," Santa Fé, Argentina.

Taulman, J. F., and L. W. Robbins. 2014. Range expansion and distributional limits of the nine-banded armadillo in the United States: An update of Taulman & Robbins (1996). Journal of Biogeography 41:1626–1630.

Tavares, S. V., and J. G. Koenemann. 2008. Ocorrência de T*amandua tetradactyla* (Linnaeus, 1758) (Xenarthra, Myrmecophagidae) no Município de Itaqui, Fronteira Oeste do Rio Grande do Sul, Brasil. Biodiversidade Pampeana 6:30–33.

Terborgh, J., K. Feeley, M. Silman, P. Nuñez, and B. Balukjian. 2006. Vegetation dynamics of predator-free land-bridge islands. Journal of Ecology 94:253–263.

Texera, W. A. 1973. Zaedyus pichiy (Edentata, Dasypodidae) Nueva Especie een La provincia de Magallanes, Chile. Anal. Inst. Patagonia, Punta Arenas (Chile) IV:1–3.

Thomas, O. 1919. List of mammals from the highlands of Jujuy, north Argentina, collected by Sr. E. Budin. Annals and Magazine of Natural History 9:128–135.

Timm, R. M., D. Lieberman, M. Lieberman, and D. Mcclearn. 2009. Mammals of Cabo Blanco: History, diversity, and conservation after 45 years of regrowth of a Costa Rican dry forest. Forest Ecology and Management 258:997–1013.

Timock, J., and C. Vaughan. 2002. A census of mammal populations in Punta Leona Private Wildlife Refuge, Costa Rica. Revista de Biologia Tropical 50:1169–1180.

Tinoco-Sotomayor, A. N., H. D. Ramos-Guerra, H. A. Vides-Avilez, D. C. Rodríguez-Alarcón, J. F. González-Maya, and H. Gómez-Estrada. 2016. Inventario preliminar y uso de mamíferos silvestres no voladores en la vereda Camarón, Montes de María (Bolívar-Colombia). Mammalogy Notes 3:32–36.

Toledo, P. M. de, H. M. Moraes-Santos, and C. C. S. Melo. 1999. Levantamento preliminar de mamíferos não-voadores da Serra dos Carajás: grupos silvestres recentes e zooarqueológicos. Bol. Mus. Para. Emílio Goeldi, sér. Zool 15:141–157.

Torres, R., J. Monguillot, G. Bruno, P. Michelutti, and A. Ponce. 2009. Ampliación del límite austral de la distribución del oso melero (*Tamandua tetradactyla*) en la Argentina. Nótulas Faunísticas, Segunda Serie 39:1–5.

Tortato, F. R., S. L. Althoff, Mammalia, and Myrmecophagidae. 2011. Mammalia, Myrmecophagidae, *Myrmecophaga tridactyla* (Linnaeus, 1758) and Cervidae, Ozotoceros bezoarticus (Linnaeus, 1758): Contribution to the knowledge of the historical distribution in Santa Catarina, southern Brazil. Check List 7:146–148.

Tortato, F. R., A. F. Testoni, and S. L. Althoff. 2014. Mastofauna terrestre da Reserva Biológica Estadual do Sassafrás, Doutor Pedrinho, Santa Catarina, Sul do Brasil. Biotemas 27:123.

Trinca, C. T., F. B. L. Palmeira, and J. de Sousa e Silva Júnior. 2006. A Southern Extension of the Geographic Distribution of the Two-Toed Sloth, *Choloepus didactylus* (Xenarthra, Megalonychidae). Edentata 7:7–9.

Trolle, M. 2003. Mammal survey in the southeastern Pantanal, Brazil. Biodiversity and Conservation 12:823–836.

Trucco, C. E., and J. Gato. 2002. Vertebrados de Valor Especial - Parques Nacionales del NOA y Monumento Natural Laguna de los Pozuelos.

Ubaid, F. K., L. S. Medonça, and F. Maffei. 2010. Contribuição ao Conhecimento da Distribuição Geográfica do Cabassous tatouay no Brasil: Revisão, Status e Comentários sobre a Espécie. Edentata 11:22–28

UNIBIO, and IBUNAM. 2018. Colección Nacional de mamíferos (CNMA). https://doi.org/10.15468/rchosl.

Unidad Administrativa Especial de Parques Nacionales Naturales de Colombia. 2004. Plan Basico de Manejo 2006 - 2010 Santuario de Fauna y Flora Otun Quimbaya.

Unidad Administrativa Especial de Parques Nacionales Naturales de Colombia. 2005. Plan de Manejo 2008 – 2012 Parque Nacional Natural Selva de Florencia. Corregimiento de Florencia, Samaná.

University of Minnesota Bell Museum of Natural History. 2018. Mammal specimens.

Vancine, M. H., K. da S. Duarte, Y. S. de Souza, J. G. R. Giovanelli, P. M. Martins-Sobrinho, A. López, R. P. Bovo, F. Maffei, M. B. Lion, J. W. Ribeiro Júnior, R. Brassaloti, C. O. R. da Costa, H. O. Sawakuchi, L. R. Forti, P. Cacciali, J. Bertoluci, C. F. B. Haddad, and M. C. Ribeiro. 2018. ATLANTIC AMPHIBIANS: a data set of amphibian communities from the Atlantic Forests of South America. Ecology 99:1692.

Vásquez, C., S. Robledo, J. Calle, O. Triana, and O. Triana. 2013. Identificación de nuevos escenarios epidemiológicos para la enfermedad de Chagas en la región Momposina, norte de Colombia. Biomédica 33:526–37.

Vaughan, C., O. Ramírez, G. Herrera, and R. Guries. 2007. Spatial ecology and conservation of two sloth species in a cacao landscape in limón, Costa Rica. Biodiversity and Conservation 16:2293–2310.

Vaz, S. M. 2005. Mamíferos coletados em Pedra Branca, município de Paraty, Rio de Janeiro, Brazil Mammals collected in Pedra Branca, municipality of Paraty, State of Rio de Janeiro, Brazil. Revista Brasileira de Zoologia 22:1164–1169.

Velázquez Montes, J. A., and P. Ramos Rivera. 2017a. Análisis de la heterogeneidad ambiental y conectividad de las áreas naturales del sur del Valle de México. Comisión nacional para el conocimiento y uso de la biodiversidad. https://doi.org/10.15468/xcdipw.

Velázquez Montes, J. A., and P. Ramos Rivera. 2017b. Biodiversidad, hábitat y manejo en el Parque Nacional Pico de Tancítaro, Michoacán, México. Versión 1.3. Comisión nacional para el conocimiento y uso de la biodiversidad.

Vizcaino, S. F., and W.J. Loughry. 2008. Xenarthran biology: Past, present, and future. Pages 1-7 *in* S. F. Vizcaino and W. J. Loughry, editors. The Biology of the Xenarthra. First edition. University Press of Florida, Gainesville, Florida.

Vidoz, F., and O. González. 1994. Listado de mamíferos registrados en el Parque Nacional Lago Puelo desde Junio de 1992 hasta Abril de 1994.

Vieira, C. C. 1953. Sobre uma coleção de mamíferos do estado de Alagoas. Arquivos de Zoologia do Estado de São Paulo 8:209–222.

Del Vitto, L. A., M. E. Mulgura, and E. M. Petenatti. 1993. Una nueva especie de Atriplex (Chenopodiaceae) de la Argentina. Hickenia 2:77–80.

Vizcaíno, S. F., and A. Giallombardo. 2001. Armadillos del noroeste argentino (Provincias de Jujuy y Salta). Edentata 4:5–8.

Vizcaíno, S. F., and W. J. Loughry. 2008. Biology of the Xenarthra. University Press of Florida, Florida.

Wallace, R.B., H. Gómez, Z.R. Porcel & D.I. Rumiz (Eds.). 2010. Distribución, Ecología y Conservación de los Mamíferos Medianos y Grandes de Bolivia. Editorial: Centro de Ecología Difusión Simón I. Patiño. Santa Cruz de la Sierra, Bolivia. 906 pp.

Wallace, R., H. López-Strauss, N. Mercado, and Z. Porcel. 2013. Base de datos sobre la distribución de los mamíferos medianos y grandes de Bolivia. Interactive DVD. Wildlife Conservation Society, La Paz, Bolivia.

Wallauer, J. P., M. Becker, L. G. Martins-Sá, L. M. Liermann, S. H. Perretto, and V. Schermack. 2000. Levantamento dos mamíferos da Floresta Nacional de Três Barras - Santa Catarina. Biotemas 13:103–127.

Weber, M. de M., C. Roman, and N. C. Cáceres. 2013. Mamíferos do Rio Grande do Sul. Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul.

Wetzel, R. M., and F. D. de Avila-Pires. 1980. Identification and distribution of the recent sloths of Brazil (Edentata). Revista Brasileira de Biologia 40:831–836.

Wetzel, R. M., A. L. Gardner, K. H. Redford, and J. F. Eisenberg. 2007. Order Cingulata Illiger, 1811. *in* A. L. Gardner, editor. Mammals of South America, volume 1: marsupials, xenarthrans, shrews, and bats. The University of Chicago Press, Chicago.

Wilson D. D. and R. A. Mittermeier. 2018. Handbook of the Mammals of the World, volume 8:: 8.Insectivores, Sloths and Colugos. Lynx Edicions, Barcelona, Spain, 710p.

Xavier, M. S. 2016. Mamíferos terrestres de médio e grande porte do Parque Nacional da Restinga de Jurubatiba: riqueza de espécies e vulnerabilidade local. NUPEM, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil.

Xavier da Silva, M., A. Paviolo, L. R. Tambosi, and R. Pardini. 2018. Effectiveness of Protected Areas for biodiversity conservation: Mammal occupancy patterns in the Iguaçu National Park, Brazil. Journal for Nature Conservation 41:51–62.

Yepes, J. 1938a. Disquisiciones zoogeográficas referidas a mamíferos comunes a las faunas de Brazil y Argentina. Pages 37–60 *in* GAEA, Anales de la Sociedad argentina de estudios geográficos, Buenos Aires.

Yepes, J. 1938b. La fisiografía regional y la distribución geográfica de algunos de nuestros mamíferos. imp. A. Baiocco y Cia.

Yepes, J. 1939. Una nueva subespecie de "pichiciego" mayor (Chlamyphorinae) y su probable distribución geográfica. Physis (Buenos Aires) 16:35–39.

Yepes, J. 1944. Comentarios sobre cien localidades nuevas para mamíferos Sudamericanos. Revista Argentina de Zoogeografía 4:59–71.

Zanin, M., R. Sollmann, N. M. Tôrres, M. M. Furtado, A. T. A. Jácomo, L. Silveira, and P. De Marco. 2015. Landscapes attributes and their consequences on jaguar *Panthera onca* and cattle depredation occurrence. European Journal of Wildlife Research 61:529–537.

Zeballos, E. S. 1960. Viaje al país de los araucanos. Hachette.

Zimbres, B., C. A. Peres, and R. B. Machado. 2017. Terrestrial mammal responses to habitat structure and quality of remnant riparian forests in an Amazonian cattle-ranching landscape. Biological Conservation 206:283–292.

Capítulo 2

Living on the Edge: Forest cover threshold effect on endangered maned sloth occurrence in Atlantic Forest

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Manuscript published at Biological Conservation: https://doi.org/10.1016/j.biocon.2019.108264

Abstract

Habitat loss and the isolation of remaining habitats are undoubtedly the two greatest threats to biodiversity conservation, especially for the maned sloth, due to its ecological restrictions. In this study, we identified a critical threshold of forest cover for maned sloth occurrence and explored the effects of other local and landscape variables. We sampled 68 sites, where we searched for the maned sloth and collected local habitat variables. We calculated the percentage of forest cover and open areas, assessing the appropriated scale through model selection. We used occupancy models and model selection methods to identify the threshold and assess occupancy and detection probabilities. The occupancy probability of the maned sloth is 0.97, but it decreases abruptly at 35% of forest cover, reaching zero in areas with less than 20% of forest cover. The two landscape variables are the most important predictors of sloth occupancy, based on the cumulative weight of evidence, were: Forest cover (78%) and Open areas cover (46%); the latter influencing negatively maned sloth occupancy. This is the first attempt to identify the habitat requirements of the threatened maned sloth in a fragmented area using landscape and local variables. Our results imply that conservation of maned sloth will benefit from an increase in the amount of native forest at the landscape scale. Given difficulties in the creation of new public protected areas, this improvement could be achieved via restoration of areas located in private properties which are protected by the Brazilian Forest Code.

Keywords: *Bradypus torquatus;* Pilosa; Threatened; Threshold; Atlantic Forest; Habitat loss

1. Introduction

Human-dominated areas have expanded throughout the world and are primarily responsible for increased deforestation (LEBLOIS *et al*., 2017). Habitat fragmentation and loss leads to patch size reduction, increases habitat isolation and edge effects, and have several negative consequences for biodiversity (FAHRIG, 2003). Worldwide, most of Earth's native ecosystems are within 1 km of the habitat edge (HADDAD *et al.*, 2015), embedded in anthropogenic matrix that is often inhospitable to biodiversity (CASTELLÓN; SIEVING, 2006). These anthropogenic matrices can act as a filter, restricting dynamic processes such as dispersion and movement (MORAES *et al.*, 2018; MORATO *et al.*, 2018), gene flow (DIXO *et al.*, 2009), and pollination (PAVAGEAU *et al.*, 2017). Additionally, deforested areas have limited shelter or refuge for native fauna, exposing species to opportunist predation by domestic dogs (DOHERTY *et al.*, 2017), poaching (FERREGUETTI *et al*., 2018) and roadkill (ASCENSAO *et al.*, 2017; ASSIS; GIACOMINI; RIBEIRO, 2019). All these threats are commonly related with human activities in a non-habitat matrix areas (DOHERTY *et al*., 2017; FERREGUETTI *et al*., 2018).

Among the various attributes intrinsic to anthropized environments, the amount of remaining habitat is perhaps one of the most influential in the dynamics of populations and communities (FAHRIG, 2013). When habitat loss increases and reaches a critical threshold, small modifications in the remaining habitat can produce more severe changes in biological responses (WITH; KING, 1999; Huggett, 2005). Theory predicts that structural and functional connectivity suffers when the amount of remaining habitat drops below this critical threshold, and a species distribution becomes more dependent on patch size and isolation (LANDE, 1987; FAHRIG, 2003). The threshold value will vary among species, following the species' habitat requirements

(Muylaert et al., 2016), patch size (MAGIOLI *et al.*, 2015), matrix composition (BOESING; NICHOLS; METZGER, 2018), and biome (Melo et al., 2018).

As the proportion of suitable habitat increases (*i.e.* above a given threshold), other variables may drive the ecological dynamics, besides the landscape context, such as habitat quality. The local habitat structure and composition plays an important role in occurrence and persistence of animal communities (August, 1983; Santos et al., 2016). Increasing habitat complexity creates a safe and dynamic environment, providing different resources and conditions necessary for reproduction (SHENBROT *et al.*, 2002) and foraging success (JACOB; MATTER; CAMERON, 2017). In addition, a more complex habitat structure may increase the alpha and beta diversities by providing suitable habitats for a higher number of species (CAMARGO; SANO; VIEIRA, 2018; GRELLE, 2003).

The Atlantic Forest is a biodiversity hotspot (ZACHOS; HABEL, 2011) and one of the most threatened biomes in the world and its area has been reduced to 28% of its original cover (REZENDE *et al.*, 2018). Most remaining forest patches are smaller than 50 ha and about half of the remaining forest is within 100 meters of any forest edge (RIBEIRO *et al.*, 2009). Landscape composition and configuration pose a threat to several species, including the endemic maned sloth (*Bradypus torquatus*; Bradypodidae). According to Santos *et al*. (2019), in a data paper that compiled the largest data set on abundance and occurrence of Neotropical Xenarthrans, maned sloth (with 638 records) are distributed along Atlantic Forest cost from Sergipe to Rio Janeiro, Brazil. The species inhabits dense ombrophylous forests (HIRSCH; CHIARELLO, 2012) and feeds mainly on leaves and shoots (MONTGOMERY; SUNQUIST, 1975; CHIARELLO, 1998b). The species rarely descends to the ground, moving mostly through the forest canopy (MONTGOMERY; SUNQUIST, 1975). Due to its strictly arboreal habit and its low capacity to move in non-forested areas, the species is highly affected by the habitat loss (CHIARELLO; MORAES-BARROS, 2014) Its restricted distribution and the dependence on forest led the International Union for Conservation of Nature (IUCN) to classify the maned sloth as Vulnerable (VU) in 2014 (CHIARELLO; MORAES-BARROS, 2014).

There is strong evidence that habitat loss and fragmentation negatively influence maned sloth occurrence (CHIARELLO; MORAES-BARROS, 2014). Intuitively, increasing the connection between fragments would be a logical strategy to improve the conservation of the species. Nevertheless, what exactly does "improve connection" mean for the maned sloth? What are the minimum habitat amount requirements to maintain this species? Is there a critical threshold, below which landscape variables would most likely influence the species occurrence? These questions are relevant to decision-makers responsible for applying resources to direct conservation efforts; these efforts are led by the National Center for Research and Conservation of Brazilian Primates (CPB) and linked to Chico Mendes Institute for Biodiversity Conservation (ICMBio), a Brazilian federal agency responsible for the National Action Plans.

In previously study, Santos *et al*. (2016) found a strong positive relationship between local variables (e.g., canopy height and proportion of important trees) and maned sloth occurrence – these local variables were more important than factors related to habitat fragmentation (e.g., patch size and isolation metrics). However, the studied area encompassed a region with >36% of forest cover, a level that exceeds forest thresholds found in other ecosystems with different taxa (thresholds ~30 – 35% forest cover; ANDRÉN, 1994; ESTAVILLO *et al.*, 2013). Motivated by our previous experience, here, we expanded the study region to encompass a broader area covering the full gradient of available habitat (5 to 100% forest cover) to identify and assess larger-scale variables for maned sloth occurrence. In this study, we aimed to better understand what affects maned sloth occupancy probability at the landscape level and in a local context to improve the subsidies for landscape and local management, respectively. We also contribute to the understanding of maned sloth habitat requirements, which are still unclear. We hypothesize there is a threshold relationship between the forest cover (%) and maned sloth occurrence: above this threshold maned sloth occurrence should be high and governed primarily by local variables and below this threshold maned sloth occupancy should decline rapidly regardless of local variables.

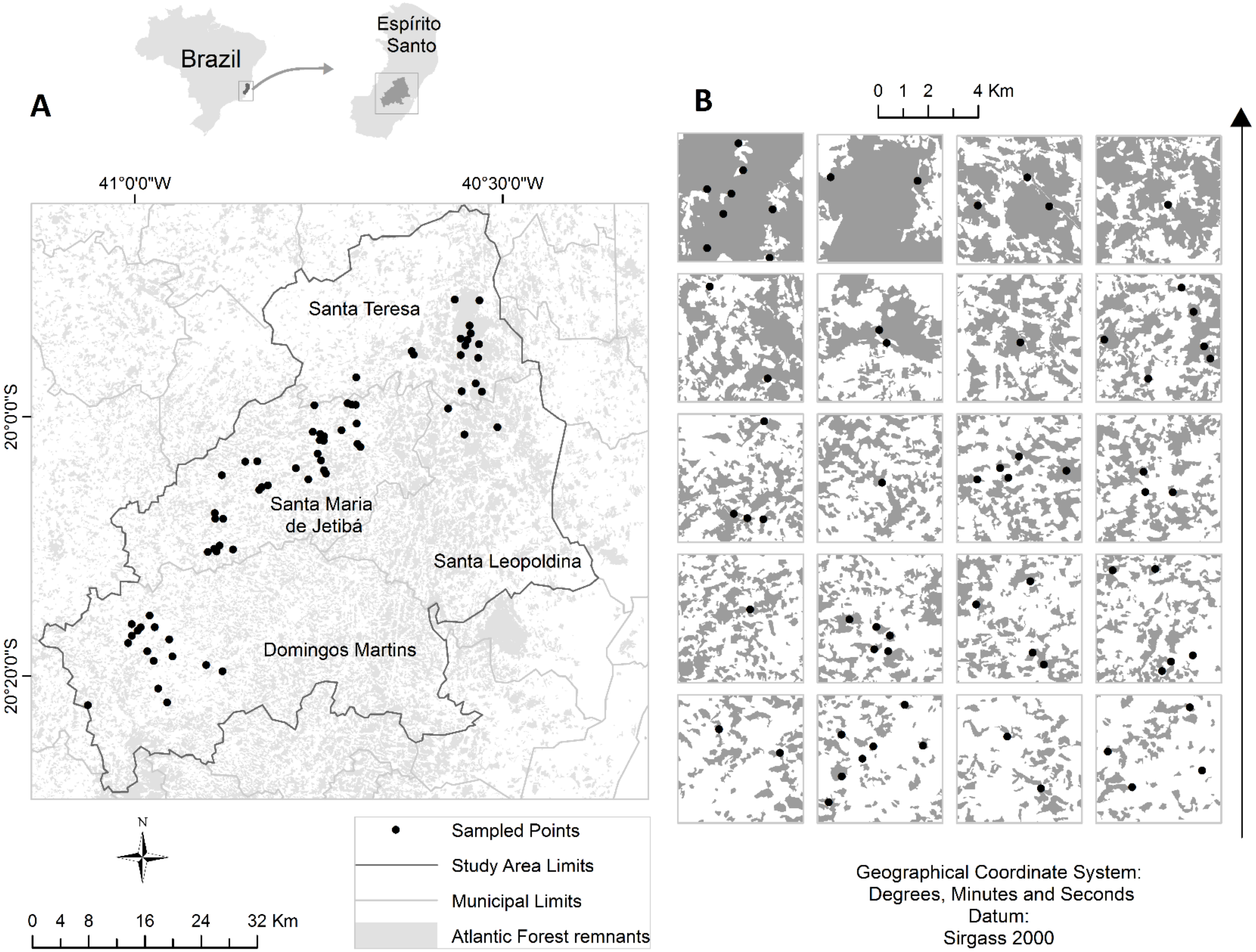
2. Material and Methods

2.1. Study area

We conducted this study in the mountainous region of Espírito Santo State in southeast Brazil (Fig. 1), which historically consisted entirely of the Atlantic Forest (MUYLAERT *et al.*, 2018). The study region encompasses an area of approximately 187,000 ha (Fig. 1), composed primarily of dense lower-montane and montane ombrophylous forests (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2012). The elevation ranges from 600 to 1200 m.a.s.l. and temperatures are mild throughout the year (mean annual temperature = 22.1°C). The annual mean precipitation is 1232 mm, with most rain concentrated between November and March (INCAPER, 2013a, b, d, c).

The study region has 34% of native forests, concentrated (> 85%) in the northeast, where the largest protected areas are located, while the southern part has less than 20% of forest cover (Fig. 1). Most forest areas are privately owned (97.2%), mainly by descendents from European settlers, who arrived at the region in the early

19th century, and established small agricultral properties and a family farming system – which remains the economic base today (INCAPER, 2013a, b, d, c).

A
Brazil
Espírito
Santo
41°0'0"W
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20°0'0"S
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Santa Teresa
Santa Maria
de Jetibá
Santa Leopoldina
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0 4 8 16 24 32 Km
Sampled Points
Study Area Limits
Municipal Limits
Atlantic Forest remnants
B
0 1 2 4 Km
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Degrees, Minutes and Seconds
Datum:
Sirgass 2000

Fig. 1: Study area with the location of the 68 sampled points for recording maned sloth within Atlantic Forest remnants, Espírito Santo, Brazil (A). Example of the forest cover gradient throughout the region, in which the sampled points are inserted (B).

2.2. Sampling design and covariates selection

We selected 68 sampling points (i.e., sites) using GrassGis 7.4.1 software (GRASS Development Team, 2018) across a range of forest cover (5-100%) within the study region. Specifically, we select 19 sites on northeast (higher percentage of forest cover), 16 sites in the south (lower percentage of forest cover), and 33 sites from the central Santa Maria de Jetibá region (medium percentage of forest cover). To minimize spatial autocorrelation, sites were at least 500 m away from each other, a distance that is large enough to accommodate the home ranges of multiple individuals – the average sloth home range was estimated at 4.5 ha in previous studies conducted in this same area (CHIARELLO, 1998a). Sloth surveys were conducted during the dry season to avoid effects of rain on species detection. Specifically, we surveyed 33 sites in the central Santa Maria de Jetibá region from April to August in 2014 (Santos et al., 2016), and 35 different sites from April to October in 2017 and from March to July in 2018. The sites surveyed in 2014 were not surveyed in 2017/2018 and vice-versa. Surveys within a given dry season were spaced at approximately 1-month intervals such that each site was surveyed six times. During each survey, we established two perpendicular 200-m transects, forming a cross (Figure A.1). We walked the resulting four 100-m long segments at a speed of about 0.24 km/h, searching the canopies for maned sloths. To maximize detection, we walked the transects between 7 am - 5 pm, when the species is most active (CHIARELLO, 1998a; GINÉ *et al.*, 2015). We measured two local variables, canopy height (m) and the proportion of important trees (hereafter important trees) at five locations, including the center point (intersection of the two perpendicular transects) and at the halfway point of each 100-m transects (Figure A.1). At each location, we measured the canopy height with a rangefinder (Bushnell model Sport 850, 4 x 20 mm) and we recorded the presence/absence of important tree species

(*Micropholis venulosa, Cupania furfuraceae, Crecopia* spp., and *Ficus* spp.) within a 5 m radius of each location. Collectively, these species represent more than 40% of the maned sloth diet (CHIARELLO, 1998b). We combined the measurements at the five locations for each site to determine the site-specific mean canopy height and the proportion of locations with at least one of the important trees.

We also calculated two compositional landscape strucutre variables that we felt may influence maned sloth probability of occurrence: forest cover (%) and open areas cover (%). We expected each covariate of interest to influence maned sloth ecology and biology differently (Table 1). For example, forest cover is important to reproduction, foraging success, and other aspects of maned sloth ecology and behavior. Therefore, we expected a positive relationship between the forest cover and maned sloth occurrence. Conversely, open areas cover may deter or hamper the species' dispersal, since moving through these areas may expose sloths to predation, starvation, temperature stress, and other hazards. As the open areas cover increases, we expect maned sloth occupancy to decrease. At the local level, important trees are a necessary food source and consequently, there should be more maned sloth in areas with a high proportion of those trees, leading to higher species occurrence and detection probabilities. The relationship with detection should also be positive since it may be easier to detect the species if individuals spend more time in or around these food sources. Many trees also serve as shelter where sloths can safely rest and thermoregulate appropriately, which is usually done in the upper strata of the forest canopy. Accordingly, we expect occupancy probability to increase with increasing canopy height. However, detection is more difficult the higher the sloth is in the canopy since vegetation density also increase with canopy height, obstructing our viewing capacity.

Table 1: Local and landscape level variables thought to influence occupancy probability (Ψ) or detection probability (p). Hypothesized positive (+) effect or negative (-) effect on occupancy probability or detection probability.

Type of Variable	Variable	Level	Ecological Importance	Parameter	Effect on Ψ	Effect on p
Class	% Forest cover	Landscape	Breeding Foraging success Shelter	Ψ	+	
Class	% Open Areas cover	Landscape	Dispersal Exposure to threats	Ψ	-	
Local	Important trees	Local	Food source	Ψ/p	+	+
Local	Canopy Height (m)	Local	Shelter Thermoregulation	Ψ/p	+	-

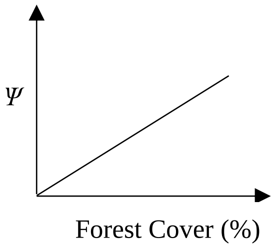
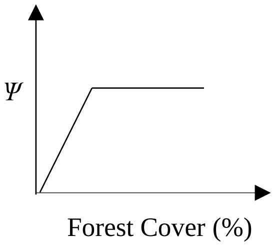
To calculate landscape variables for each sampled site, we used a 2015 land use and land cover map with 10-m resolution, georeferenced in the UTM Projection System, SIRGAS 2000 Datum, Zone 24s, provided by Geobases (IEMA-ES, https://geobases.es.gov.br/). We ran the landscape analyses with Fragstats 4.2 (McGarigal et al., 2012) and considered six buffer sizes (i.e. scale of effect or spatial extension; Miguet et al., 2015) for each sampled sites: 100 m, 200 m, 300 m, 400 m, 500 m and 600 m. The usage of multiple spatial extents when evaluating the scale of effect of landscape structure influence on species occurrence, abundance or species richness is of utmost importance in landscape ecology studies (GESTICH *et al.*, 2019). Within each buffer, we calculated the percentage of forest cover and the percentage of open areas cover – the latter including existing and abandoned pasture and exposed soil.

2.3. Occupancy and detection probabilities

We used a step-wise approach (four steps) to evaluate factors influencing maned sloth occupancy and detection probabilities. First, we determined the scale of effect (buffer size) for each of our landscape covariates: percentage of forest cover and percentage of open areas cover. Using a general model structure where both occupancy and detection probabilities are modeled as additive functions of local variables (important trees and canopy height), we fitted 36 models, where sloth occupancy was modeled as a linear function (on the logit scale) of all possible combinations of the six spatial extents for percent forest cover and percent open areas cover (Table A.1). We used the best-supported scale of effect for each of the landscape variables in subsequent analyses. We also performed a correlation analysis using the best-supported scale of effect for forest cover (500 m) and open area cover (600 m) and our local covariates to ensure that none of our covariates were highly correlated ($|r| < 0.6$; Table A.2).

Second, we explored if there was evidence of a threshold relationship between the probability of sloth occurrence and the percent of forest cover, using a general detection probability structure and an occupancy structure that accounted for potential variation associated with our other covariates. Specifically, we built eight occupancy structures: one corresponding to the linear relation (on the logit scale) between the sloth occupancy probability and percent forest cover and the other seven models reflected threshold effects at specified values of forest cover (e.g., 20%, 25%, 30%,…, 50% forest cover; Tables 2 and A.4). For example, a model with a specified threshold of 30% forest cover suggests that sloth occupancy starts to decline when the forest cover falls below 30%, but sloth occupancy is approximately equal at sites above the threshold (see Table 2 for a graphical representation of these relationships). We modelled thresholds from 20% to 50% forest cover (increasing in 5% increments) and used a model selection criteria (AICc) to determine which threshold level was best supported by our data (Table A.4).

Table 2: Eight competing global models with different threshold relations between forest cover (%) and occupancy probability (*Ψ)* of maned sloth within Atlantic Forest, Espírito Santo, Brazil. The **“X”** in **“Ψ Forest Cover_X%”** represents the different values of percentage of forest cover threshold.

Model	Relationship	Graphical Representation
Ψ **Forest Cover** % + Open Area Cover %+ Important trees + Canopy Height, *p* Canopy Height + Important Trees	Linear	
Ψ **Forest Cover_X%*** + Open Area Cover %+ Important trees + Canopy Height, *p* Canopy Height + Important Trees	Threshold at X% of Forest Cover	

*Forest cover ranges 20 to 50%, 5 by 5%.

Third, using the best supported threshold occupancy structure, we explored local factors that could influence sloth detection probability. Specifically, we fitted four detection probability structures that included all additive combinations of canopy height and important tree (Table 3). Finally, we considered occupancy structures to explore additive (16 models) and interactive effects (6 models) of our local and landscape variables, fitting models with up to 7 parameters to avoid the overparameterization. We explored interactive relationships between forest cover and the other occupancy covariates because the effect of some variables (e.g., important trees and open areas cover) may change as the forest cover increases.

All models were fitted using the single-season occupancy model (MACKENZIE *et al.*, 2006) incorporated in program MARK (WHITE; BURHNAM 1999). Using our global model, we conducted a goodness-of-fit test and estimated overdispersion ($\hat{c}$) using the parametric bootstrap procedure (MACKENZIE; BAILEY, 2004) implemented in program PRESENCE (software version 2.12.20; HINES, 2006). We evaluated model selection using second-order Akaike Information Criterion (AICc) or Quasi-Akaike Information Criterion (QAICc; Burnham and Anderson, 2002), selecting only those models with ΔAICc< 2 (MACKENZIE *et al.*, 2006). In addition, we calculated cumulative model weights (w_+) for each explanatory variable in our balanced set of models associated with each of the four steps described above (BURNHAM; ANDERSON, 2002). Then, we used estimated effects from our best-supported model to generate predict maps for the maned sloth distribution at the study area.

3. Results

We detected the maned sloth 53 times at 32 out 68 sampled sites (naïve occupancy estimate = 47%). Among the sites with sloth detections, 53% had only one detection, 34% had two detections, and 6% had three or four detections. The forest cover around the sampled sites range from 5% to 100%, open areas cover ranges from 0 to 69%, the proportion of important trees range from 0 to 1 and canopy height range from 8.9 to 30.5 m (Table A.3).

The evaluation of the scale of effect (buffer size) for our two landscape variables suggested that a model that included forest cover at 500m and open area cover at 600m was approximately twice as likely as any other model in candidate set (Table A.1). These scales of effects were used in all subsequent modeling. The parametric bootstrap goodness of fit revealed some evidence of overdispersion ($\hat{c}$=2.59), so we used Quasi-AICc (BURNHAM; ANDERSON, 2002) for model selection procedures. Our best-supported forest threshold relationship suggested that maned sloth occupancy declined when forest cover was below 30-35% (Tables 3A, A.4).We found some evidence that detection probability was positively affected by canopy height (w_+ = 0.32; $\hat{\beta}$ = 0.09, SE($\hat{\beta}$) = 0.07; Fig. 2), but a model with constant detection probability was more parsimonious (model weight = 0.44, Table 3B). To ensure less bias in our occupancy estimates, we used the more general structure where detection could vary among sites with different canopy height in our evaluation of factors influencing sloth occupancy.

Table 3: Summary of the model selection results for models of: (1) Scale off effect, (2) thresholds effects of Forest Cover, (3) detection probability structure and (4) occupancy probability structure. Reported statistics include QAICc = Quasi-AICc; *w* = model weight; -2Log(L) = -2 Log Likelihood; *K*= number of parameters.

Model	QAICc	ΔQAICc	*w*	-2Log(L)	*K*
(1) Threshold effect					
Ψ ~ Forest Cover_35% + Open Area Cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	**117.32**	**0**	**0.21**	**250.07**	**8**
Ψ ~ Forest Cover + Open Area Cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	119.57	2.24	0.07	255.75	8
(2) Detection probability					
Ψ ~Forest Cover_35% + Open Area Cover + Important trees + Canopy Height, *p* ~ null	114.30	0	0.44	255.22	6

Ψ~ Forest Cover_35% + Open Area Cover + Important trees + Canopy Height, ***p* ~ Canopy Height**	**114.98**	**0.68**	**0.32**	**250.64**	**7**
Ψ~ Forest Cover_35% + Open Area Cover + Important trees + Canopy Height, *p* ~ Important trees	116.56	2.26	0.14	254.63	7
Ψ~ Forest Cover_35% + Open Area Cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	117.33	3.027	0.01	250.07	8
(3) Occupancy probability					
Ψ ~ Forest Cover_35%	**110.24**	**0**	**0.20**	255.92	**4**
Ψ ~ Forest Cover_35% + Open Area Cover	111.09	0.86	0.13	252.11	5
Ψ ~ Forest Cover_35% + Important trees	111.35	1.12	0.12	252.748	5
Global model	114.98	4.74	0.02	249.42	7
Null model	115.01	4.77	0.02	273.98	3

Among competing occupancy models, three had the ΔQAICc <2 (Tables 3C, A.5). Our best-supported model suggests that sloth occurrence is extremely high (near 1.0) when there is over 35% forest cover surrounding a site, but sloth occurrence drops rapidly when forest cover is below this threshold (Fig. 2). Our data also suggested that sloths do not occur at sites with ≤20% of forest cover (Fig 2). As expected, the proportion of important trees showed a positive relationship with occupancy probability and the percentage of open areas cover had a negative influence on sloth occurrence

(Fig. 2). We found no evidence of interactive relationship between the forest cover and the other three variables (Table A.5), possibly due to our distribution of sampling sites. Landscape variables have the most pronounced importance: forest cover had the highest cumulative weight ($w_+ = 0.78$), followed by the open area cover ($w_+ = 0.46$). The two local variables had the lowest cumulative weights $w_+ < 0.40$ (Fig. 3).

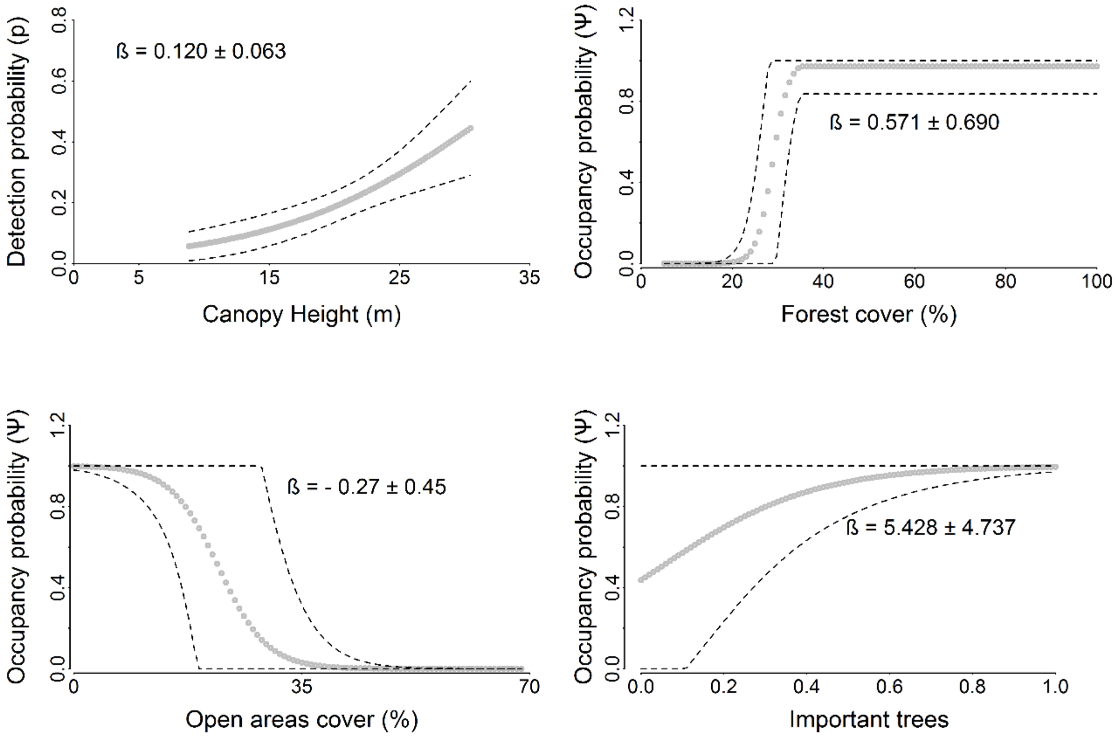


Fig. 2: Maned sloth detection and occupancy probabilities at 68 sampled sites within Atlantic Forest, Espírito Santo, Brazil, predicted by the three best-supported models.

The slope parameters (betas) estimated for the covariates “forest cover”, “open areas cover” (second ranked model) and “important trees” (third ranked model) are also shown. The gray line indicates the estimated covariate relationship and the black dash indicate the standard error. The relationships between open areas and important trees are graphed using the mean forest cover (%).

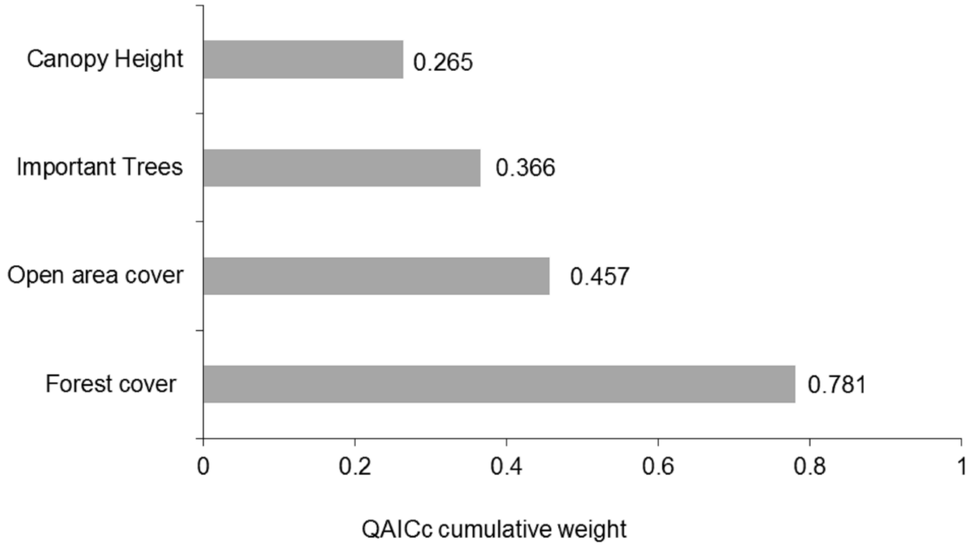


Fig. 3: Cumulative weight of evidence (QAICc cumulative weight) for each covariate used to model maned sloth occupancy within Atlantic Forest, Espírito Santo, Brazil.

Our predictive maps generated from the top three occupancy models show the maned sloth occurring with higher probabilities in a relatively wide band that stretches approximately north-southward in the study region (Fig. 4). In all three predictions, the maned sloth has a high occupancy probability in the northeast and central part of the study area. Conversely, the sloth is almost absent in the areas in the south, north and east edge – which corresponds to the areas with low forest cover.

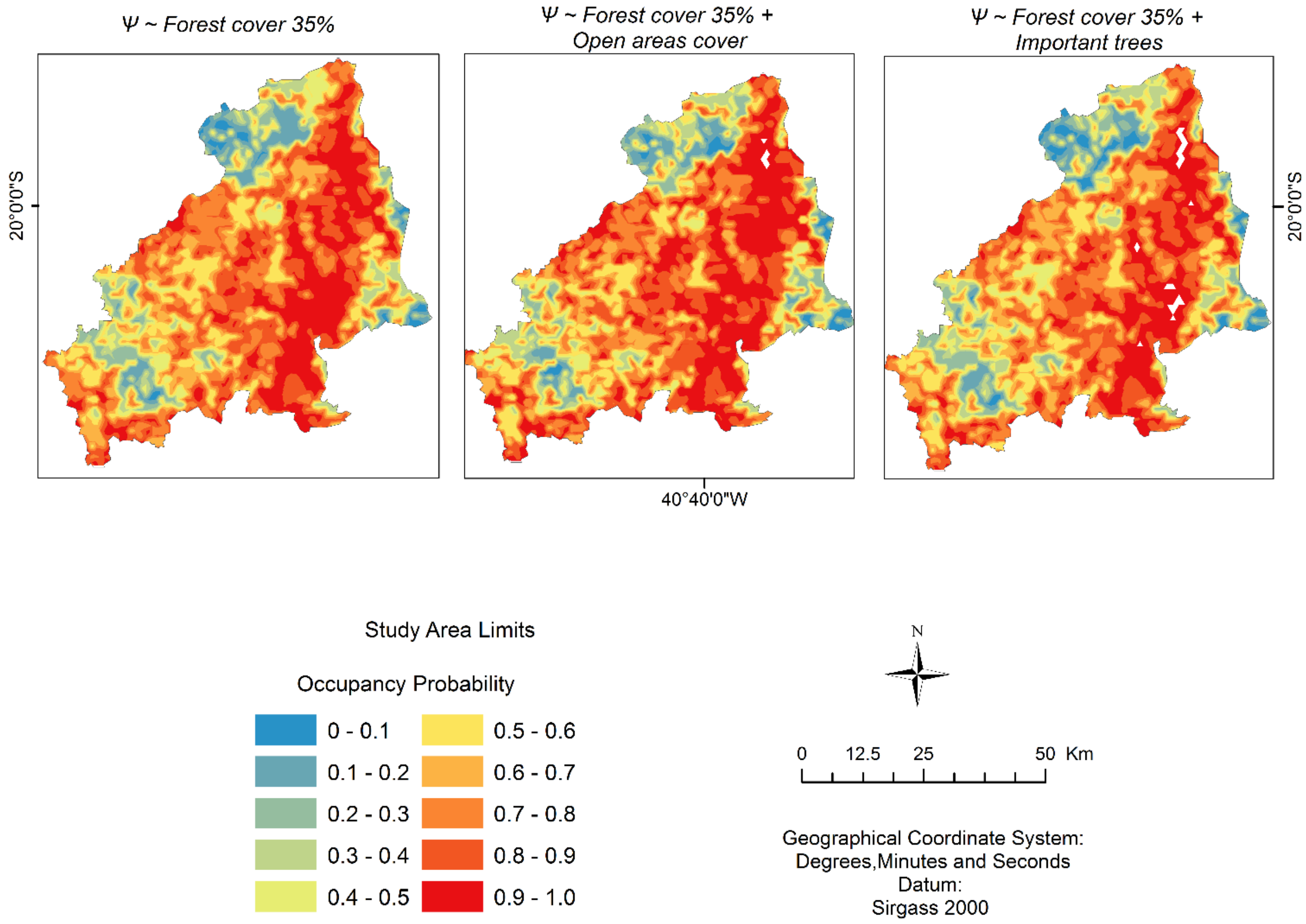

Ψ ~ Forest cover 35%
Ψ ~ Forest cover 35% + Open areas cover
Ψ ~ Forest cover 35% + Important trees
20°0'0"S
20°0'0"S
40°40'0"W
Study Area Limits
Occupancy Probability
0 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.4
0.4 - 0.5
0.5 - 0.6
0.6 - 0.7
0.7 - 0.8
0.8 - 0.9
0.9 - 1.0
N
0
12.5
25
50 Km
Geographical Coordinate System:
Degrees,Minutes and Seconds
Datum:
Sirgass 2000

Fig. 4: Predicted estimates of maned sloth occupancy probability in the study area within Atlantic Forest, Espírito Santo, Brazil; the three best-supported occupancy models were used.

4. Discussion

We found a threshold effect for the occupancy probability of the threatened and cryptic maned sloth. In contrast to previous study (SANTOS *et al.*, 2016), our results suggest that both forest cover and open areas cover strongly affect maned sloth occurrence across forest fragmentation gradients. The effect of local variables on detection probability at occupied sites was similar to our previous study, with canopy height positively influencing the maned sloth's detection. This positive relationship was contrary to our expectation and may be related to the higher abundance of the maned sloth in taller forests which, apparently, overcompensates the difficulties in finding sloths high up in the canopy.

4.1 – Thresholds effects on occupancy probability

The best-supported model predicts that areas with more than 35% of forest cover (65% of the study area) are likely to support maned sloth ($\hat{\psi}$ = 0.97, SE ($\hat{\psi}$) = 0.13), but occupancy estimates decrease abruptly in areas below that threshold (Fig. 2), which corresponds to 35% of the study area (Fig. 4). Other habitat specialist groups exhibit similar responses to changes in habitat amount, including small to medium-sized terrestrial mammals (ESTAVILLO; PARDINI; DA ROCHA, 2013; OCHOA-QUINTERO *et al.*, 2015), woody plants (LIMA; MARIANO-NETO, 2014), and birds (ZUCKERBERG; PORTER, 2010). We also observed the absence of the maned sloth in areas with less than 20% of forest cover (15% of the study area; Fig.4). Forest loss in the region is already severe (originally 100% forest cover) and additional forest loss will increase the isolation of remaining forest patches and decrease patch size. These processes are likely to lead to the local extinction of sloth in some patches and reduce sloth movement between patches making recolonization difficult.

As a forest specialist, habitat loss represents one of the major threats for the maned sloth. Landscapes with high concentration of natural habitats have smaller inter-patch distances and large numbers of patches (number of patches peaks at 30%, see GUSTAFSON; PARKER, 1992). This configuration allows the maned sloth – a strictly arboreal species – to move easily between forest patches. As the forest cover decreases, patch isolation and matrix resistance increase, followed by a decrease in patch size (ANDRÉN, 1994; SWIFT; HANNON, 2010). Isolated and small fragments might no longer support viable populations of maned sloth. In general, community composition may exhibit a shift (PARDINI *et al*., 2010; BANKS-LEITE *et al*., 2014; MAGIOLI *et al*., 2015), holding mainly generalists species, since they can exploit different types of habitat to complement their diet and behavior or resource needs (ESTAVILLO; PARDINI; DA ROCHA, 2013; LIMA; MARIANO-NETO, 2014).

4.2 – Interactions between Forest Cover and local/landscape levels

Contrary to our expectations, we found no evidence of interaction between the forest cover and the local variables, though our findings may be influenced by our limited number of sites with forest cover values between 20-35%, where sloth occupancy estimates are greater than 0, but less than 1 (Fig 2). Forest structure and composition play an unquestionable role in sustaining high biodiversity (AUGUST, 1983). Habitat loss may cause important changes in the habitat structure of remaining patches, with an increase of light demanding arboreal species (early successional), and canopy openness, and a decrease of overall basal area (ROCHA-SANTOS *et al.*, 2016; BENCHIMOL *et al*., 2017). Species richness may decrease within patches (ANDRADE *et a*l., 2015; MAGIOLI *et al.*, 2015), and the compositional dissimilarity of plants between fragments may increase (ARROYO-RODRÍGUEZ *et al.*, 2013; BENCHIMOL *et al.*, 2017). This simplification of habitat composition and structure can limit food resource for the maned sloth, since in general, the sloths have a very restrictive diet, feeding on a few arboreal species (CHIARELLO, 1998b; MONTGOMERY; SUNQUIST, 1975), including some shade tolerant species (CHIARELLO, 1998b). The reduction of canopy height and increase of canopy openness can also influence sloths, since they spend most of their time on high canopy strata resting, feeding, breeding, and executing thermoregulatory behavior (MONTGOMERY; SUNQUIST, 1975; PAULI *et al.*, 2016; GARCÉS-RESTREPO *et al.*, 2017).

Our second-best model suggests that sloth occupancy is influenced by both the open areas cover and forest cover, with a strong negative effect of open areas (Fig 2). Therefore, open areas may limit maned sloth movements, and the species may avoid it – a pattern also found previously (FALCONI *et al.*, 2015). Sloths can survive in small fragments of forest surrounded by an intermediate forest cover (20-35%) due to their relatively small home range (CHIARELLO, 1998b; FALCONI *et al.*, 2015). They can exploit living fences (*e.g.* narrow linear strips of planted trees; LEÓN; HARVEY, 2006), isolated trees, forestry systems, and agriculture crops if these habitat patches provide food resources or are located between potentially accessible forest fragments(CASSANO; KIERULFF; CHIARELLO, 2011; PEERY; PAULI, 2014; VAUGHAN *et al.*, 2007). This is also true for other arboreal mammal, such as *Alouatta palliata mexicana* (ASENSIO *et al.*, 2009), *Colobus anglensis palliatus* (ANDERSON; ROWCLIFFE; COWLISHAW, 2007), and *Callicebus personatus* found in our study area (Pers. Observation). The use of living fences, isolated trees, forestry systems and agriculture crops – habitats with poor resources and conditions – by animals that are considered strictly arboreal provides evidence of the species adaptive capacity to maximize resource consumption in more anthropogenic landscapes due to the lower quality of existing forest fragments. However, the use of open areas may represent a severe predation hazard since the sloths, and other arboreal species, are frequently exposed to attacks by domestic and feral dogs *(*VAUGHAN *et al., 2007;* OLIVEIRA *et al*., 2008; GARCÉS-RESTREPO *et al*., 2018). Similarly, since disturbed forests are of low quality, the sloths would be foraging on a lower and more open canopy, becoming more exposed to predation by ocelot (*Leopardus pardalis* - DELIBES *et al.*, 2011) and tayra (*Eira Barbara* - SÁENZ-BOLAÑOS *et al.*, 2018). In addition, the energy expenditure to cross larger open areas may be higher than its putative resource gains, since the sloth anatomy is not adapted to movements on the ground (GOFFART, 1971).

4.3 – Implications for conservation

We provide the first assessment of the maned sloth habitat requirements in a broader landscape context, representing the full spectrum of forest cover gradient, and with a multi-scale perspective covering a wide range of scale of effects. This understanding can lead to better targeted conservation actions, including a more accurate assessment of the species conservation status and threats. The use of thresholds in conservation and management actions might be debated, mainly because the threshold value may exclude species that require more contiguous habitat (JOHNSON, 2013; VAN DER HOEK; ZUCKERBERG; MANNE, 2015). Additionally, when habitat loss is severe, biodiversity recovery may require different conservation approaches and the previous conservation state may never be obtained (JOHNSON, 2013; VAN DER HOEK; ZUCKERBERG; MANNE, 2015). Still, maintaining 30% to 35% of forest cover in an area can be important for a wide diversity of species and may conserve several ecological process essential to ecosystem function(BANKS-LEITE *et al.*, 2014; MARTENSEN *et al.*, 2012; MUYLAERT; STEVEN; RIBEIRO, 2016).

To improve maned sloth conservation, our results support the need for an increase in forest cover, which will also increase habitat connectivity, by: 1) restoring and increasing riparian vegetation and 2) increasing matrix permeability with agroforestry systems and living fences. The Atlantic Forest has lost much of its riparian vegetation, and if this vegetation could be restored, the forest cover could increase to 30% (REZENDE *et al*., 2018), approaching the threshold level found in our study. Sloths typically use riparian forest for foraging and dispersal (RAMIREZ *et al.*, 2011; GARCÉS-RESTREPO *et al*., 2018) and an early study observed maned sloths using swamp forests in Poço das Antas Reserve (PINDER, 1985). These areas are also useful for birds (TREMBLAY; ST. CLAIR, 2011) butterflies (VAN HALDER *et al.*, 2015), and bats (MUYLAERT; STEVEN; RIBEIRO, 2016; WORDLEY *et al.*, 2015). Additionally, riparian vegetation has a positive impact on water quality by reducing the nutrient and sediment load in streams (DOSSKEY *et al.*, 2010).

Still, conserving and restoring riparian vegetation may not be enough to ensure the conservation of maned sloth. According to the Brazilian Native Vegetation Protection Law (Federal Law 12,727/2012), 20% of forest areas in rural properties must be set aside as legal forest reserves. However, this value is far below our threshold of 35%, and we found that maned sloth is unlikely to exist in areas with less than 20% of forest cover (Fig. 2). Thereby, we reinforce that areas with less than 20% forest cover are unlikely to sustain viable populations of sloths. Additionally, the current law incorporates riparian vegetation in the calculation of the legal reserves, resulting in future deficits in the overall vegetation (SOARES-FILHO *et al*., 2014), including our study area where 97.3% of forest cover are privately owned. To guarantee more consistent conservation, the restoration of riparian forest must be followed by forest reforestation in other areas.

By mixing native vegetation with agricultural production, the agroforestry systems may be a sustainable way of reducing the contrast between the forest cover and the matrix, along with increasing forest area (SCHROTH; HARVEY, 2007; SANTOS *et al*., 2019). When combined with other forested areas, these systems can offer more suitable habitat for maned sloths than the traditional agricultural system (CASSANO; KIERULFF; CHIARELLO, 2011) Moreover, providing different trees in the form of living fences yield new resource areas, resting refugia, and can act as movement corridors between habitat patches for the sloths, enhancing the landscape connectivity and reducing the pressure to traverse the anthropogenic open matrix (CASTELLÓN; SIEVING, 2006; LEÓN; HARVEY, 2006). Together, the restoration and increase of riparian vegetation and the creation of living fences and biodiverse agroforestry system may provide useful corridors and habitats for the maned sloth and for a wide range of species, thus allowing a long-term biodiversity conservation.

In this paper, we found a threshold relationship between maned sloth occurrence and forest cover using an occupancy modeling framework. This framework is recommended for species with low detection probabilities, such as sloth species. Sloth occurrence declined quickly in areas with less than 35% forest cover and sloth were unlikely to occur in areas with less than 20% forest cover. Future studies aiming at understanding the potential interaction between landscape and local variables for this species may concentrate effort within this forest cover range and could provide valuable information for conservation efforts in degraded forest areas. In addition, we strongly recommend long-term monitoring of sloth in our study region – as well as in other key distribution areas of the species –incorporating movement monitoring, to estimate changes in occupancy over time and determine sloth movements and resource use within and between forest patches surrounded by different types of non-habitat and poor-habitat matrix. Such studies would make it possible to better infer how the maned sloth uses and selects their habitats in a heterogeneous and anthropogenic landscape, improving the management and conservation of this lesser known species.

Acknowledgements

We thank LB`s Lab for useful comments on earlier versions of the manuscript and the two anonymous reviewers for the useful comments on an early version. PMS research grants from The Rufford Foundation (21498-1) and scholarship from CNPq (141571/2017-9) and CAPES (88881.188493/2018-01). MCR thanks FAPESP (process #2013/50421-2), CNPq (processes # 312045/2013-1; #312292/2016-3) and PROCAD/CAPES (project # 88881.068425/2014-01) for their financial support. AGC has a Research Productivity Grant from CNPq (303101/2017-2). APP research support from FAPEMIG and CAPES. We thank to Sérgio L. Mendes and all his lab team, to the field work support, specially Nila R.C. Gontijo. We thank all the landowners for the authorization of research on their areas, and to ICMBio/SISBIO (License 57979), MNRJ and SEMAST (License 78343860) for the authorizations of research on protected areas.

References

ANDERSON, J; ROWCLIFFE, J; COWLISHAW, G. Does the matrix matter? A forest primate in a complex agricultural landscape. Biological Conservation, v. 135, n. 2, p. 212–222, mar. 2007. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S0006320706004472>. Acesso em: 22 dez. 2014.

ANDRADE, E. R. et al. Effects of habitat loss on taxonomic and phylogenetic diversity of understory Rubiaceae in Atlantic forest landscapes. Forest Ecology and Management, v. 349, p. 73–84, 2015. Disponível em: <http://dx.doi.org/10.1016/j.foreco.2015.03.049>.

ANDRÉN, Henrik. Effects of Habitat Fragmentation on Birds and Mammals in Landscapes with Different Proportions of Suitable Habitat : A Review. Oikos, v. 71, n. 3, p. 355–366, 1994.

ARROYO-RODRÍGUEZ, Víctor et al. Plant β-diversity in fragmented rain forests: Testing floristic homogenization and differentiation hypotheses. Journal of Ecology, v. 101, n. 6, p. 1449–1458, 2013.

ASCENSAO, Fernando et al. Spatial patterns of road mortality of medium–large mammals in Mato Grosso do Sul, Brazil. Wildlife Research, v. 44, n. 2, p. 135, 2017. Disponível em: <http://www.publish.csiro.au/?paper=WR16108>.

ASENSIO, Norberto et al. Conservation Value of Landscape Supplementation for Howler Monkeys Living in Forest Patches. Biotropica, v. 41, n. 6, p. 768–773, 2009.

ASSIS, Julia C.; GIACOMINI, Henrique C.; RIBEIRO, Milton Cezar. Road Permeability Index: Evaluating the heterogeneous permeability of roads for wildlife crossing. Ecological Indicators, v. 99, n. May 2018, p. 365–374, 2019. Disponível em: <https://doi.org/10.1016/j.ecolind.2018.12.012>.

AUGUST, Peter V. The Role of Habitat Complexity and Heterogeneity in Structuring Tropical Mammal Communities. Ecology, v. 64, n. 6, p. 1495–1507, 1983.

BANKS-LEITE, Cristina; PARDINI, Renata; TAMBOSI, Leandro R; PEARSE, William D; BUENO, Adriana A; BRUSCAGIN, Roberta T; CONDEZ, Thais H; DIXO, Marianna; IGARI, Alexandre T; MARTENSEN, Alexandre C; METZGER, Jean Paul; et al. Using ecological thresholds to evaluate the costs and benefits of set-asides in a biodiversity hotspot. Science, v. 345, n. 6200, p. 1041–1045, 2014.

BENCHIMOL, Maíra et al. Translating plant community responses to habitat loss into conservation practices : Forest cover matters. Biological Conservation, v. 209, n. April, p. 499–507, 2017. Disponível em: <http://dx.doi.org/10.1016/j.biocon.2017.03.024>.

BOESING, Andrea Larissa; NICHOLS, Elizabeth; METZGER, Jean Paul. Biodiversity extinction thresholds are modulated by matrix type. Ecography, p. 1520–1533, 2018.

BURNHAM, Keneth P.; ANDERSON, David R. Model Selection and Multimodel Inference. Second ed. [S.l.]: Springer US, 2002.

CAMARGO, Nícholas Ferreira De; SANO, Nayara Yoshie; VIEIRA, Emerson M. Forest vertical complexity affects alpha and beta diversity of small mammals. Journal of Mammalogy, n. x, p. 1–11, 2018. Disponível em: <http://fdslive.oup.com/www.oup.com/pdf/production_in_progress.pdf>.

CASSANO, Camila Righetto; KIERULFF, Maria Cecília Martins; CHIARELLO, Adriano G. The cacao agroforests of the Brazilian Atlantic forest as habitat for the endangered maned sloth Bradypus torquatus. Mammalian Biology - Zeitschrift für Säugetierkunde, v. 76, n. 3, p. 243–250, maio 2011. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504710000984>. Acesso em: 7 jan. 2015.

CASTELLÓN, Traci D.; SIEVING, Kathryn E. An Experimental Test of Matrix Permeability and Corridor Use by an Endemic Understory Bird. Conservation Biology, v. 20, n. 1, p. 135–145, 11 fev. 2006. Disponível em: <http://doi.wiley.com/10.1111/j.1523-1739.2006.00332.x>. Acesso em: 18 dez. 2014.

CHIARELLO, Adriano Garcia. Activity budgets and ranging patterns of the Atlantic forest maned sloth Bradypus torquatus (Xenarthra: Bradypodidae). Journal of Zoology, v. 246, n. 1, p. 1–10, set. 1998a. Disponível em: <http://doi.wiley.com/10.1111/j.1469-7998.1998.tb00126.x>.

CHIARELLO, Adriano Garcia. Diet of the Atlantic forest maned sloth Bradypus torquatus (Xenarthra : Bradypodidae). Journal of Zoology, v. 246, p. 11–19, 1998b.

CHIARELLO, Adriano Garcia; MORAES-BARROS, Nadia De. Bradypus torquatus,. . [S.l: s.n.], 2014. Disponível em: <https://www.iucnredlist.org/species/3036/47436575>.

DELIBES, Miguel et al. Unusual observation of an ocelot (Leopardus pardalis) eating an adult Linnaeus's two-toed sloth (Choloepus didactylus). Mammalian Biology, v. 76, n. 2, p. 240–241, 2011. Disponível em: <http://dx.doi.org/10.1016/j.mambio.2010.08.006>.

DIXO, Marianna et al. Habitat fragmentation reduces genetic diversity and connectivity among toad populations in the Brazilian Atlantic Coastal Forest. Biological Conservation, v. 142, n. 8, p. 1560–1569, ago. 2009. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S0006320708004540>. Acesso em: 11 jul. 2014.

DOHERTY, Tim S. et al. The global impacts of domestic dogs on threatened vertebrates. Biological Conservation, v. 210, n. December 2016, p. 56–59, 2017. Disponível em: <http://dx.doi.org/10.1016/j.biocon.2017.04.007>.

DOSSKEY, Michael G et al. The Role of Riparian Vegetation in Protecting and Improving Chemical Water Quality in Streams 1. Journal of the American Water Resources Association, v. 46, n. 2, p. 1–17, 2010.

ESTAVILLO, Candelaria; PARDINI, Renata; DA ROCHA, Pedro Luís Bernardo. Forest loss and the biodiversity threshold: An evaluation considering species habitat requirements and the use of matrix habitats. PLoS ONE, v. 8, n. 12, p. 1–10, 2013.

FAHRIG, Lenore. Effects of Habitat Fragmentation on Biodiversity. Annual Review of Ecology, Evolution, and Systematics, v. 34, n. 1, p. 487–515, nov. 2003. Disponível em: <http://www.annualreviews.org/doi/abs/10.1146/annurev.ecolsys.34.011802.132419>. Acesso em: 9 jul. 2014.

FAHRIG, Lenore. Rethinking patch size and isolation effects: the habitat amount hypothesis. Journal of Biogeography, v. 40, n. 9, p. 1649–1663, 2013. Disponível em: <http://doi.wiley.com/10.1111/jbi.12130>.

FALCONI, Nereyda et al. The home range and multi-scale habitat selection of the threatened maned three-toed sloth (Bradypus torquatus). Mammalian Biology - Zeitschrift für Säugetierkunde, 2015. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504715000117>.

FERREGUETTI, Átilla Colombo et al. One step ahead to predict potential poaching hotspots: Modeling occupancy and detectability of poachers in a neotropical rainforest. Biological Conservation, v. 227, n. September, p. 133–140, 2018. Disponível em: <https://linkinghub.elsevier.com/retrieve/pii/S0006320718306396>.

GARCÉS-RESTREPO, Mario F. et al. Individual reproductive strategies shape the mating system of tree sloths. Journal of Mammalogy, v. 98, n. 5, p. 1417–1425, 2017.

GARCÉS-RESTREPO, Mario F.; PAULI, Jonathan N.; PEERY, M. Zachariah. Natal dispersal of tree sloths in a human-dominated landscape: Implications for tropical biodiversity conservation. Journal of Applied Ecology, v. 55, n. 5, p. 2253–2262, 2018.

GESTICH, Carla C. et al. Unraveling the scales of effect of landscape structure on primate species richness and density of titi monkeys (Callicebus nigrifrons). Ecological Research, v. 34, n. 1, p. 150–159, 2019.

GINÉ, Gastón Andrés Fernandez et al. Activity budget, pattern and rhythm of maned sloths (Bradypus torquatus): responses to variations in ambient temperature. Mammalian Biology, v. 80, n. 6, p. 459–467, 2015. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504715000658>.

GOFFART, M. 1971. Function and Form in the Sloth. Oxford: Pergamon Press.

GRELLE, Carlos Eduardo Viveiros. Forest Structure and Vertical Stratification of Small Mammals in a Secondary Atlantic Forest , Southeastern Brazil. Studies on Neotropical Fauna and Environment, v. 38, n. March 2013, p. 81–85, 2003.

GUSTAFSON, Eric J.; PARKER, George R. Relationships between landcover proportion and indices of landscape spatial pattern. Landscape Ecology, v. 7, n. 2, p. 101–110, jun. 1992. Disponível em: <http://link.springer.com/10.1007/BF02418941>.

HADDAD, N. M. et al. Habitat fragmentation and its lasting impact on Earth’s ecosystems. Science Advances, v. 1, n. 2, p. e1500052–e1500052, 2015. Disponível em: <http://advances.sciencemag.org/cgi/doi/10.1126/sciadv.1500052>.

HINES, J. E. 2006. PRESENCE – Software to estimate patch occupancy and related parameters, version 7.8. USGS-PWRC. www.mbr-pwrc.usgs.gov/software/presence.html. (10.10.2013).

HIRSCH, André; CHIARELLO, Adriano Garcia. The endangered maned sloth Bradypus torquatus of the Brazilian Atlantic forest: a review and update of geographical distribution and habitat preferences. Mammal Review, v. 42, n. 1, p. 35–54, 20 jan. 2012. Disponível em: <http://doi.wiley.com/10.1111/j.1365-2907.2011.00188.x>. Acesso em: 7 jan. 2015.

HUGGETT, Andrew J. The concept and utility of “ecological thresholds” in biodiversity conservation. Biological Conservation, v. 124, n. 3, p. 301–310, 2005.

INCAPER, Instituto Capixaba de Pesquisa Assistência técnica e Extensão. Programa de Assistência Técnica e Extensão Rural Proater 2011-2013: Domingos Martins. . Vitória: [s.n.], 2013a. Disponível em: <01E28>.

INCAPER, Instituto Capixaba de Pesquisa Assistência técnica e Extensão. Programa de Assistência Técnica e Extensão Rural Proater 2011-2013: Santa Leopoldina. . Vitória: [s.n.], 2013b. Disponível em: <http://www.incaper.es.gov.br/?a=proater/municipios>.

INCAPER, Instituto Capixaba de Pesquisa Assistência técnica e Extensão. Programa de Assistência Técnica e Extensão Rural Proater 2011-2013: Santa Maria De Jetiba. . Vitória: [s.n.], 2013c. Disponível em: <03E03>.

INCAPER, Instituto Capixaba de Pesquisa Assistência técnica e Extensão. Programa de Assistência Técnica e Extensão Rural Proater 2011-2013: Santa Teresa. . Vitória: [s.n.], 2013d.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, IBGE. Manual Técnico da Vegetação Brasileira. 1. ed. Rio de Janeiro: IBGE, 2012. Disponível em: <https://biblioteca.ibge.gov.br/visualizacao/livros/liv63011.pdf>.

JACOB, Suellen A.; MATTER, Stephen F.; CAMERON, Guy N. Interactive effects of vegetation and illumination on foraging behavior of white-footed mice (Peromyscus leucopus). Journal of Mammalogy, v. 98, n. 3, p. 804–814, 2017. Disponível em: <http://academic.oup.com/jmammal/article/98/3/804/3051788/Interactive-effects-of-vegetation-and-illumination>.

JOHNSON, Chris J. Identifying ecological thresholds for regulating human activity: Effective conservation or wishful thinking? Biological Conservation, v. 168, p. 57–65, 2013. Disponível em: <http://dx.doi.org/10.1016/j.biocon.2013.09.012>.

LANDE, Russel. Extinction Thresholds in Demographic Models of Territorial Populations. The American Naturalist, v. 130, n. 4, p. 624–635, 1987.

LEBLOIS, Antoine; DAMETTE, Olivier; WOLFERSBERGER, Julien. What has Driven Deforestation in Developing Countries Since the 2000s ? Evidence from New Remote-Sensing Data. World Development, v. 92, p. 82–102, 2017. Disponível em: <http://dx.doi.org/10.1016/j.worlddev.2016.11.012>.

LEÓN, Mario Chacón; HARVEY, Celia A. Live fences and landscape connectivity in a neotropical agricultural landscape. Agroforestry Systems, v. 68, n. 1, p. 15–26, 2006.

LIMA, Marília Mascarenhas; MARIANO-NETO, Eduardo. Extinction thresholds for Sapotaceae due to forest cover in Atlantic Forest landscapes. Forest Ecology and Management, v. 312, p. 260–270, 2014.

MACKENZIE, Darryl.I., BAILEY, Larissa L., 2004. Assessing the fit of site-occupancy models. J. Agric. Biol. Environ. Stat. 9, 300–318. https://doi.org/10.1198/108571104X3361

MACKENZIE, Darryl I. et al. Occupancy Estimation and Modeling: Inferring Patterns and Dynamics of Species Occurence. 1. ed. [S.l.]: Elsevier Inc., 2006.

MAGIOLI, M. et al. Thresholds in the relationship between functional diversity and patch size for mammals in the Brazilian Atlantic Forest. Animal Conservation, v. 18, n. 6, p. 499–511, 2015.

MARTENSEN, Alexandre Camargo et al. Associations of Forest Cover, Fragment Area, and Connectivity with Neotropical Understory Bird Species Richness and Abundance. Conservation Biology, v. 26, n. 6, p. 1100–1111, 2012.

MELO, Isabel et al. A review of threshold responses of birds to landscape changes across the world. v. 0, n. 0, p. 1–12, 2018.

MIGUET, Paul et al. What determines the spatial extent of landscape effects on species? Landscape Ecology, v. 31, n. 6, p. 1–18, 2015.

MONTGOMERY, G G; SUNQUIST, M E. Impact of sloths on Neotropical forest energy flow and nutrient cycling. Tropical Ecology Systems, Trends in Terrestrial and Aquatic Research, p. 69–98, 1975.

MORAES, A.M. et al. Landscape resistance influences effective dispersal of endangered golden lion tamarins within the Atlantic Forest. Biological Conservation, v. 224, n. June 2017, p. 178–187, 2018. Disponível em: <https://doi.org/10.1016/j.biocon.2018.05.023>.

MORATO, R. G. et al. Resource selection in an apex predator and variation in response to local landscape characteristics. Biological Conservation, v. 228, n. August, p. 233–240, 2018. Disponível em: <https://doi.org/10.1016/j.biocon.2018.10.022>.

MUYLAERT, R.L. et al. Uma Nota Sobre Os Limites Territoriais Da Mata Atlântica. Oecologia Australis, v. 22, n. 03, p. 302–311, 2018.

MUYLAERT, R.L.; STEVEN, R.D.; RIBEIRO, M.C. Threshold effect of habitat loss on bat richness in cerrado-forest landscape. Ecological Applications, v. 26, n. 6, p. 1854–1867, 2016.

OCHOA-QUINTERO, Jose Manuel et al. Thresholds of species loss in Amazonian deforestation frontier landscapes. Conservation Biology, v. 29, n. 2, p. 440–451, 2015.

OLIVEIRA, Valeska B De et al. Predation on the black capuchin monkey by domestic dogs in the Parque Estadual Serra do Brigadeiro. Revista Brasileira de Zoologia, v. 25, n. 2, p. 376–378, 2008.

PARDINI, Renata et al. Beyond the fragmentation threshold hypothesis: Regime shifts in biodiversity across fragmented landscapes. PLoS ONE, v. 5, n. 10, 2010.

PARDINI, Renata et al. The challenge of maintaining Atlantic forest biodiversity: A multi-taxa conservation assessment of specialist and generalist species in an agro-forestry mosaic in southern Bahia. Biological Conservation, v. 142, n. 6, p. 1178–1190, 2009. Disponível em: <http://dx.doi.org/10.1016/j.biocon.2009.02.010>.

PAULI, Jonathan N. et al. Arboreal Folivores Limit Their Energetic Output, All the Way to Slothfulness. The American Naturalist, v. 188, n. 2, p. 196–204, 2016. Disponível em: <http://www.journals.uchicago.edu/doi/10.1086/687032>.

PAVAGEAU, Charlotte et al. Nesting sites of giant honey bees modulated by landscape patterns. Journal of Applied Ecology, n. November 2017, p. 1–11, 2017. Disponível em: <http://doi.wiley.com/10.1111/1365-2664.13069>.

PEERY, M. Zachariah; PAULI, Jonathan N. Shade-grown cacao supports a self-sustaining population of two-toed but not three-toed sloths. Journal of Applied Ecology, v. 51, n. 1, p.

162–170, 20 fev. 2014. Disponível em: <http://doi.wiley.com/10.1111/1365-2664.12182>. Acesso em: 4 jan. 2015.

RAMIREZ, Oscar et al. Temporal and spatial resource use by female three-toed sloths and their young in an agricultural landscape in Costa Rica. Revista de Biologia Tropical, v. 59, n. 4, p. 1743–1755, 2011.

REZENDE, Camila Linhares et al. From hotspot to hopespot : An opportunity for the Brazilian Atlantic Forest. Perspectives in Ecology and Conservation, 2018.

RIBEIRO, Milton Cezar et al. The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for conservation. Biological Conservation, v. 142, n. 6, p. 1141–1153, jun. 2009. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S0006320709000974>. Acesso em: 9 jul. 2014.

ROCHA-SANTOS, Larissa et al. The shrinkage of a forest : Landscape-scale deforestation leading to overall changes in local forest structure. Biological Conservation, v. 196, p. 1–9, 2016. Disponível em: <http://dx.doi.org/10.1016/j.biocon.2016.01.028>.

SÁENZ-BOLAÑOS, Carolina et al. Tayra (Eira barbara) predation of a brown-throated three-toed sloth (Bradypus variegatus) in Costa Rica. Edentata, n. September, p. 1–4, 2018.

SANTOS, Paloma Marques et al. Local and landscape influences on the habitat occupancy of the endangered Maned Sloth Bradypus torquatus within fragmented landscapes. Mammalian Biology - Zeitschrift für Säugetierkunde, v. 81, p. 447–454, 2016. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504716300416>.

SANTOS, Pedro Zanetti Freire; CROUZEILLES, Renato; SANSEVERO, Jerônimo Boelsums Barreto. Can agroforestry systems enhance biodiversity and ecosystem service provision in agricultural landscapes? A meta-analysis for the Brazilian Atlantic Forest. Forest

Ecology and Management, v. 433, n. July 2018, p. 140–145, 2019. Disponível em: <https://linkinghub.elsevier.com/retrieve/pii/S037811271831332X>.

SCHROTH, G.; HARVEY, C. a. Biodiversity conservation in cocoa production landscapes: An overview. Biodivers. Conserv. 16, 2237–2244, 2007.

SHENBROT, Georgy et al. Habitat-dependent differences in architecture and microclimate of the burrows of Sundevall's jird (Meriones crassus) (Rodentia: Gerbillinae) in the Negev Desert, Israel. Journal of Arid Environments, v. 51, n. 2, p. 265–279, 2002.

SOARES-FILHO, Britaldo et al. Cracking Brazil ' s Forest Code. Science, v. 344, n. April, p. 363–364, 2014.

SWIFT, Trisha L.; HANNON, Susan J. Critical thresholds associated with habitat loss: A review of the concepts, evidence, and applications. Biological Reviews, v. 85, n. 1, p. 35–53, 2010.

TREMBLAY, Marie A.; ST. CLAIR, Colleen C. Permeability of a heterogeneous urban landscape to the movements of forest songbirds. Journal of Applied Ecology, v. 48, n. 3, p. 679–688, 2011.

VAN DER HOEK, Yntze; ZUCKERBERG, Benjamin; MANNE, Lisa L. Application of habitat thresholds in conservation: Considerations, limitations, and future directions. Global Ecology and Conservation, v. 3, p. 736–743, 2015. Disponível em: <http://dx.doi.org/10.1016/j.gecco.2015.03.010>.

VAN HALDER, Inge et al. Woodland habitat quality prevails over fragmentation for shaping butterfly diversity in deciduous forest remnants. Forest Ecology and Management, v. 357, p. 171–180, 2015.

VAUGHAN, Christopher et al. Spatial ecology and conservation of two sloth species in a cacao landscape in limón, Costa Rica. Biodiversity and Conservation, v. 16, p. 2293–2310, 2007.

WITH, Kimberly A.; KING, Anthony W. Extinction thresholds for species in fractal landscapes. Conservation Biology, v. 13, n. 2, p. 314–326, 1999.

WHITE, G.; BURNHAM, K. P. Program MARK: survival estimation from populations of marked animals. Bird Study 46, 120–138. 1999.

WORDLEY, Claire F.R. et al. Landscape scale habitat suitability modelling of bats in the Western Ghats of India: Bats like something in their tea. Biological Conservation, v. 191, p. 529–536, 2015. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S0006320715300562>.

ZUCKERBERG, Benjamin; PORTER, William F. Thresholds in the long-term responses of breeding birds to forest cover and fragmentation. Biological Conservation, v. 143, n. 4, p. 952–962, 2010. Disponível em: <http://dx.doi.org/10.1016/j.biocon.2010.01.004>.

Appendix A. Supplementary data

Table A.1: Model selection results for supported models of scale of effect. The same general model structure was used for sloth occupancy, Ψ (Canopy Height + ImpTrees + Forest cover *scale of effect* + Open areas cover *scale of effect*), varying the scale (buffer, m) of each landscape variable. Detection probability was modeled as a function of both local covariates, *p* (Canopy Height +ImpTrees). For each model we report: AICc = Akaike information criteria corrected for small samples; *w* = Model Weight; -2Log(L) = Measurements of model fit; K = number of parameters. The bolded model represents the most parsimonious model in the candidate model set.

Model	AICc	ΔAICc	*w*	*K*	-2log(L)
General structure: Ψ (Canopy Height + ImpTrees + Forest cover scale of effect + Open areas cover scale of effect), p (Canopy Height +ImpTrees)					
Forest cover 500 + Open areas cover 600	**271.02**	**0.00**	**0.09**	**8**	**252.58**
Forest cover 600 + Open areas cover 600	272.33	1.31	0.05	8	253.89
Forest cover 500 + Open areas cover 400	272.47	1.45	0.04	8	254.03
Forest cover 600 + Open areas cover 400	272.47	1.45	0.04	8	254.03
Forest cover 100 + Open areas cover 400	272.56	1.54	0.04	8	254.12
Forest cover 400 + Open areas cover 400	272.59	1.57	0.04	8	254.15
Forest cover 600 + Open areas cover 500	272.72	1.69	0.04	8	254.28
Forest cover 300 + Open areas cover 400	272.74	1.72	0.04	8	254.30
Forest cover 500 + Open areas cover 500	272.79	1.77	0.04	8	254.35
Forest cover 100 + Open areas cover 300	272.79	1.77	0.04	8	254.35
Forest cover 200 + Open areas cover 400	272.90	1.87	0.04	8	254.45
Forest cover 500 + Open areas cover 300	273.08	2.06	0.03	8	254.64
Forest cover 600 + Open areas cover 300	273.09	2.07	0.03	8	254.65
Forest cover 100 + Open areas cover 200	273.10	2.07	0.03	8	254.66
Forest cover 400 + Open areas cover 600	273.10	2.08	0.03	8	254.66
Forest cover 400 + Open areas cover 300	273.19	2.16	0.03	8	254.75
Forest cover 300 + Open areas cover 300	273.23	2.21	0.03	8	254.79
Forest cover 400 + Open areas cover 500	273.24	2.22	0.03	8	254.80
Forest cover 200 + Open areas cover 300	273.28	2.26	0.03	8	254.84
Forest cover 100 + Open areas cover 500	273.43	2.41	0.03	8	254.99
Forest cover 300 + Open areas cover 600	273.50	2.48	0.03	8	255.06
Forest cover 300 + Open areas cover 500	273.60	2.58	0.02	8	255.16
Forest cover 100 + Open areas cover 600	273.81	2.78	0.02	8	255.37

Forest cover 200 + Open areas cover 500	273.81	2.79	0.02	8	255.37
Forest cover 300 + Open areas cover 200	273.81	2.79	0.02	8	255.37
Forest cover 400 + Open areas cover 200	273.83	2.81	0.02	8	255.39
Forest cover 600 + Open areas cover 200	273.86	2.83	0.02	8	255.42
Forest cover 200 + Open areas cover 200	273.86	2.83	0.02	8	255.42
Forest cover 500 + Open areas cover 200	273.86	2.83	0.02	8	255.42
Forest cover 200 + Open areas cover 600	273.95	2.93	0.02	8	255.51
Forest cover 100 + Open areas cover 100	278.60	7.58	0.00	8	260.16
Forest cover 300 + Open areas cover 100	279.27	8.25	0.00	8	260.83
Forest cover 200 + Open areas cover 100	279.48	8.46	0.00	8	261.04
Forest cover 500 + Open areas cover 100	279.63	8.61	0.00	8	261.19
Forest cover 400 + Open areas cover 100	280.82	9.80	0.00	8	262.38
Forest cover 600 + Open areas cover 100	280.85	9.83	0.00	8	262.41

Table A.2: Pearson Correlation Matrix for selected covariates.

	Canopy Height (m)	Important Trees	Open areas cover (%) in 600 m	Forest Cover (%) in 500 m
Canopy Height (m)	**1**			
Important Trees	0.39	**1**		
Open areas cover (%) in 600 m	-0.46	-0.32	**1**	
Forest Cover (%) in 500 m	0.25	0.27	-0.50	**1**

Table A.3: General characteristics for the sampled sites in study area. Where: Total mean – mean of the respective variable in al sampled sites; Non-detected = mean of the respective variable in all sites which the maned sloth were not detected; Detected = mean of the respective variable in all sites which the maned sloth were detected; m = meters; SD = Standard Deviation.

Variable	Total Mean (SD)	Non-detected (SD)	Detected (SD)
Forest cover (%)	48.72 (±21.05)	41.47 (±10.49)	56.87 (±20.96)
Open areas cover (%)	10.46 (±11.75)	16.59 (±17.29)	3.56 (±3.47)
Important Trees (0-1)	0.63 (±0.27)	0.53 (±0.31)	0.73 (±0.20)
Canopy Height (m)	19.59 (±3.34)	18 (±3.12)	21.38 (±3.41)
Total of the sampled Sites	68	36	32

Table A.4: Model selection results for eight models exploring thresholds effect between forest cover and the Maned sloth occupancy probability. All models include a general detection probability structure, *p* (Canopy Height+ ImpTrees), and an occupancy structure that accounted for potential variation associated with our other covariates, Ψ (Open areas cover + ImpTrees + Canopy Height + *Threshold Relationship*) . For each model we report: QAICc = Quasi-AICc; *w* = Model Weight; -2Log(L) = Measurements of model fit; *K* = number of parameters.

Model	QAICc	ΔQAICc	*w*	-2log(L)	*K*
Ψ ~ Forest cover_35% + Open areas cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	117.33	0	0.213	250.07	8
Ψ ~ Forest cover_30% + Open areas cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	117.7	0.37	0.18	251.02	8
Ψ ~ Forest cover_40% + Open areas cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	118.09	0.77	0.15	252.02	8
Ψ ~ Forest cover_45% + Open areas cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	118.35	1.02	0.13	252.65	8
Ψ ~ Forest cover_50% + Open areas cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	118.51	1.20	0.12	253.12	8
Ψ ~ Forest cover_25% + Open areas cover + Important trees + Canopy Height, *p* ~ Canopy Height + Important Trees	118.93	1.61	0.1	254.13	8
Ψ ~ Forest cover + Open areas cover + Important trees + Canopy Height,	119.57	2.24	0.07	255.74	8

p ~ Canopy Height + Important Trees					
Ψ ~ Forest cover_20% + Open areas cover + Important trees + Canopy Height, p ~ Canopy Height + Important Trees	119.99	2.66	0.06	256.81	8

Table A.5: Model selection results for occupancy structures that included additive (16 models) and interactive effects (6 models) of our local and landscape variables on Maned sloth occupancy probability. All models include the supported detection probability structure, *p* (Canopy Height). For each model we report: QAICc = Quasi-AICc; *w* = Model Weight; -*2Log(L)* = -2 Log Likelihood; *K* = number of parameters; + = Additive models; * = Interactive models. The bolded model represents the three better models in the candidate model set (ΔQAICc < 2).

Model	QAICc	ΔQAICc	*w*	*-2Log(L)*	*K*
***Ψ* Forest cover_35%**	**110.23**	**0**	**0.20**	255.92	**4**
***Ψ* Forest cover_35% + Open areas cover**	**111.10**	**0.86**	**0.13**	252.11	**5**
***Ψ* Forest cover_35% + Important trees**	**111.35**	**1.12**	**0.12**	252.74	**5**
Ψ Forest Cover_35% + Canopy height	112.36	2.12	0.07	255.36	5
Ψ Open areas cover	112.46	2.22	0.07	261.58	4
Ψ Forest Cover_35% + Open areas cover + Important trees	112.66	2.43	0.06	249.91	6
Ψ Forest Cover_35% + Open areas cover+ Canopy height	113.40	3.17	0.04	251.83	6
Ψ Forest Cover_35% + Canopy Height + Important trees	113.47	3.23	0.04	251.96	6

Ψ Forest Cover_35% * Open areas cover	113.49	3.25	0.04	252.08	6
Ψ Open areas cover+ Important trees	113.639	3.40	0.04	258.56	5
Ψ Forest Cover_35% * Important trees	113.71	3.48	0.04	252.61	6
Ψ Open areas cover + Canopy height	114.62	4.39	0.02	261.09	5
Ψ Forest Cover_35% * Canopy height	114.68	4.44	0.022	255.14	6
Global model	115.00	4.74	0.02	249.42	7
Null model	115.01	4.77	0.019	273.98	3
Ψ Open areas cover+ Canopy height + Important trees	115.36	5.12	0.02	256.74	6
Ψ Open areas cover* Important trees	115.72	5.48	0.01	257.73	6
Ψ Canopy height + Important trees	115.75	5.517	0.01	263.91	5
Ψ Important trees	115.94	5.71	0.01	270.44	4
Ψ Canopy height	116.56	6.33	0.01	260.10	4

Ψ Open areas cover* Canopy height	116.62	6.38	0.01	272.12	6
Ψ Canopy height *Important trees	118.13	7.89	0.00	263.80	6

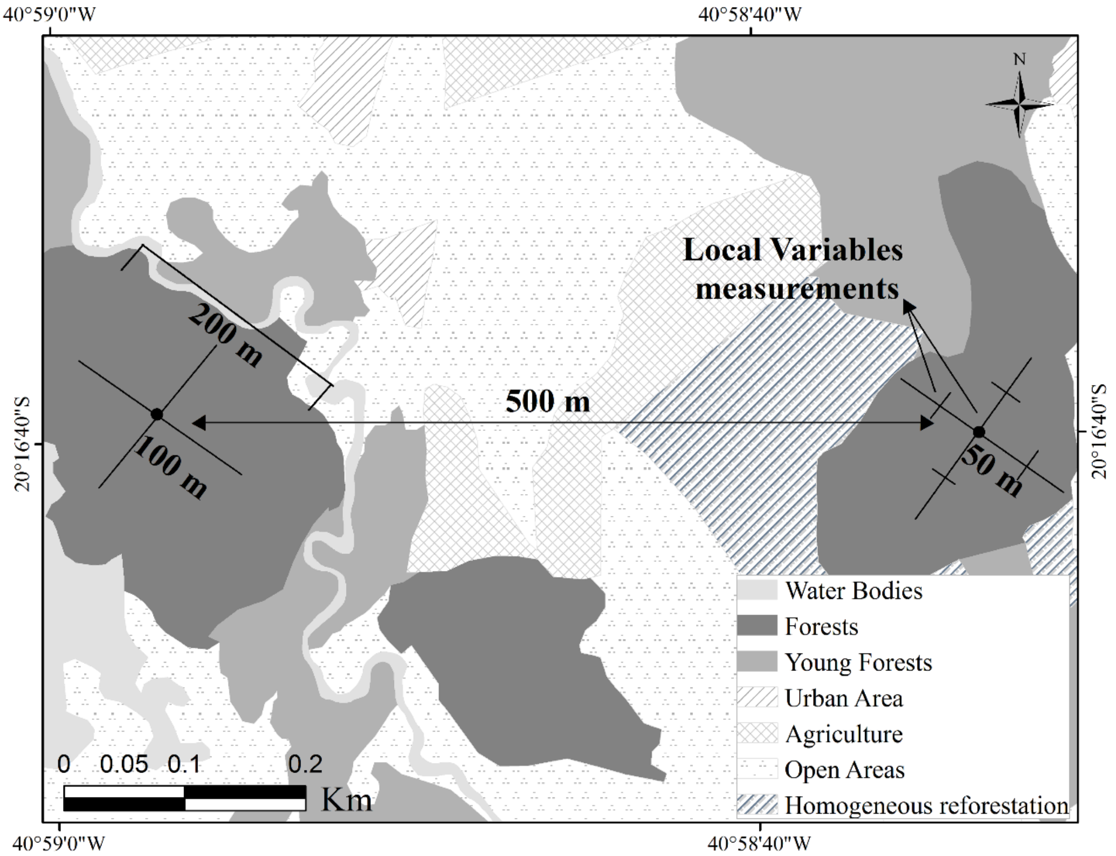


Fig. A.1: Schematic representation of sample design.

Capítulo 3

Natural regeneration can mitigate the climate change effects on suitable areas for the endangered maned sloth in Atlantic Forest, Brazil.

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Manuscript to be submitted in Global Change Biology

Abstract

Climate changes and habitat loss are two of the major factors responsible for the species extinction. Urgent conservation measures are needed to stop the spread of these global threats, such as encouraging forest regeneration. This article sought to evaluate the environmental suitability for the endangered maned sloth (*Bradypus torquatus*) in its entire distribution, using SDM tools, and modeling the two evolutionary units separately – ESU01 (North) and ESU02 (South). We also used Maxent to model future scenarios, taking into account climate change in 2050 and regeneration scenarios – BAU, scenario 02 less optimistc and scenario 03 – more optimisct. We used climate variables from WorldCim V.1 and we calculated two landscape variables – forest cover and pasture cover. We analysed the generated models in face of the brazilian legislation, to understand how the suitable areas are in relation to their legal conservation. Suitable areas correspond to 17.71 % of the delimited area for ESU01, and 7.0% for ESU02. ESU01 exhibits a decrease of suitable areas in scenarios BAU and 02, but a stability in scenario 03. On the other hand, ESU02 exhibits a increase of suitable areas in all scenarios. For both populatins, forest cover play and important role in the current environmental suitability, but this pattern may change in future scenarios, mainly in ESU02, in which the climate variable gain importance in future scenarios. Most part of suitable areas are outside from any legal protection, and this patterns continue in future scenarios. The future conservaion of *B.torquatus* will depend on landscape planning, in order to include different types of forest regeneration.

Keywords: Conservation, Forest regeneration, Landscape ecology, Global warming, Pilosa

1. Introduction

Successful biodiversity conservation is intrinsically linked to the our capacity to foresee how of if a given habitat will support the presence of different species and viable populations in the future. Climate change will act as the primary actor in the following years, with severe negative impacts on biodiversity distribution (GILANI *et al.*, 2020), species richness and composition (GOUVEIA *et al.*, 2016a), and suitable areas for viable populations (ZHANG *et al.*, 2020). Human activities, such as agriculture, forestry, and other land uses are responsible for 23% of global greenhouse gas emissions (IPCC, 2018). In addition, several biomes are experiencing high rates of habitat loss and decreasing biodiversity, since small and isolated habitats may be inadequate to sustain viable populations (FAHRIG, 2003; SILVA *et al.*, 2015).

Globally, forest areas play a fundamental role in regulating local and global climate, mitigating the effects caused by climate (PREVEDELLO *et al.*, 2019; SILVÉRIO *et al.*, 2015); thus, reducing deforestation is imperative and urgent. Additionally, the regeneration of natural habitats is crucial to reduce the impacts of global warming (BAPTISTA; RUDEL, 2006; RUDEL *et al.*, 2005; RUDEL; BATES; MACHINGUIASHI, 2002), since growing young forests are excellent carbon sinks (CASPERSEN *et al.*, 2000; STRASSBURG *et al.*, 2014). Deforested areas can be recovered in two ways: active restoration and passive — or natural — regeneration (CHAZDON, 2012). The latter is considered the cheapest form of forest recovery, since it is simply a natural process of ecological succession (CHAZDON, 2012). The former involves human labor for planting seedlings and seeding directly and is therefore costlier, especially for small landowners (LAMB; ERSKINE; PARROTTA, 2005; but see BANKS-LEITE *et al.*, 2014). Some conservations initiatives are fundamental in order to ensure the long-term preservation of natural environments and the species that inhabit them, such as the establishment of a protected areas system (NAUGHTON-TREVES;

HOLLAND; BRANDON, 2005) and the conservation of natural areas in private lands (BOWERS, 1999; METZGER *et al.*, 2019).

The Brazilian Atlantic Forest has been reduced to just over 28% of its original size (REZENDE *et al.*, 2018), and is composed mainly of fragments smaller than 50 ha that are immersed in a heterogeneous matrix (RIBEIRO *et al.*, 2009), and highly vulnerable to climate change (BELLARD *et al.*, 2014; SOBRAL-SOUZA *et al.*, 2018). Still, the biome has been experiencing a decrease in deforestation rates, with the lowest deforestation rate in 30 years recorded between 2017 and 2018 (FUNDAÇÃO SOS MATA ATLÂNTICA, 2018). Furthermore, some regions report an increase in forest cover, mainly due to natural succession processes (BAPTISTA; RUDEL, 2006; DE REZENDE *et al.*, 2015; TEIXEIRA *et al.*, 2009).

Even with its long history of deforestation, the biome is still home to the endemic maned sloth (*Bradypus torquatus)*, a threatened species according to the national red list (ICMBio. CHIARELLO *et al*., 2018) and by the international list (IUCN. CHIARELLO ; MORAES-BARROS, 2014). Due to their strictly arboreal and folivorous habit (CHIARELLO, 1998a, b), maned sloths need sizeable forest cover for their survival and are practically absent in areas with less than 20% forest cover (SANTOS *et al*., 2019). Additionally, the presence of large open areas such as abandoned pasture lands has a detrimental effect on them (FALCONI *et al.*, 2015; SANTOS *et al.*, 2019). Since they are highly adapted and at the same time, restricted to the arboreal environment, a very high energy expenditure is required to cross these open areas and doing so exposes them to opportunistic predation events (PEERY; PAULI, 2014; VAUGHAN *et al.*, 2007). Additionally, they are very sensitive to climatic conditions, especially to changes in temperature, since their low metabolic rate causes their body temperature to vary according to the environment (CHIARELLO, 1998a; GINÉ *et al.*, 2015).

B. torquatus has a restricted and discontinuous distribution in the Atlantic Coast forest, (HIRSCH; CHIARELLO, 2012; SANTOS *et al.*, 2019), inhabiting fragments in four Brazilian states—Sergipe, Bahia, Espírito Santo, and Rio de Janeiro (HIRSCH; CHIARELLO, 2012; SANTOS *et al.*, 2019). Overall, populations of *B. torquatus* are genetically structured, with northern lineages (Sergipe and Bahia) being divergent from southern ones (Espírito Santo and Rio de Janeiro) to the point of being considered two distincts Evolutionary Significant Units (ESUs) (SCHETINO; COIMBRA; SANTOS, 2017). This diversification occurred during the Miocene-Pliocene transition, probably as a result of climate events in Atlantic Forest (SCHETINO; COIMBRA; SANTOS, 2017), and the current natural boundaries between the two lineages is located in northern Espírito Santo (from the limit with Bahia, to the north of Rio Doce). Consequently, it is extremely important to treat these two lineages as if they were different species (MOREIRA *et al.*, 2014; SCHETINO; COIMBRA; SANTOS, 2017).

Species Distribution Models (SDM) are an important tool given its capacity for predicting areas where the species in question is likely to be found (ELITH; LEATHWICK, 2009). Through occurrence data and environmental variables, this tool allows researchers to understand the relationship between the distribution of a given species and the environmental conditions, and thus to map environmentally suitable areas for the species (FERRAZ *et al.*, 2012). The approach has been widely used to identify priority areas for species conservation (CARRASCO *et al.*, 2020; PORTUGAL *et al.*, 2019; RODRIGUES *et al.*, 2004), define areas for regeneration through ecological corridors (MORATO *et al.*, 2014), predict potential hybridization zones between native and invasive species (MORAES *et al.*, 2019), and identify possible effects of habitat regeneration on species conservation (ANGELIERI *et al.*, 2016), among other uses.

Climatic stability and large forest areas act positively for the occurrence of *B. torquatus* (CHIARELLO 1998a; GINÉ *et al.*, 2015; MOREIRA *et al.*, 2014; SANTOS *et al.*, 2019), yet, it is uncertain how climate and landscape changes will interact in the future. Using the Species Distribution Models (SDM) and considering the two evolutionary units, this novel study aimed to 1) Evaluate the environmental suitability for *B. torquatus* throughout its distribution; 2) Assess environmental suitability in the future, using natural forest regeneration and climate change scenarios; 3) Analyze the resulting scenarios - present and future - in accordance with the Brazilian environmental legislation. Thus, we evaluated whether suitable areas are legally protected and the likely gains from suitable areas will be protected in the future.

2. Material and Methods

2.1 Study area

The Atlantic Forest covers part of the Brazilian east coast, extending to more inland areas in its southern distribution (MUYLAERT *et al.*, 2018). Throughout its extent, the biome encompasses different vegetation types, and the ombrophilous formations - preferred by *B.torquatus* - are located near coastal areas and in the eastern slope of Serra do Mar (OLIVEIRA-FILHO; FONTES, 2000). We delimited the study area using the WWF terrestrial ecoregions database (OLSON *et al.*, 2001), selecting only the vegetation types present in the current known distribution of *B.torquatus* (HIRSCH; CHIARELLO, 2012). We also included ecoregions present in the most northerly areas of ecoregions, comprising the states of Pernambuco (PE), Paraiba (PB), and Rio Grande do Norte (RN, Fig. 1). Such coverage is justified by the fact that there are reports of the species in such areas, although this has never been confirmed (HIRSCH; CHIARELLO, 2012). The defined area is 237,935 km², encompassing coastal areas in eight states and consisting mainly of perennial vegetation, sandbanks, and mangroves (Fig. 1).

2.2 Modeling framework

In this study, we opted to model current and future suitable areas separately for each of the Evolutionary Significative Units (ESU) of *B. torquatus* (SCHETINO; COIMBRA; SANTOS, 2017). We used ESU01 and ESU02 to refer to the two modeled areas (Fig. 1): ESU01 corresponding to the northern population ,located in Sergipe and Bahia, and ESU02 to the southern population, present in Espírito Santo and Rio de Janeiro (SCHETINO; COIMBRA; SANTOS, 2017).

First, we modelled the current scenario, using current climate data and current landscape data. Then, we modeled the future environmental suitability surfaces in three scenarios: 1) Scenario 01, Business as Usual (BAU), projected future climate, but without changes in landscape. In this case we analyzed the losses/gains of suitable areas only from the perspective of climate change. The other two scenarios correspond to the analysis of losses/gains of suitable areas from the perspective of climate change and of regeneration scenarios: 2) Scenario 02, less optimistic, projected future climate and changes in landscape, with a small rate of regeneration, only enough to maintain the species, i.e., 35% of forest cover, a threshold level of forest cover we detected previsously (Santos et al., 2019); and 3) Scenario 03, more optimistic, projected future climate and changes in landscape with high rate of regeneration, beyond the minimum amount to maintain the species. We used the same variables for present and for future scenarios.

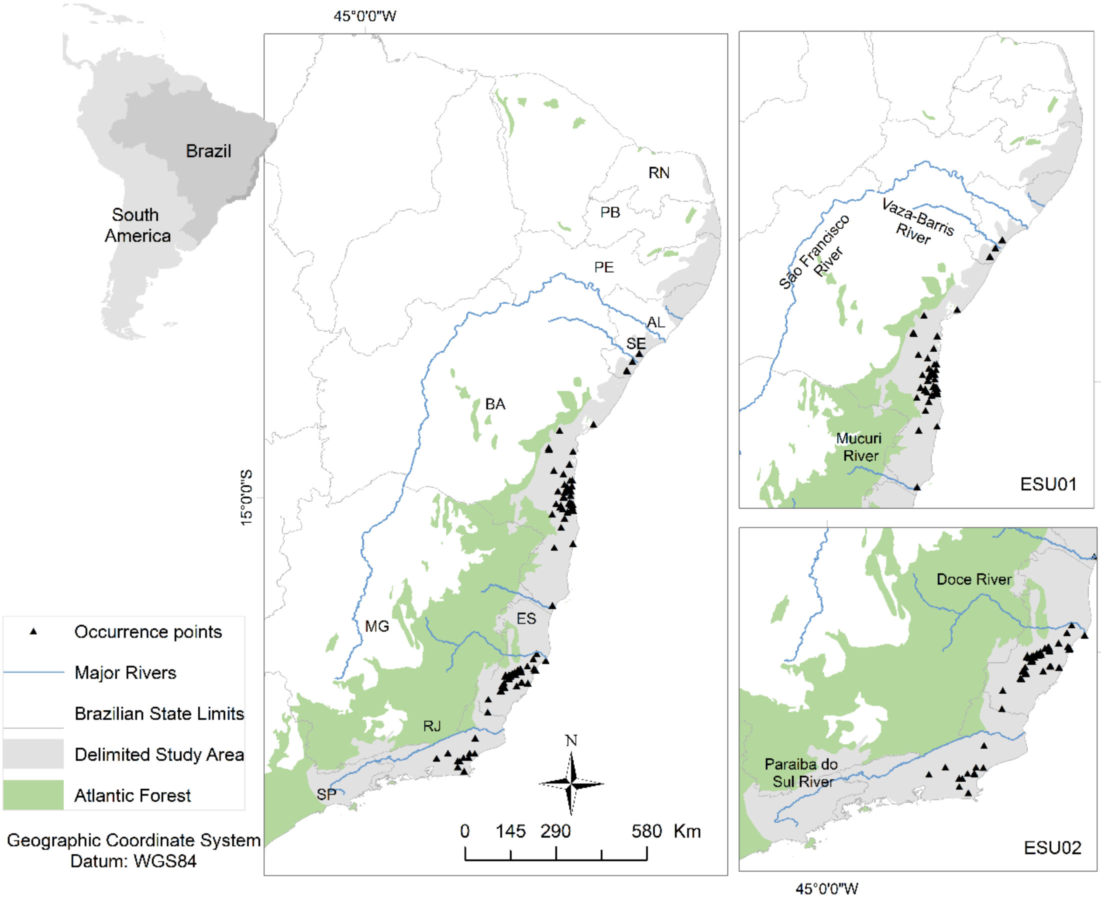


Fig. 1 Study area delimitated by WWF Ecorregions (Olson et al., 2001) and distribution of occurrence points in each Evolutionary Significant Units (ESU).

2.3 Occurrence points and sampling bias

To construct the habitat suitability models we compiled *B. torquatus* occurrence data available from Neotropical Xenarthrans data papers (SANTOS *et al*., 2019). This database is a vast compilation of data from various sources and researchers, including data that were previously unknown and inaccessible, totaling 638 records. Subsequently, we filtered all occurrence points in five steps. First, all points with coordinate accuracy above 100 meters were eliminated. The data paper included the information about coordinate precision, allowing us select only location points, and not locality. Second, all points related to apprehension, interview, and roadkill were eliminated, since these are often not representative of the real location of the species and are often inaccurate. Third, only data obtained from

2009 to present were selected, to be temporally consistent with the environmental data used. Fourth, duplicate points were eliminated, using the program RStudio 3.5.1 (R CORE TEAM, 2018), *vegan* package (Okansen et al., 2007). Fifth, we maintain all points with a minimum distance of 500 m to avoid spatial correlation (SANTOS, *et al.*, 2016, 2019). At the end, a database with 174 points was generated, consisting of 94 points from ESU01 and 70 points from ESU02 (Fig. 01). Finally, we developed a sampling probability surface, called bias grid, to reduce the sampling bias in areas more intensely sampled than others (PHILLIPS *et al.*, 2009) by decreasing the weight of these locations. The bias grid was created by calculating the Gaussian Kernel density of the sampling locations with a distance of 30 km. This value best represents the two large clusters of sampling points - in the south of Bahia and in the mountain region of Espirito Santo.

2.4 Environmental variables and future scenarios

We obtained the bioclimatic data through the WorldClim data base (WordClim V.1) and elevation data through USGS (United States Geological Service) (Table A.1). Since the bioclimatic variables are generally correlated with each other, a factor analysis with maximum variation rotation was performed, separately for each ESU, to check for multicollinearity. We selected only 2 bioclimatic variables for the ESU: Precipitation of Wettest Month (Bio13) and Precipitation Seasonality (Bio15) for ESU01 and Precipitation of Driest Month (Bio14) and Temperature Seasonality (Bio04), for ESU02. For future climate scenarios, we selected the bioclimatic variables from two Representative Concentration Pathways (RCPs), related to different scenarios of greenhouse gas emissions for 2050. The RCP 4.5 represent the less optimistic scenario, and RCP 8.5 represents the more pessimistic climate scenario (IPCC, 2014). For each RCP, we considered three Global Climate Model (GCM) – GCMS4, HadGEM2-ES and MIROC-ESM. These models have performed very well in other studies of primates in the Atlantic Forest (GOUVEIA *et al.*, 2016a).

The two landscape variables chosen for modeling was forest cover and pasture cover, which are important predictors for the presence of *B. torquatus* (SANTOS, PALOMA MARQUES *et al.*, 2019). We used the spatial data available from The Brazilian Foundation for Sustainable Development (In Portuguese Fundação Brasileira para o Desenvolvimento Sustentável - FBDS) and the Laboratory of Processing Images and Geoprocessing (In Portuguese Laboratório de Processamento de Imagens e Geoprocessamento - LAPIG (Table A.1). The software GrassGis 7.4.4 (Grass, 2018) was used to perform all landscape analyses.

To create the regeneration scenarios, we used a map of pixels with values of natural regeneration potential in pastures areas, ranging from 0 to 100, where higher values represented greater potential for regeneration (NIEBUHR *et al.*, 2017). First, we calculated how much area would need to be regenerated to ensure the presence of *B. torquatus* in the delimited area, based on Santos *et al*., (2019a), which reported a critical threshold on habitat amount to *B.torquatus* presence: the occupancy probability start to decline in areas with less than 35% of forest cover. Currently, only 25.45% of the area for maned sloth in ESU01 is covered by the Atlantic Forest remnants, and 27.61% in ESU02. To guarantee future populations of the species, it would be necessary to restore 9.55% (11,794.67 km²) and 7.39% (8,455.20 km²), respectively, to reach 35% of forest cover. So, for each ESU, we selected the pixels necessary to reach this goal (Table 01).

Second, we selected the pixels in the regeneration map to create the different scenario – except for Scenario 01 (BAU). For Scenario 02, we selected all pixels with regeneration potential higher than 10 for ESU01 and selected all pixels with regeneration potential higher than 40 for ESU02 (Table 01). For Scenario 03, we selected all pixels with some regeneration potential for both ESUs (Table 1). The third step consisted of mosaicking the raster created with the current forest cover raster (Table A.1), creating forest cover maps for future scenarios. The reverse process was done with the pasture cover, in which we subtract from the current raster pasture areas that will be potentially regenerated, creating the future pasture cover maps. The fourth step was to calculate the percentage of forest and pasture in each pixel of 1km.

Table 1 Accumulated area of pixels in the regeneration map for both ESU (central and left column). The bold lines correspond to the minimum pixel values selected to create the Scenario 02 map.

Pixel Value	**Accumulated area (Km^2) of pixels - ESU01**	**Accumulated area (Km^2) of pixels - ESU02**
90	393.55	600.81
80	1227	1976.47
70	2041.61	3364.14
60	3210.95	5372.95
50	4600.42	7795
40	6226.5	**10606.72**
30	8007.82	13743.87
20	10382.57	17815.78
10	**13216.83**	22714.19
0	22800.23	39661.32

To rule out possible correlations between all selected variables, we performed a correlation analysis using a Pearson correlation matrix, for which the results were p> 0.7 indicating that none of the variables were correlated. For the modeling, the chosen environmental variables were all standardized to a spatial resolution of 0.0083 decimal degrees (approximately 1 km).

2.5 Species Distribution Models (SDM)

We use the Maximum Entropy algorithm to generate the distribution models through the Maxent 3.4.1 software (PHILLIPS; DUDI, 2008). Maxent is a modeling technique with high accuracy and better performance than other methods (MORAES *et al*., 2019; ROURA-PASCUAL *et al*., 2009). MaxEnt uses only presence points and background points – also namely as pseudo-absence points, environmental variables and sampling points to calculates an environmental suitability index, indicating where the species is most likely to occur, with values ranging from 0 to 1.

We calibrate the current and future models using boostrapping methods with 10 random partitions, in which 70% of the data set went for training and 30% went for testing. All models were generated with a convergence threshold of 1.0^{E-5} with 500 interactions and 10,000 background points. We use a Jackknife test to measure the relative importance of each variable in model performance. To evaluate the performance of resulting models, we calculate the Area Under the Curve (AUC) of the Receiving Operator Characteristic (ROC), in which values above 0.75 correspond with great discriminatory capacity between the generated models and random models.

The 20 final models (10 models for each ESU) for current (2 models) and future scenarios (18 models – 9 from each RCP) were converted into binary maps to discriminate between suitable and unsuitable maps, applying a threshold rule defined by the 10th percentile of training presence points. This threshold removes suitability values that are less than the 10% higher suitability values (MUKHERJEE *et al*., 2020). Binomial probability and omission error were also evaluated. We create consensus models to facilitate the presentation on the results, through the extension BioDinamica, from DinamicaEgo software (SOARES-

FILHO; RODRIGUES; COSTA, 2009). The results of each RCP are available in the supplementary material (Fig S1).

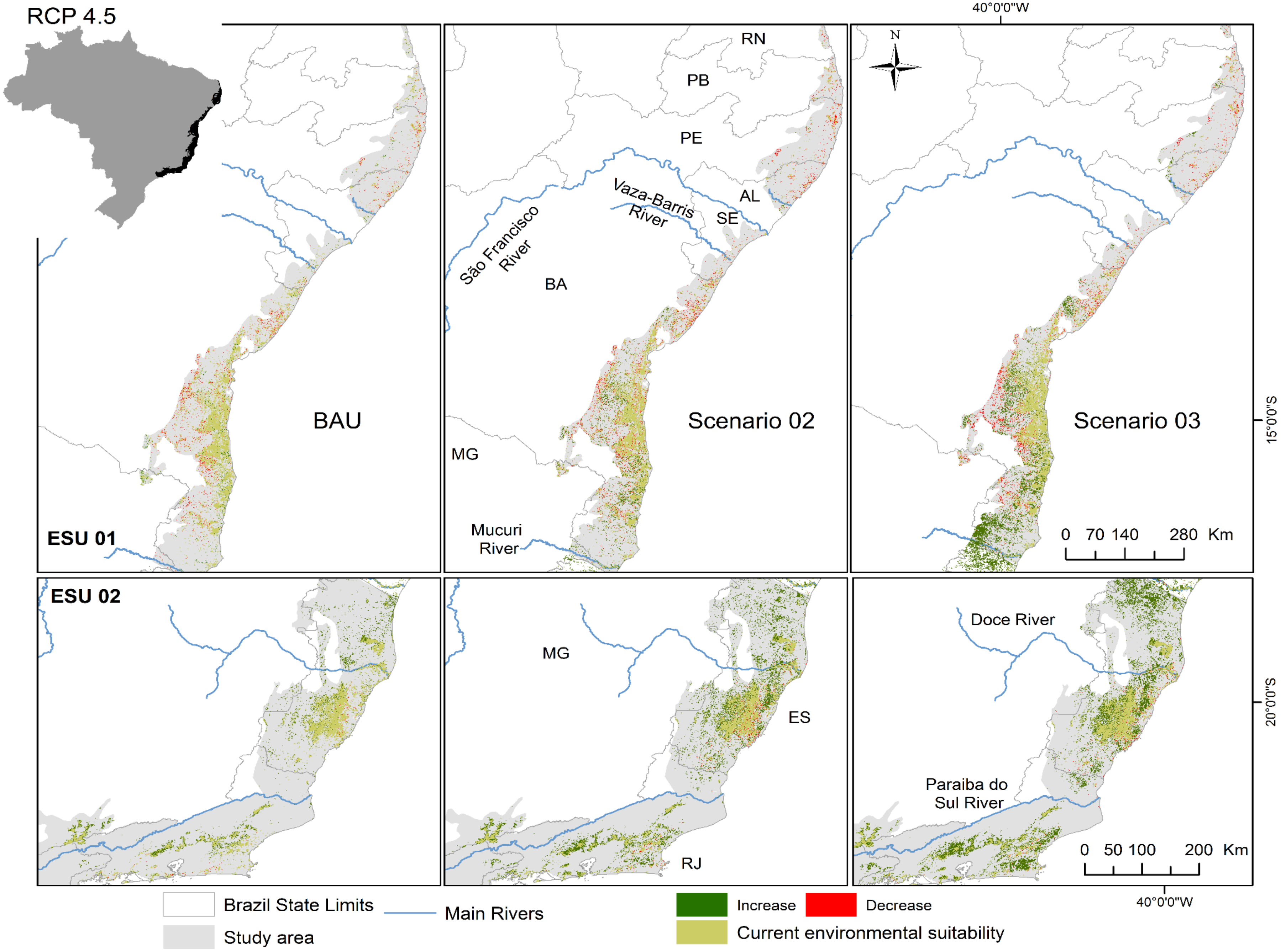
2.6 Suitable areas conservation

After applying the threshold in all resulting maps, we analyzed the different scenarios according to Brazilian Native Protection Conservation Law (LPVN. Law 12,727/2012) and to the National System of Conservation Units (In portuguese Sistema Nacional de Unidades de Conservação – SNUC. Law 9,985/2000). The LPVN established the Legal Reserve (RL, from Reserva Legal, in portuguese) of 20% of native vegetation in private properties and the Permanent Protection Area (APP from Área de Preservação Permanente, in Portuguese) focused on preservation of river springs, river banks, lakes, lagoons, hilltops and steep slopes. The SNUC establish two types of protected areas – Strictly protected areas and Protected areas of sustainable use. We obtained a GIS database available from different official sources to calculate the percentage of suitable areas in three different conservation categories: riparian APP, Strictly Protected Area and Protected Area of Sustainable Use (Table A.1).

3. Results

All resulting models had good discriminatory power according to AUC values, ranging from 0.8774 to 0.9613 (Table A.2). The current model predicts that 29,886.07 km² - only 4.15% of the study area – are suitable for *B.torquatus*. ESU01 was found to have higher cover of suitable areas (17.71 % or - 21,872.38 km²) then ESU02 (7.0% or- 8,013.69 km²). Two areas of the range of *B. torquatus* stand out for their high suitability: South Bahia and Center-South Espírito Santo (Fig. 2).

In future scenarios, both Esu01 and ESU02 show differences in future land cover changes (Table 02, Fig. 02). The ESU01 would experience a loss of suitable areas, even in the regeneration scenarios, mainly further inland and more northern areas (Table 02; Fig. 02). In the BAU scenario, the suitable areas would decrease more abruptly, reaching 4033.02 km² (4.0%) in losses by 2050 (Table 02). The loss would be subtler in Scenario 02, and in Scenario 03, a stability in the suitable areas would take place only in RCP 4.5 (Table 2). On the other hand, ESU02 would experience an increase in the amount of suitable areas, including in the scenario without regeneration (Table 2; Fig 02).


RCP 4.5
40°0'0"W
N
RN
PB
PE
AL
SE
Vaza-Barris River
São Francisco River
BA
BAU
Scenario 02
Scenario 03
15°0'0"S
MG
Mucuri River
ESU 01
0 70 140 280 Km
ESU 02
MG
ES
RJ
Doce River
Paraiba do Sul River
20°0'0"S
0 50 100 200 Km
40°0'0"W
Brazil State Limits
Study area
Main Rivers
Increase
Decrease
Current environmental suitability

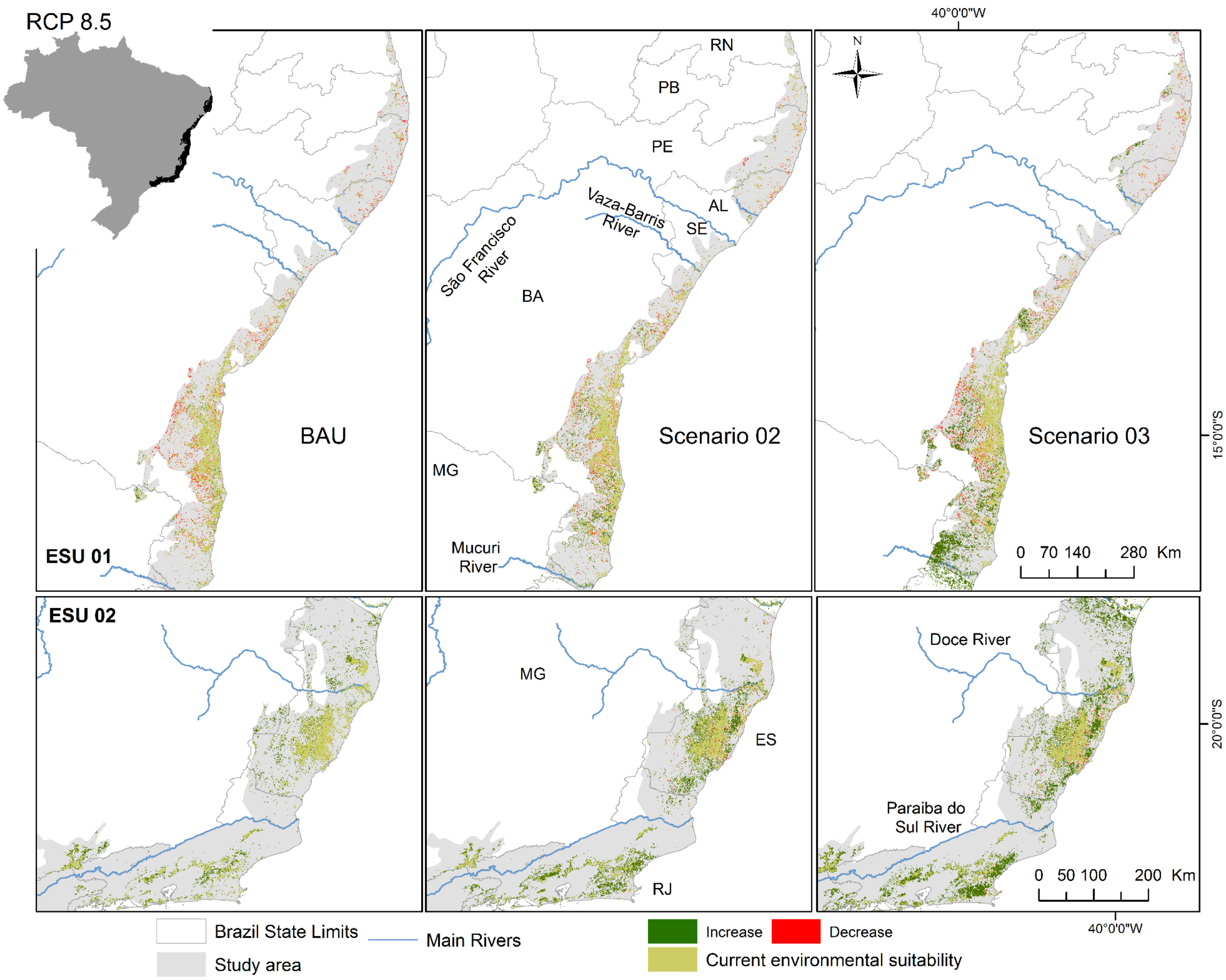

RCP 8.5
40°0'0"W
RN
PB
PE
AL
SE
Vaza-Barris River
São Francisco River
BA
MG
Mucuri River
BAU
Scenario 02
Scenario 03
ESU 01
ESU 02
N
0 70 140 280 Km
15°0'0"S
MG
ES
RJ
Doce River
Paraiba do Sul River
20°0'0"S
0 50 100 200 Km
40°0'0"W
Brazil State Limits
Study area
Main Rivers
Increase
Decrease
Current environmental suitability

Fig. 02 Increase and decrease of suitable areas in relation to current environmental suitability for both populations of *Bradypus torquatus*, considering regeneration scenarios and climate changes. BAU – Business As Usual; RN – Rio Grande do Norte; PB – Paraíba; PE – Pernambuco; AL – Alagoas; SE – Sergipe’; BA – Bahia; MG – Minas Gerais; ES – Espírito Santo; RJ – Rio de Janeiro.

Table 02 Suitable habitat in km² for the two populations, in the different scenarios. S01 – Scenario 01 (BAU), S02 - Scenario 02, S03 - Scenario 03. 45 and 85 – RCP 4.5 and 8.5, respectively

Scenario	ESU01	ESU02	Total area
Current	21872.38	8013.69	29886.07
S01-45	16939.36	9450.87	26390.23
S01-85	16130.52	10366.02	26496.53
S02-45	18595.45	12525.23	31120.68
S02-85	19382.81	13002.29	32385.10
S03-45	22030.83	14055.82	36086.65
S03-85	21115.40	14270.71	35386.11

According to the Jackknife test, the environmental parameter with the highest influence on environmental suitability was forest cover for ESU01 (Fig.3), which positively influenced the suitability (Fig.04). However, ESU02 showed a different pattern: the forest cover was only important in scenarios without regeneration (Fig.3). In both regeneration scenarios, Bio 04 (Temperature Seasonality) and pasture cover had more influence on environmental suitability.

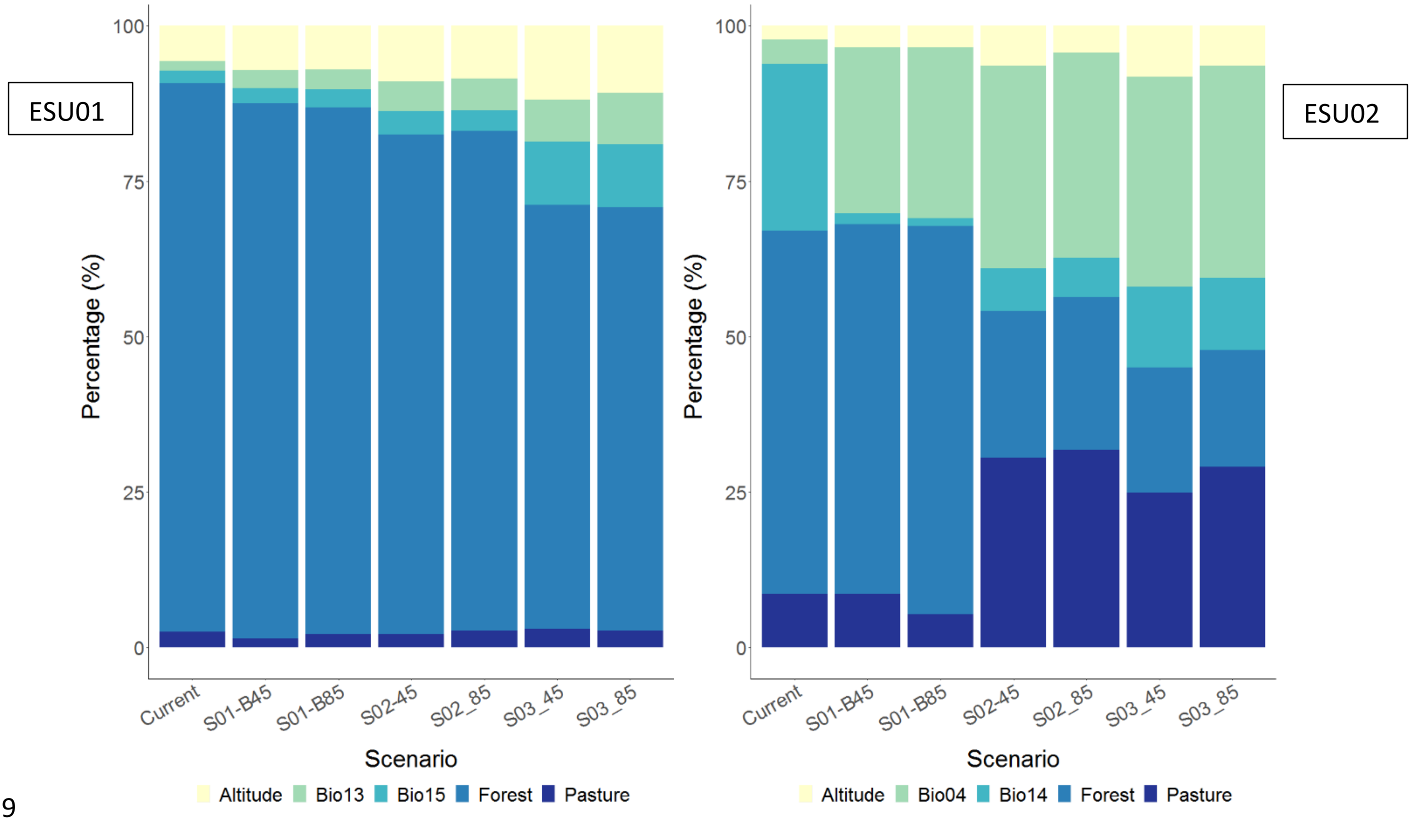


Fig. 03 Results in percentage for the Jackknife test for variable of environmental variables in the development of Maxent model.

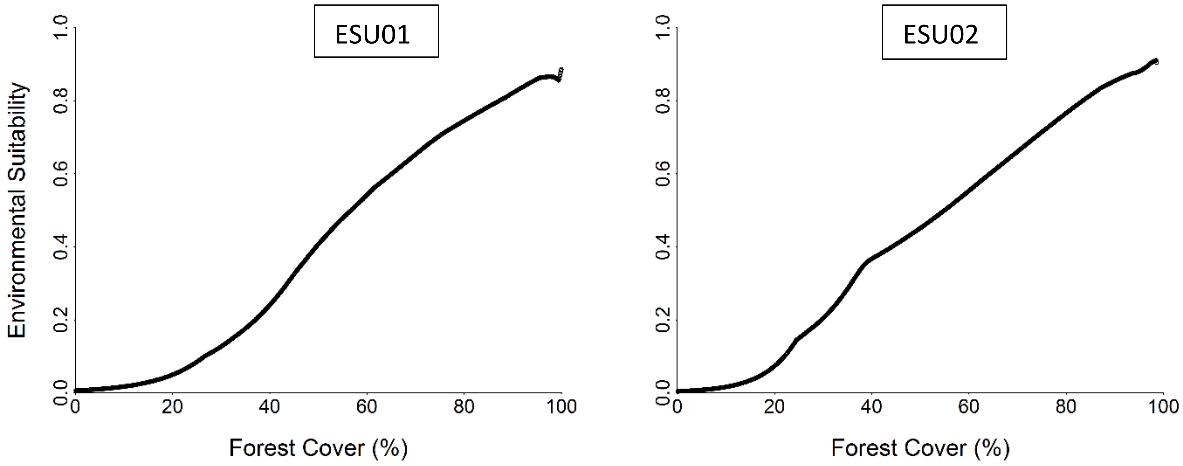


Fig. 04 Response curves of the most important variable and the environmental suitability.

Currently, most part of these suitable areas in both ESUs are excluded from any legal protection (ESU01 – 65.03% and ESU02 – 56%; Fig.5). Among the protected regions, areas of Sustainable use protection encompass more suitable areas in ESU01 (21.4%), followed by APP (7.27%) and Strictly protected areas (6.30%). For ESU02, suitable areas are present almost in same proportion in the three conservation categories (15.32%, 14.44%, and 14.25, respectively - Fig.5). The same trend for both ESUs remains throughout the future scenarios, with the majority of the suitable areas remaining unprotected (Fig.5).

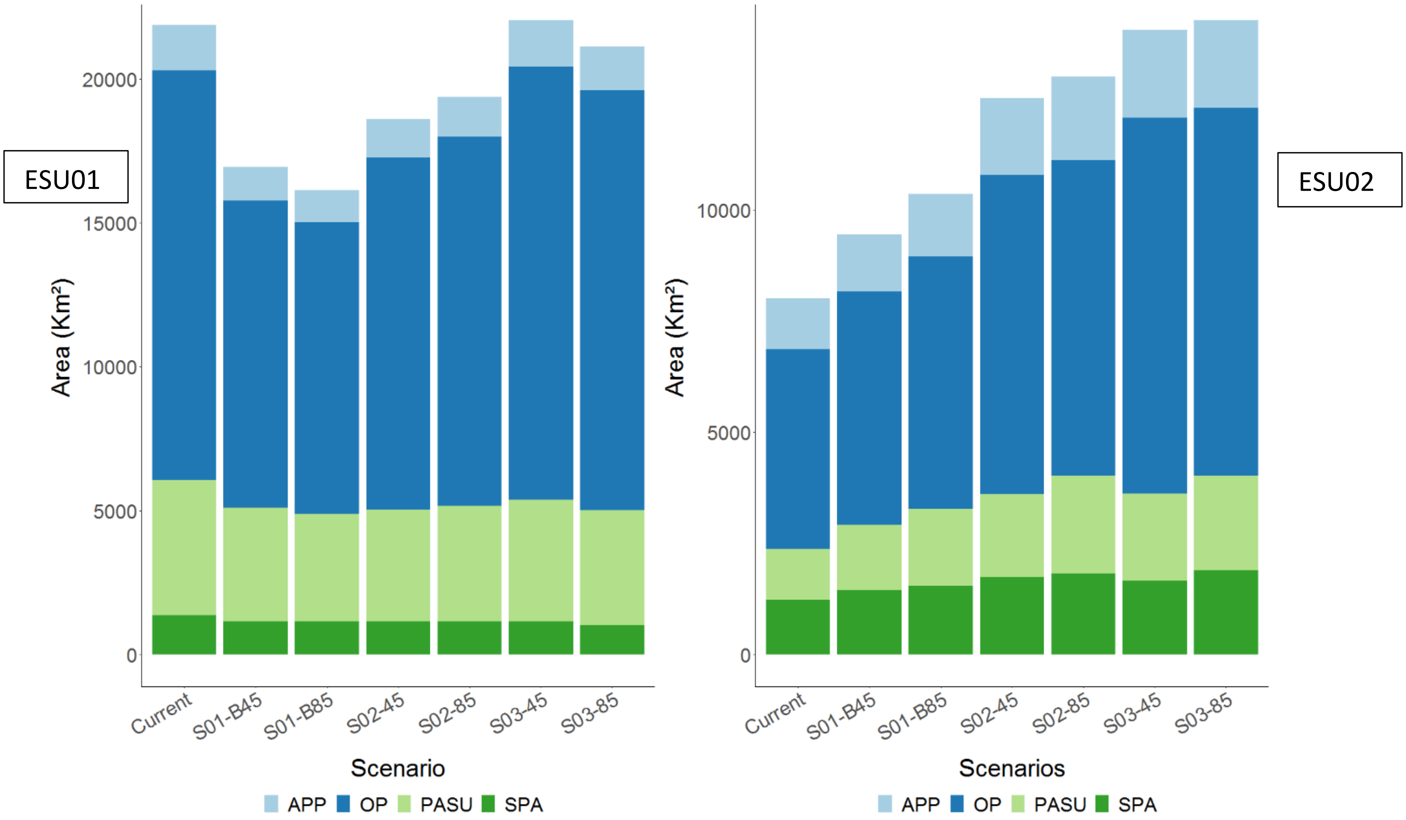


Fig. 5 Distribution of Suitable Areas in different conservation categories, according to conservation Categories, where: APP - Permanent Protection Areas; PASU – Protected Areas of Sustainable Use; SPA – Strictly Protected Areas/ OP – Outside Protected Areas.

4. Discussion

4.1 Overview of environmental Suitability models

The strong influence of climate change on the species distribution and the size of suitable areas is undeniable (GOUVEIA *et al.*, 2016b; STRUEBIG *et al.*, 2015). However, as we demonstrate here, and in accordance with other works (PREVEDELLO *et al.*, 2019; SILVÉRIO *et al.*, 2015), forest regeneration can mitigate the negative influence of climate change. We also highlight the importance of considering the genetic structure of species in ecological analyses. Genetically distinct populations of the same species present some particularities and distinct relations within the inhabited environment. Additionally, the inclusion of other variables besides climate data (e.g. landscape variables) allowed us to draw different conclusions from what was previously published (Moreira et al., 2014).

South Bahia and Center-South of Espírito Santo represents two important strongholds for *B.torquatus* (Fig 02). Both locations present well-preserved forest cover and include important protected areas, such as Una Biological Reserve and UNA Wildlife Refuge (BA) and Augusto Ruscchi Biological Reserve (ES). Our models correctly predict the current low environmental suitability already indicated by gaps in the distribution of *B. torquatus*, in North Espírito Santo and North Rio de Janeiro (Fig.2). These areas present a low forest cover, which reduces the environmental suitability for the species. Yet, two large blocks of forest in the distribution gap between Bahia and Espírito Santo have been classified as suitable, which leads us to believe the existence of other undetected influences. Other studies highlight past epirogenic and climatic events which resulted in forest shrinkage, fragmentation and vegetation change (SCHETINO; COIMBRA; SANTOS, 2017; VASCONCELOS *et al.*, 1992). This gap region is distinct from the rest of the ombrophilous Atlantic Forest, with high seasonality and the presence of a semi-deciduous forest (JESUS;

ROLIM, 2005). Similarly, previous studies carried out in North of Rio de Janeiro state highlights the low tree diversity of the semi-deciduous forests existing there (OLIVEIRA-FILHO; FONTES, 2000), linked to a strongly seasonal climate (HIRSCH; CHIARELLO, 2012; OLIVEIRA-FILHO *et al.*, 2005), which likely acts as a limiting factor for the presence of strictly folivorous species.

The northernmost part of *B. torquatus*' range, the regions of Pernambuco (PE), Paraiba (PB) and Rio Grande do Norte (RN - Fig. 02), present low environmental suitability. Previous research indicates similar result (MOREIRA *et al.*, 2014), evidencing the current absence of the species in the region. In contrast, Sergipe (SE), which represent the known northern limit of *B. torquatus'* range, still presents important though isolated areas suitable for the species, especially near the border of this state with Bahia (Fig. 2, Fig. S1). These populations deserve special attention; since the confirmation of this species in the region in 2009 (CHAGAS *et al.*, 2009), only one unpublished study has been conducted on this population (SANTOS, P.M.; BOCCHIGLIERI; *et al.*, 2019). Thus, several ecological aspects remain unknow. Furthermore, the genetics of this population have not yet been studied (SCHETINO; COIMBRA; SANTOS, 2017), and it has not been included in any national conservation plan.

4.2 Present and future scenarios

The ESU01 concentrates large and continuous suitable areas for *B. torquatus*, with a stability trend only in the most positive scenarios (Table 02). Additionally, most current and future suitable areas in ESU01 represent one of the most climatically stable regions of the Atlantic Forest (CARNAVAL *et al.*, 2009; SOBRAL-SOUZA *et al.*, 2018). Overall, the Atlantic forest presents an increase in precipitation seasonality from east to west, and also from south to north (OLIVEIRA-FILHO; FONTES, 2000), and this trend will become stronger with climate changes (IPCC, 2018). The increase of precipitation seasonality and the decrease in precipitation of the wettest month, combined with a low forest cover, might explain why the environmental suitability declined mainly further inland and in northern areas - more vulnerable to climate changes (CARNAVAL *et al*., 2009). Fluctuations in the precipitation regimes, may affect the production of young leaves, a preferred food item that becomes more abundant during the wet season (CHIARELLO, 1998b).

The BAU scenario – which represents the climate changes effects without the forest regeneration - presents a sharp decrease in suitable areas. This trend decreased in the less optimist scenario (Scenario 02 - Fig 02; Table 02), ratifying the importance of forest regeneration in mitigating the effects of climate change. Even though, the decrease in suitable areas in practically all scenarios (Scenario 02 – Fig 02, Table 02) lights a warning for the species conservation, since the region was one of the most deforested between 2017 and 2018, counteracting the national trend of decreasing and stabilizing deforestation in the Atlantic Forest (FUNDAÇÃO SOS MATA ATLÂNTICA, 2018).

In the ESU02 region, the environmental suitability depends on other factors, besides the percentage of forest cover, such as the presence of pasture and climate conditions. A slight improvement in climatic conditions and a large increase in forest cover may result in a continuous increase on suitable areas, even in the BAU scenario (Fig 2, Table 02). The southeast Atlantic Forest is considered climatically unstable (CARNAVAL *et al.*, 2009), presenting a strong seasonality in precipitation and in temperature throughout the year (OLIVERA - FILHO; FONTES, 2000). With global warming, the temperature seasonality and the precipitation of the driest month tends to decrease (Table S3). More constant temperatures might benefits the species, since their body temperature varies with the environment and activity decreases during cold periods (CHIARELLO, 1998a; GINÉ *et al.*, 2015). Differently, the decrease of precipitation of the driest month can be harmful to the species, since it may exacerbate water deficit during the driest months, affecting leaf production in the dry season (LIEBERMAN; LIEBERMAN, 1984; REICH, 1995). The maned sloths from ESU02 are able to find and consume young leaves throughout the year (CHIARELLO, 1998b), despite the seasonal variation that is typical of this region today, but this flexibility might be compromised if precipitation seasonaly increases. As we highlited above, the two distribution gaps of this species have stronger seasonality in precipitation than non-gap areas.

Regarding the forest remnants, the increase in suitable areas is concentrated in specific locations, around the largest forest areas (Fig. 02). The region englobes a few large forest patches, as well as regions with medium-sized fragments, that are functionally connected (SANTOS; JÚNIOR; EUGENIO, 2012; SANTOS *et al.*, 2016), and also a high incidence of pastures. This combination creates ideal conditions for increasing forest cover, since larger fragments encompass a greater diversity of species – including important animals seed dispersal (WUNDERLE, 1997) - and therefore, their matrices are more exposed to seed rain (CHAZDON, 2012; CROUZEILLES *et al.*, 2016; TAMBOSI *et al.*, 2014). Additionally, the region experiment lower rates of habitat loss, presenting the lowest deforestation rate in the last 30 years (FUNDAÇÃO SOS MATA ATLÂNTICA, 2018).

4.3 Conservation Status of Suitable areas

In both ESUs, the percentage of suitable areas legally protected in the three categories we analyzed is consistently low. Part of this unprotected area is somewhat protected by the Atlantic Forest Law (Law 11. 428/2006), which prohibits the suppression of primary and late secondary forest areas, except in rare cases, in which environmental compensation is given. However, it allows the suppression of early secondary areas and of the initial stage, threatening, for example, the incidence of the natural regeneration of an area

(VARJABEDIAN, 2010). Thus, it`s quite necessary to guarantee the conservation of these areas, in order to ensure a substantial increase in forest cover, and consequently the environmental suitability for several forest species endemic to the Atlantic Forest.

The other areas lying outside of the aforementioned conservation categories may belong to areas of Legal Reserves. According to LPVN, Legal Reserves is an instrument for preserving areas of natural vegetation in private areas, and in the Atlantic Forest this area occupies 20% of private property. The Legal Reserves system, however, has been constantly threatened with the argument that it is necessary to increase agricultural production areas (METZGER *et al.*, 2019), and its presence in the future is unknown. Legal Reserves have been neglected since the approval of the LPVN in 2012, which ruled that APP areas also must enter into the calculation of the RL areas. This was, in addition to forgiving the debt of small landowners who deforested their RL areas before 2008, a decision that cost the regeneration of thousands of hectares (BRANCALION *et al.*, 2016; SOARES-FILHO *et al.*, 2014). Legal Reserves have fundamental ecological roles, including improving regional and global climate regulation (METZGER *et al.*, 2019). They compose the landscape and along with APPs and can increase the area of regional forest, facilitating the flow of organisms between protected areas and maintaining the genetic viability of populations (METZGER *et al.*, 2019; PADOVEZI *et al.*, 2018).

5. Conclusions

Our models evaluate the environmental suitability for *B. torquatus*, which does not necessarily indicate that the species is currently present in the area. This approach is highly useful for conservation and management purposes (MUKHERJEE *et al.*, 2020; PORTUGAL *et al.*, 2019; PRÉAU *et al.*, 2020), and in particular, helps to identify and prioritize areas for reintroduction (DANKS; KLEIN, 2002; MARTÍNEZ-MEYER *et al.*, 2006; PANT *et al.*, 2020; PETERSON, 2006) , and to identify areas to create potential wildlife corridors to link suitable yet noncontiguous areas (LIU *et al.*, 2018; MORATO *et al.*, 2014).

Natural regeneration is a reality in Atlantic Forest, and as we show here, it can guarantee a decrease in local effects of climate change effects on environmental suitability for a forest dependent species. The majority of pasture lands are economically unproductive (STRASSBURG *et al.*, 2014), and therefore present an opportunity for forest recovery (LATAWIEC *et al.*, 2015). Our models will contribute to several conservation actions for *B. torquatus* and are especially useful for our different analyses for the two ESUs. Even though its conservation status is threatened, mainly due to habitat loss, there remain adequate areas to sustain viable populations.

In this sense, it is extremely important to ensure the maintenance of areas that are already protected, mainly those in South Bahia, Espírito Santo and Rio de Janeiro, by decreasing external pressures. Promoting compliance with environmental law in the entire analyzed area will also be necessary to preserve APPs and Legal Reserves. Lastly, the natural regeneration of abandoned areas should be encouraged, especially in the more northerly areas (Sergipe and North Bahia) that currently contain suitable but isolated areas. In this case, it is also necessary to collaborate for their protection, to minimize the suppression of regrowth, and to monitor the forests' successional stages, interfering when necessary to increase its quality.

Acknowledgements

PMS research grants from The Rufford Foundation (21498-1) and scholarship from CNPq (141571/2017-9) and CAPES (88881.188493/2018-01). MCR thanks FAPESP (process #2013/50421-2), CNPq (processes # 312045/2013-1; #312292/2016-3) and PROCAD/CAPES (project # 88881.068425/2014-01) for their financial support. AGC has a

Research Productivity Grant from CNPq (303101/2017-2). APP research support from FAPEMIG and CAPES.

References

ANGELIERI, Cintia Camila Silva et al. Using species distribution models to predict potential landscape restoration effects on puma conservation. PLoS ONE, v. 11, n. 1, p. 1–18, 2016.

BANKS-LEITE, Cristina et al. Using ecological thresholds to evaluate the costs and benefits of set-asides in a biodiversity hotspot. Science, v. 345, n. 6200, p. 1041–1045, 2014.

BAPTISTA, Sandra R.; RUDEL, Thomas K. A re-emerging Atlantic forest? Urbanization, industrialization and the forest transition in Santa Catarina, southern Brazil. Environmental Conservation, v. 33, n. 03, p. 195–202, 19 jul. 2006. Disponível em: <http://www.journals.cambridge.org/abstract_S0376892906003134>. Acesso em: 8 jan. 2015.

BELLARD, Céline et al. Vulnerability of biodiversity hotspots to global change. Global Ecology and Biogeography, v. 23, n. 12, p. 1376–1386, 2014.

BOWERS, John. Policy instruments for the conservation of remnant vegetation on private land. Biological Conservation, v. 87, n. 3, p. 327–339, 1999.

BRANCALION, Pedro H S et al. A critical analysis of the Native Vegetation Protection Law of Brazil (2012): Updates and ongoing initiatives. Natureza e Conservacao, n. 2012, p. 1–18, 2016.

CARNAVAL, Ana Carolina et al. Stability predicts genetic diversity in the Brazilian Atlantic forest hotspot. Science, v. 323, n. 5915, p. 785–789, 2009.

CARRASCO, Jesus et al. Selecting priority areas for the conservation of endemic trees species and their ecosystems in Madagascar considering both conservation value and vulnerability to human pressure. Biodiversity and Conservation, n. 0123456789, 2020. Disponível em: <https://doi.org/10.1007/s10531-020-01947-1>.

CASPERSEN, J. P. et al. Contributions of land-use history to carbon accumulation in U.S. Forests. Science, v. 290, n. 5494, p. 1148–1151, 2000.

CHAGAS, Renata Rocha Déda et al. New Records of Bradypus torquatus (Pilosa : Bradypodidae) from Southern Sergipe, Brazil. Edentata, v. 8, n. 10, p. 21–24, 2009.

CHAZDON, Robin. Regeneração de florestas tropicais. Bol. Mus. Para. Emílio Goeldi. Cienc. Nat, v. 7, n. 3, p. 195–218, 2012.

CHIARELLO, Adriano Garcia. Activity budgets and ranging patterns of the Atlantic forest maned sloth Bradypus torquatus (Xenarthra: Bradypodidae). Journal of Zoology, v. 246, n. 1, p. 1–10, set. 1998a. Disponível em: <http://doi.wiley.com/10.1111/j.1469-7998.1998.tb00126.x>.

CHIARELLO, Adriano Garcia. Diet of the Atlantic forest maned sloth Bradypus torquatus (Xenarthra : Bradypodidae). Journal of Zoology, v. 246, p. 11–19, 1998b.

CROUZEILLES, Renato et al. A global meta-Analysis on the ecological drivers of forest restoration success. Nature Communications, v. 7, n. May, p. 1–8, 2016.

DANKS, F. S.; KLEIN, D. R. Using GIS to predict potential wildlife habitat: A case study of muskoxen in northern Alaska. International Journal of Remote Sensing, v. 23, n. 21, p. 4611–4632, 2002.

DE REZENDE, Camila Linhares et al. Atlantic Forest spontaneous regeneration at landscape scale. Biodiversity and Conservation, v. 24, n. 9, p. 2255–2272, 2015.

ELITH, Jane; LEATHWICK, John R. Species Distribution Models: Ecological Explanation and Prediction Across Space and Time. Annual Review of Ecology, Evolution, and Systematics, v. 40, n. 1, p. 677–697, 2009.

FAHRIG, Lenore. Effects of Habitat Fragmentation on Biodiversity. Annual Review of Ecology, Evolution, and Systematics, v. 34, n. 1, p. 487–515, nov. 2003. Disponível em: <http://www.annualreviews.org/doi/abs/10.1146/annurev.ecolsys.34.011802.132419>. Acesso em: 9 jul. 2014.

FALCONI, Nereyda et al. The home range and multi-scale habitat selection of the threatened maned three-toed sloth (Bradypus torquatus). Mammalian Biology - Zeitschrift für Säugetierkunde, 2015. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504715000117>.

FERRAZ, Katia Maria Paschoaletto Micchi de Barros et al. Environmental suitability of a highly fragmented and heterogeneous landscape for forest bird species in south-eastern Brazil. Environmental Conservation, v. 39, n. 4, p. 316–324, 2012.

FUNDAÇÃO SOS MATA ATLÂNTICA. Relatório Anual 2018. . São Paulo: [s.n.], 2018. Disponível em: <https://www.sosma.org.br/wp-content/uploads/2019/11/RA_SOSMA_2018_DIGITAL.pdf>.

GILANI, Hammad et al. Under predicted climate change: Distribution and ecological niche modelling of six native tree species in Gilgit-Baltistan, Pakistan. Ecological Indicators, v. 111, n. January, p. 106049, 2020. Disponível em: <https://doi.org/10.1016/j.ecolind.2019.106049>.

GINÉ, Gastón Andrés Fernandez et al. Activity budget, pattern and rhythm of maned sloths (Bradypus torquatus): responses to variations in ambient temperature. Mammalian Biology,

v. 80, n. 6, p. 459–467, 2015. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504715000658>.

GOUVEIA, Sidney F. et al. Climate and land use changes will degrade the configuration of the landscape for titi monkeys in eastern Brazil. Global Change Biology, 2016a.

GOUVEIA, Sidney F. et al. Climate and land use changes will degrade the configuration of the landscape for titi monkeys in eastern Brazil. Global Change Biology, v. 22, n. 6, p. 2003–2012, 2016b.

HIRSCH, André; CHIARELLO, Adriano Garcia. The endangered maned sloth Bradypus torquatus of the Brazilian Atlantic forest: a review and update of geographical distribution and habitat preferences. Mammal Review, v. 42, n. 1, p. 35–54, 20 jan. 2012. Disponível em: <http://doi.wiley.com/10.1111/j.1365-2907.2011.00188.x>. Acesso em: 7 jan. 2015.

IPCC. Aquecimento Global de 1,5°C. Sumário para Formuladores de Políticas. IPCC, Geneva, Switzerland. Seneva: [s.n.], 2018.

JESUS, Rm; ROLIM, Sg. Fitossociologia da Mata Atlântica de tabuleiro. Boletim Técnico da Sociedade de Investigações: [S.l: s.n.], 2005

LAMB, David; ERSKINE, Peter D.; PARROTTA, John A. Restoration of degraded tropical forest landscapes. Supporting Online Material. Science (New York, N.Y.), v. 310, n. 5754, p. 1628–1632, 2005.

LATAWIEC, Agnieszka E. et al. Creating space for large-scale restoration in tropical agricultural landscapes. Frontiers in Ecology and the Environment, v. 13, n. 4, p. 211–218, 2015.

LIEBERMAN, Diana; LIEBERMAN, Milton. The Causes and Consequences of Synchronous Flushing in a Dry Tropical Forest. Biotropica, v. 16, n. 3, p. 193–201, 1984.

LIU, Canran et al. Identifying wildlife corridors for the restoration of regional habitat connectivity: A multispecies approach and comparison of resistance surfaces. PLoS ONE, v. 13, n. 11, p. 1–14, 2018.

MARTÍNEZ-MEYER, Enrique et al. Ecological niche modelling and prioritizing areas for species reintroductions. Oryx, v. 40, n. 4, p. 411–418, 2006.

METZGER, Jean Paul et al. Why Brazil needs its Legal Reserves. Perspectives in Ecology and Conservation, v. 17, n. 3, p. 91–103, 2019. Disponível em: <https://doi.org/10.1016/j.pecon.2019.07.002>.

MONTGOMERY, G G; SUNQUIST, M E. Habitat Selection and Use by Two-toed and Three-toed Sloths. In: MONTGOMERY, G G (Org.). . The Ecology of the arboreal folivores. 1. ed. Washington D.C: Smithsonian Institutio Press, 1978. p. 329–359.

MORAES, Andreia Magro et al. Predicting the potential hybridization zones between native and invasive marmosets within Neotropical biodiversity hotspots. Global Ecology and Conservation, v. 20, p. e00706, 2019. Disponível em: <https://doi.org/10.1016/j.gecco.2019.e00706>.

MORATO, Ronaldo Gonçalves et al. Identification of priority conservation areas and potential corridors for Jaguars in the Caatinga Biome, Brazil. PLoS ONE, v. 9, n. 4, 2014.

MOREIRA, Danielle De Oliveira et al. The Distributional Ecology of the Maned Sloth : Environmental Influences on Its Distribution and Gaps in Knowledge. PLoS ONE, v. 9, n. 10, p. 1–12, 2014.

MUKHERJEE, Tanoy et al. Past, Present and Future: Combining habitat suitability and future landcover simulation for long-term conservation management of Indian rhino.

Scientific Reports, v. 10, n. 1, p. 1–12, 2020. Disponível em: <http://dx.doi.org/10.1038/s41598-020-57547-0>.

MUYLAERT, R.L. et al. Uma Nota Sobre Os Limites Territoriais Da Mata Atlântica. Oecologia Australis, v. 22, n. 03, p. 302–311, 2018.

NAGY, Kenneth A.; MONTGOMERY, G Gene. Field Metabolic Rate , Water Flux , and Food Consumption in Three-Toed Sloths (Bradypus Variegatus). Journal of Mammalogy, v. 61, n. 3, p. 465–472, 1980. Disponível em: <http://www.jstor.org/stable/1379840>.

NAUGHTON-TREVES, Lisa; HOLLAND, Margaret Buck; BRANDON, Katrina. the Role of Protected Areas in Conserving Biodiversity and Sustaining Local Livelihoods. Annual Review of Environment and Resources, v. 30, n. 1, p. 219–252, 2005.

NIEBUHR, Bernardo B. S. et al. Modelagem da regeneração natural potencial da Mata Atlântica com base na estrutura da paisagem e movimentação da fauna frugívora. n. 19, p. 1–41, 2017.

OLIVEIRA-FILHO, Ary T. et al. Análise Florística Do Compartimento Arbóreo De Áreas De Floresta Atlântica Sensu Lato Na Região Das Bacias Do Leste (Bahia, Minas Gerais, Espírito Santo E Rio De Janeiro). Rodriguésia, v. 56, n. 87, p. 185–235, 2005.

OLIVEIRA-FILHO, Ary T.; FONTES, Marco Aurelio L. Patterns of Floristic Differentiation among Atlantic Forests in Southeastern Brazil and the Influence of Climate1. Biotropica, v. 32, n. 4b, p. 793–810, 2000. Disponível em: <http://doi.wiley.com/10.1111/j.1744-7429.2000.tb00619.x>.

OLSON, David M. et al. Terrestrial Ecoregions of the World: A New Map of Life on Earth. BioScience, v. 51, n. 11, p. 933, 2001.

PADOVEZI, AURELIO; BAZARIAN, SIMONE; CORRÊA, FÁBIO FERNANDES; GIORDANO, SAMUEL RIBEIRO; BENINI, RUBENS DE MIRANDA; RODRIGUES, RICARDO RIBEIRO; TOREZAN, JOSÉ MARCELO DOMINGUES; CHAZDON, Robin. A Reserva Legal que queremos para a Mata Atlântica. [S.l: s.n.], 2018. Disponível em: <https://www.pactomataatlantica.org.br/?lightbox=dataItem-joldsnqf>.

PANT, Gaurav et al. Role of Species Distribution Models in Biodiversity Conservation. Current Status of Researches in Biosciences, n. January, p. 507–515, 2020.

PEERY, M. Zachariah; PAULI, Jonathan N. Shade-grown cacao supports a self-sustaining population of two-toed but not three-toed sloths. Journal of Applied Ecology, v. 51, n. 1, p. 162–170, 20 fev. 2014. Disponível em: <http://doi.wiley.com/10.1111/1365-2664.12182>. Acesso em: 4 jan. 2015.

PETERSON, A. Townsend. Uses and Requirements of Ecological Niche Models and Related Distributional Models. Biodiversity Informatics, v. 3, n. 0, p. 59–72, 2006.

PHILLIPS, Steven J et al. Sample Selection Bias and Presence-Only Distribution Models : Implications for Background and Pseudo-Absence Data Stable URL : http://www.jstor.org/stable/27645958 REFERENCES Linked references are available on JSTOR for this article : Sample selection bia. Ecological Applications, v. 19, n. 1, p. 181–197, 2009.

PHILLIPS, Steven J; DUDI, Miroslav. Modeling of species distributions with Maxent: new extensions and a comprehensive evaluation. Ecography, v. 31, p. 161–175, 2008.

PORTUGAL, Marina Peres et al. Priority areas for jaguar Panthera onca conservation in the Cerrado. Oryx, 2019.

PRÉAU, Clémentine et al. Habitat patches for newts in the face of climate change: local scale assessment combining niche modelling and graph theory. Scientific Reports, v. 10, n. 1, p. 1–13, 2020.

PREVEDELLO, Jayme A. et al. Impacts of forestation and deforestation on local temperature across the globe. PLoS ONE, v. 14, n. 3, p. 1–18, 2019.

REICH, P. B. Phenology of tropical forests: patterns, causes, and consequences. Canadian Journal of Botany, v. 73, n. 2, p. 164–174, 1995.

REZENDE, Camila Linhares et al. From hotspot to hopespot: An opportunity for the Brazilian Atlantic Forest. Perspectives in Ecology and Conservation, 2018.

RIBEIRO, Milton Cezar et al. The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for conservation. Biological Conservation, v. 142, n. 6, p. 1141–1153, jun. 2009. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S0006320709000974>. Acesso em: 9 jul. 2014.

RODRIGUES, ANA S. L. et al. Global Gap Analysis: Priority Regions for Expanding the Global Protected-Area Network. BioScience, v. 54, n. 12, p. 1092, 2004.

RUDEL, Thomas K. et al. Forest transitions: towards a global understanding of land use change. Global Environmental Change, v. 15, n. 1, p. 23–31, abr. 2005. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S0959378004000809>. Acesso em: 9 jul. 2014.

RUDEL, Thomas K; BATES, Diane; MACHINGUIASHI, Rafael. A Tropical Forest Transition? Agricultural Change , in the Ecuadorian Amazon. Annals of the Association of American Geographers, v. 92, n. 1, p. 87–102, 2002.

SANTOS, Alexandre Rosa Dos; JÚNIOR, Hélio Carreço de Almeida; EUGENIO, Fernando Coelho. Evolução da Cobertura Florestal no Município de Santa Maria de Jetibá – ES

Evolution of Forest Fragmentation in the Municipality of Santa Maria de Jetiba – ES. Florestsa e Ambiente, v. 19, n. 3, p. 296–307, 2012.

SANTOS, P.M.; B., A.; et al. NEOTROPICAL XENARTHRANS: a data set of occurrence of xenarthran species in the Neotropics. Ecology, v. 100, n. 7, p. 1–4, 2019.

SANTOS, P.M.; BOCCHIGLIERI, A.; et al. NEOTROPICAL XENARTHRANS: a data set of occurrence of xenarthran species in the Neotropics. Ecology, v. 100, n. 7, 2019.

SANTOS, Paloma Marques et al. Living on the edge: Forest cover threshold effect on endangered maned sloth occurrence in Atlantic Forest. Biological Conservation, v. 240, p. 108264, dez. 2019. Disponível em: <https://linkinghub.elsevier.com/retrieve/pii/S0006320719301855>.

SANTOS, Paloma Marques et al. Local and landscape influences on the habitat occupancy of the endangered Maned Sloth Bradypus torquatus within fragmented landscapes. Mammalian Biology - Zeitschrift für Säugetierkunde, v. 81, p. 447–454, 2016. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504716300416>.

SCHETINO, Marco A.A.; COIMBRA, Raphael T.F.; SANTOS, Fabrício R. Time scaled phylogeography and demography of Bradypus torquatus (Pilosa: Bradypodidae). Global Ecology and Conservation, v. 11, p. 224–235, 2017. Disponível em: <http://dx.doi.org/10.1016/j.gecco.2017.07.002>.

SILVA, Lucas Goulart Da et al. Patch Size, Functional Isolation, Visibility and Matrix Permeability Influences Neotropical Primate Occurrence within Highly Fragmented Landscapes. Plos One, v. 10, n. 2, p. 1–20, 2015. Disponível em: <http://dx.plos.org/10.1371/journal.pone.0114025>.

SILVÉRIO, Divino V. et al. Agricultural expansion dominates climate changes in southeastern Amazonia: The overlooked non-GHG forcing. Environmental Research Letters, v. 10, n. 10, 2015.

SOARES-FILHO, Britaldo et al. Cracking Brazil ’ s Forest Code. Science, v. 344, n. April, p. 363–364, 2014.

SOARES-FILHO; RODRIGUES, Ho; COSTA, W. Modeling environmental dynamics with Dinamica EGO. Instituto de Geociências - Centro de Sensoriamento Remoto, n. October, p. 114, 2009. Disponível em: <https://www.researchgate.net/profile/Tao_Guo28/publication/282782423_Dinamica_EGO_guidebookpdf/links/561c711108aea80367243fdc.pdf>.

SOBRAL-SOUZA, Thadeu et al. Efficiency of protected areas in Amazon and Atlantic Forest conservation: A spatio-temporal view. Acta Oecologica, v. 87, n. February, p. 1–7, 2018.

STRASSBURG, Bernardo B.N. et al. When enough should be enough: Improving the use of current agricultural lands could meet production demands and spare natural habitats in Brazil. Global Environmental Change, v. 28, n. 1, p. 84–97, 2014. Disponível em: <http://dx.doi.org/10.1016/j.gloenvcha.2014.06.001>.

STRUEBIG, Matthew J. et al. Anticipated climate and land-cover changes reveal refuge areas for Borneo’s orang-utans. Global Change Biology, v. 21, n. 8, p. 2891–2904, 2015.

TAMBOSI, Leandro R. et al. A framework to optimize biodiversity restoration efforts based on habitat amount and landscape connectivity. Restoration Ecology, v. 22, n. 2, p. 169–177, 2014.

TEIXEIRA, Ana Maria G. et al. Modeling landscape dynamics in an Atlantic Rainforest region: Implications for conservation. Forest Ecology and Management, v. 257, n. 4, p. 1219–1230, 2009.

VARJABEDIAN, Roberto. Lei da Mata Atlântica: Retrocesso ambiental. Estudos Avancados, v. 24, n. 68, p. 147–160, 2010.

VASCONCELOS, Paulo M. et al. Age and duration of weathering by 40K-40Ar and 40Ar/39Ar analysis of potassium-manganese oxides. Science, v. 258, n. 5081, p. 451–455, 1992.

VAUGHAN, Christopher et al. Spatial ecology and conservation of two sloth species in a cacao landscape in limón, Costa Rica. Biodiversity and Conservation, v. 16, p. 2293–2310, 2007.

WUNDERLE, Joseph M. The role of animal seed dispersal in accelerating native forest regeneration on degraded tropical lands. Forest Ecology and Management, v. 99, n. 1–2, p. 223–235, 1997.

ZHANG, Zhixin et al. Future climate change will severely reduce habitat suitability of the Critically Endangered Chinese giant salamander. Freshwater Biology, n. July 2019, p. 1–10, 2020.

Appendix A. Supplementary data

Table S1 Charactericts of variables used to delineate environmental suitability for *Bradypus torquatus*.

Use	Variable	Description	Original Resolution	Year	Source	ESU 01	ESU 02
Environmental Suitability Models	Forest Cover Percentage	Forest Cover percentage in 1x1km pixel	5 x 5 m	2018	Brazilian Foundation for Sustainable Development (In Portuguese Fundação Brasileira para o Desenvolvimento Sustentável - FBDS) Source: https://www.fbds.org.br	X	X
	Pasture cover Percentage	Pasture Cover percentage in 1x1km pixel	30x30m	2015	Image Processing and Geoprocessing Lab (In portuguese: Laboratório Processamento de Imagens e Geoprocessamento - LAPIG). Source: www.pastagem.org	X	X
	Elevation	Global elevation data	30 arc-second (1x1km)	2004	NASA Shuttle Radar Topography Mission Source: https://www2.jpl.nasa.gov/srtm/	X	X
	Bioclimatic Variables	Bio 04 = Temperature Seasonality (standard deviation *100)	30 arc-second (1x1km)	2005	Worldclim global climate variables V1. Source: https://www.worldclim.org/		X

		Bio 13 = Precipitation of Wettest Month				X	
		Bio 14 = Precipitation of Driest Month					X
		Bio 15 = Precipitation Seasonality (Coefficient of Variation)				X	
Conservation Analyses	hydric APPs	Areas of water APPs, which include rivers, water springs, lakes, lagoons and artificial reservoirs	5 x 5 m	2018	Brazilian Foundation for Sustainable Development (In Portuguese Fundação Brasileira para o Desenvolvimento Sustentável - FBDS) Source: https://www.fbds.org.br	X	X
	Strictly Protected areas (SPA) and Protected Areas of Sustainable use (PASU)	Shapefile with the distribution of protected areas of integral conservation and sustainable use			Ministry of the Environment (In Portuguese: Minstério do Meio Ambiente - MMA). Source: http://mapas.mma.gov.br/i3geo/datadownload.htm	X	X

Table S2 AUC scores, test omission, and variable contribution for each scenario. All the scenarios, $p < 0.05$.

Scenarios	**Model Evaluation**				**Variable Contibution**				
ESU01	**Test AUC**	**AUC SD**	**10 percentil**	**Omission test**	**Altitude**	**Bio13**	**Bio15**	**Forest cover**	**Pasture cover**
Current Scenario	0.929	0.017	0.367	0.094	5.701	1.563	2.032	88.177	2.527
BAU_RCP45_CCSM4	0.913	0.020	0.408	0.206	4.387	1.241	4.885	88.103	1.385
BAU_RCP45_HadGCM2-ES	0.927	0.016	0.447	0.212	7.772	5.505	1.122	83.621	1.981
BAU_RCP45_MIROC-ESM	0.913	0.020	0.364	0.171	9.338	1.985	1.204	86.375	1.097
BAU_RCP85_CCSM4	0.910	0.021	0.467	0.282	7.186	1.375	5.133	83.575	2.730
BAU_RCP85_HadGCM2-ES	0.934	0.017	0.398	0.088	6.456	5.340	2.055	84.459	1.690
BAU_RCP85_MIROC-ESM	0.928	0.016	0.424	0.176	7.434	2.960	1.440	86.301	1.865
Scenario02_RCP45_CCSM4	0.898	0.024	0.411	0.212	7.036	2.540	6.047	81.776	2.601
Scenario02_RCP45_HadGCM2-ES	0.920	0.017	0.411	0.177	7.948	9.630	2.370	78.928	1.125
Scenario02_RCP45_MIROC-ESM	0.901	0.020	0.414	0.200	12.047	1.927	2.852	80.534	2.641
Scenario02_RCP85_CCSM4	0.918	0.021	0.419	0.135	7.271	1.090	5.797	82.929	2.914
Scenario02_RCP85_HadGCM2-ES	0.924	0.022	0.357	0.147	8.880	10.103	1.037	76.972	3.008
Scenario02_RCP85_MIROC-ESM	0.925	0.018	0.422	0.153	9.236	4.348	2.928	81.323	2.165
Scenario03_RCP45_CCSM4	0.911	0.024	0.409	0.124	12.919	3.580	15.051	65.247	3.203
Scenario03_RCP45_HadGCM2-ES	0.915	0.021	0.429	0.147	7.874	13.495	8.270	68.739	1.623
Scenario03_RCP45_MIROC-ESM	0.881	0.031	0.413	0.247	14.790	3.333	7.038	70.477	4.362
Scenario03_RCP85_CCSM4	0.877	0.029	0.387	0.218	12.305	2.018	15.929	65.945	3.803
Scenario03_RCP85_HadGCM2-ES	0.931	0.019	0.416	0.147	8.441	16.522	3.520	69.660	1.856
Scenario03_RCP85_MIROC-ESM	0.903	0.024	0.430	0.200	11.738	6.034	11.220	68.419	2.589
ESU02	**Test AUC**	**AUC SD**	**10 percentil**	**Omission**	**Altitude**	**Bio14**	**Bio04**	**Forest cover**	**Pasture cover**
Current Scenario	0.961	0.009	0.407	0.171	2.168	26.888	3.959	58.351	8.634
BAU_RCP45_CCSM4	0.958	0.010	0.360	0.143	2.400	0.980	27.780	57.820	11.020

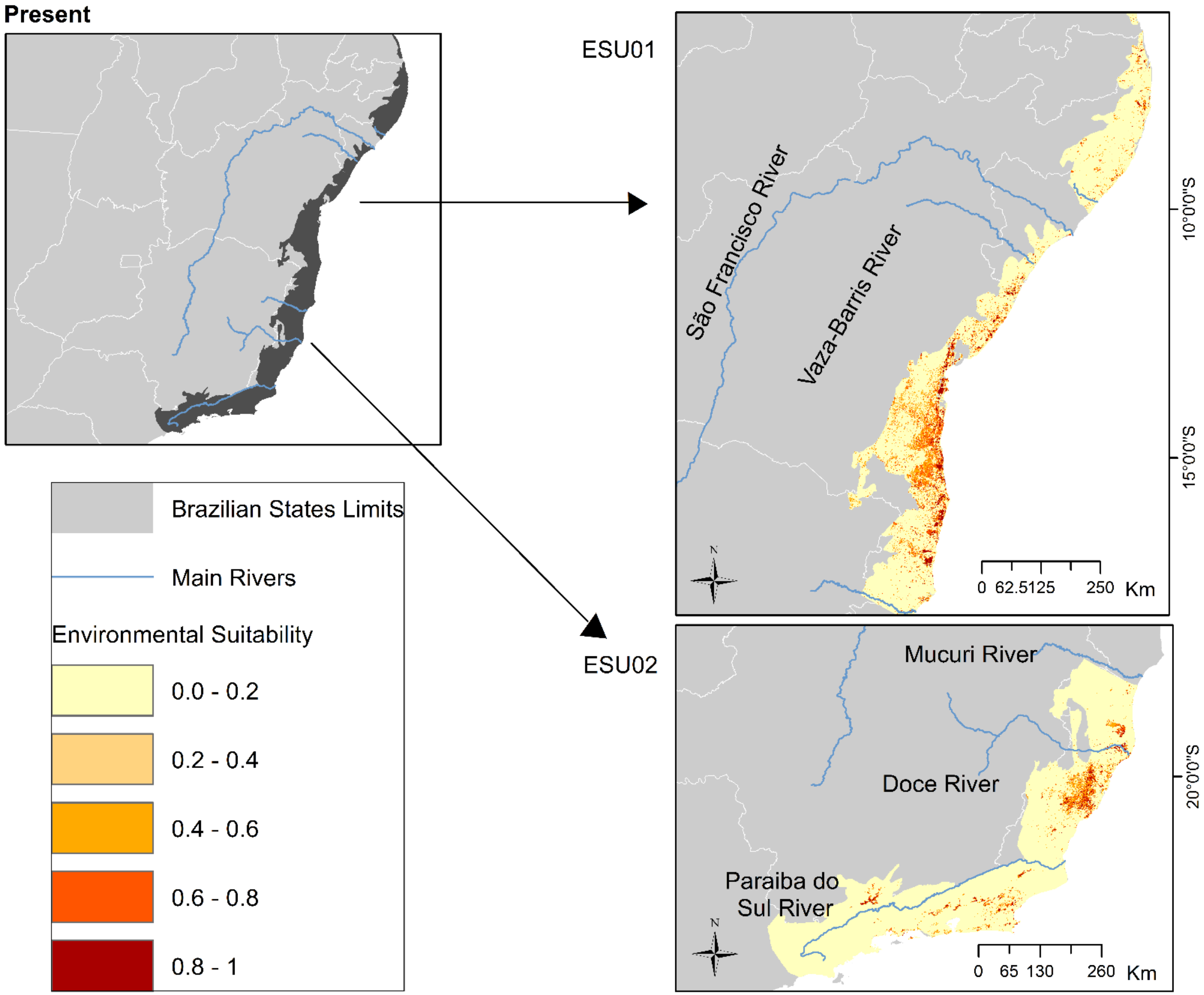
BAU_RCP45_HadGCM2-ES	0.958	0.011	0.444	0.171	1.988	1.712	28.348	60.901	7.052
BAU_RCP45_MIROC-ESM	0.957	0.009	0.327	0.124	5.882	2.464	24.092	59.607	7.955
BAU_RCP85_CCSM4	0.958	0.009	0.321	0.119	3.637	1.208	27.208	63.208	4.739
BAU_RCP85_HadGCM2-ES	0.957	0.010	0.380	0.152	3.263	2.063	28.305	59.181	7.187
BAU_RCP85_MIROC-ESM	0.947	0.011	0.380	0.210	3.512	0.556	26.853	65.104	3.975
Scenario02_RCP45_CCSM4	0.939	0.015	0.322	0.195	4.761	3.817	35.359	22.331	33.733
Scenario02_RCP45_HadGCM2-ES	0.957	0.013	0.443	0.176	4.972	7.331	34.382	22.525	30.791
Scenario02_RCP45_MIROC-ESM	0.932	0.020	0.326	0.186	9.562	9.339	27.906	26.211	26.982
Scenario02_RCP85_CCSM4	0.957	0.011	0.309	0.081	4.395	4.811	35.060	24.801	30.933
Scenario02_RCP85_HadGCM2-ES	0.947	0.018	0.351	0.148	2.585	9.614	33.919	23.968	29.914
Scenario02_RCP85_MIROC-ESM	0.931	0.020	0.311	0.176	6.037	4.382	30.008	24.977	34.596
Scenario03_RCP45_CCSM4	0.945	0.017	0.350	0.129	9.576	11.100	37.400	19.186	22.738
Scenario03_RCP45_HadGCM2-ES	0.938	0.020	0.317	0.157	4.506	12.906	34.907	20.090	27.591
Scenario03_RCP45_MIROC-ESM	0.940	0.017	0.354	0.138	10.354	14.881	29.340	21.175	24.251
Scenario03_RCP85_CCSM4	0.932	0.020	0.369	0.162	6.149	11.919	35.391	17.890	28.651
Scenario03_RCP85_HadGCM2-ES	0.941	0.018	0.316	0.105	3.943	13.433	32.701	18.893	31.031
Scenario03_RCP85_MIROC-ESM	0.925	0.022	0.379	0.162	9.322	9.434	34.090	19.735	27.419

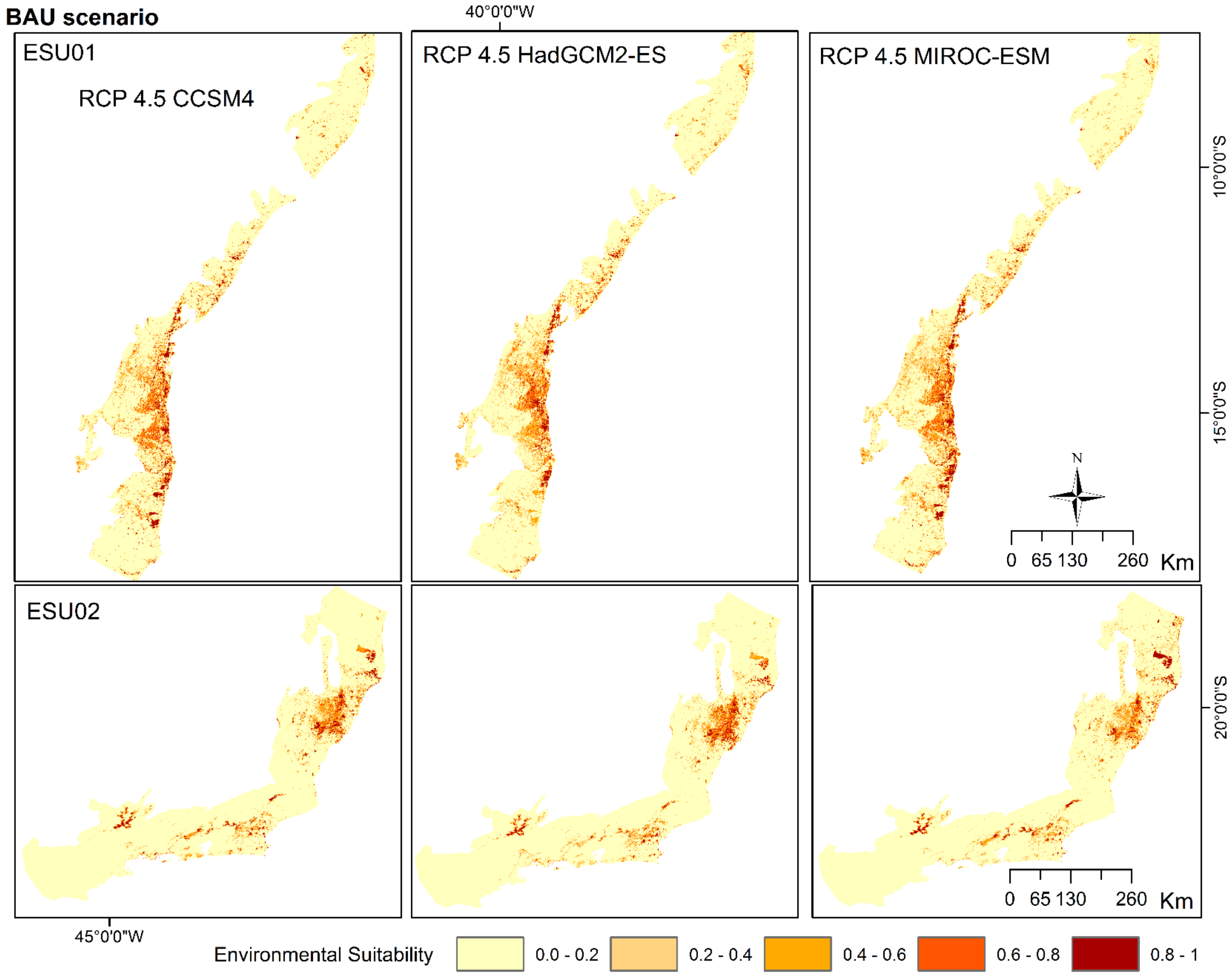
Table S3 Maximum, minimum and mean values of the variables for both populations and in all scenarios.

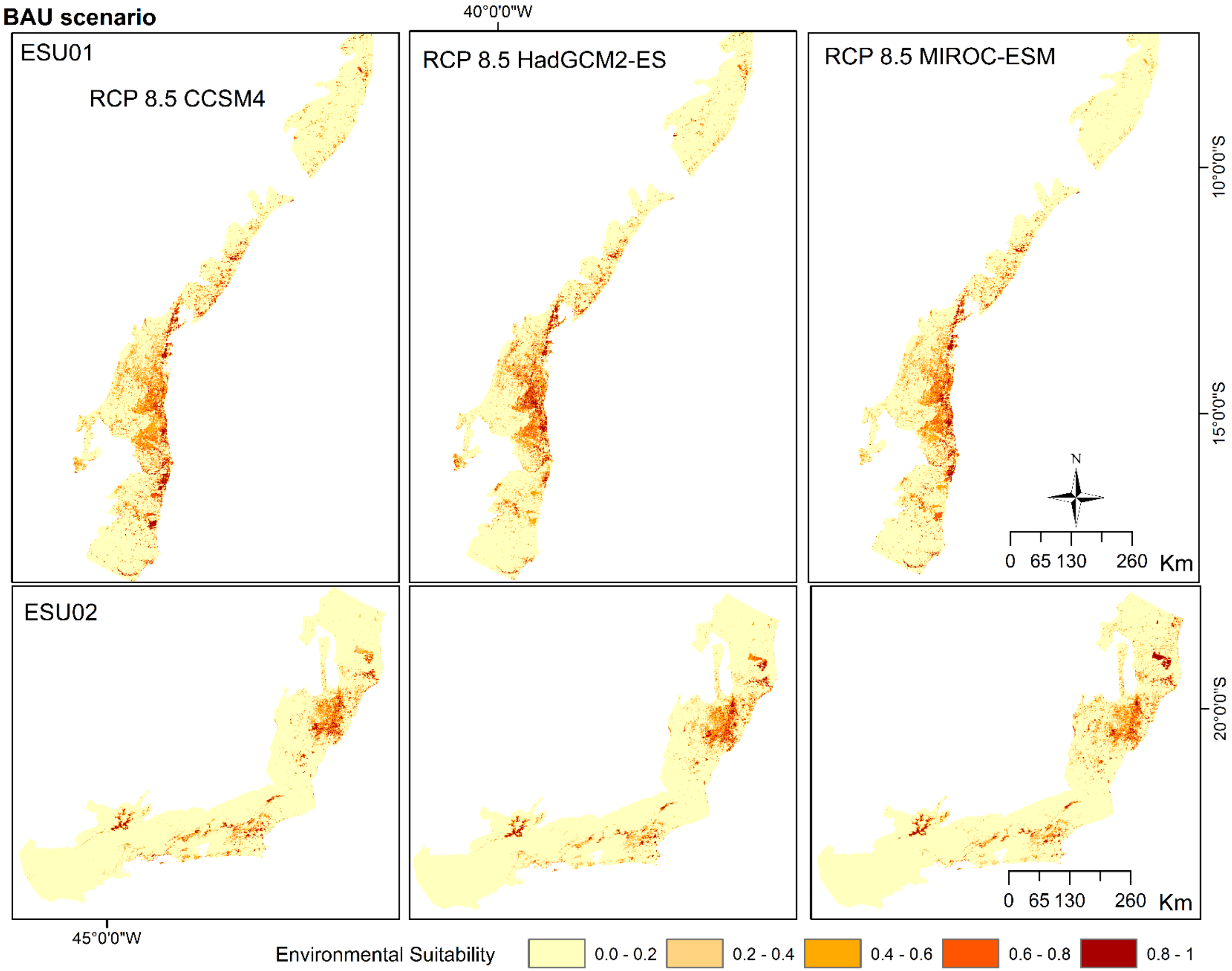
ESU01						
	Bio13 - Precipitation of the Wettest month (mm)			**Bio15 - Precipitation Seasonality**		
Scenario	**Max**	**Min**	**Mean**	**Max**	**Min**	**Mean**
Current Scenario	336	4	186.412	76	9	40.128
RCP45 CCSM4	275	84	162.629	78	14	42.200
RCP45 HadGCM2-ES	280	95	166.433	78	18	45.138
RCP45 MIROC-ESM	265	74	157.197	80	14	43.088
RCP85 CCSM4	249	76	156.710	78	11	42.600
RCP85 HadGCM2-ES	306	105	184.003	79	23	50.040
RCP85 MIROC-ESM	234	75	156.672	85	18	44.721

ESU02						
	Bio04 - Temperature Seasonality			**Bio14 - Precipitation of the driest month (mm)**		
Scenario	**Max**	**Min**	**Mean**	**Max**	**Min**	**Mean**
Current Scenario	2525	1444	1960.396	176	13	32.613
RCP45 CCSM4	2423	1427	1847.344	178	12	30.334
RCP45 HadGCM2-ES	2534	1515	2009.255	195	13	31.569
RCP45 MIROC-ESM	2354	1312	1786.010	159	10	27.033
RCP85 CCSM4	2380	1393	1908.077	159	12	28.866
RCP85 HadGCM2-ES	2602	1575	2088.178	197	12	29.145
RCP85 MIROC-ESM	2324	1343	1822.031	120	7	22.561

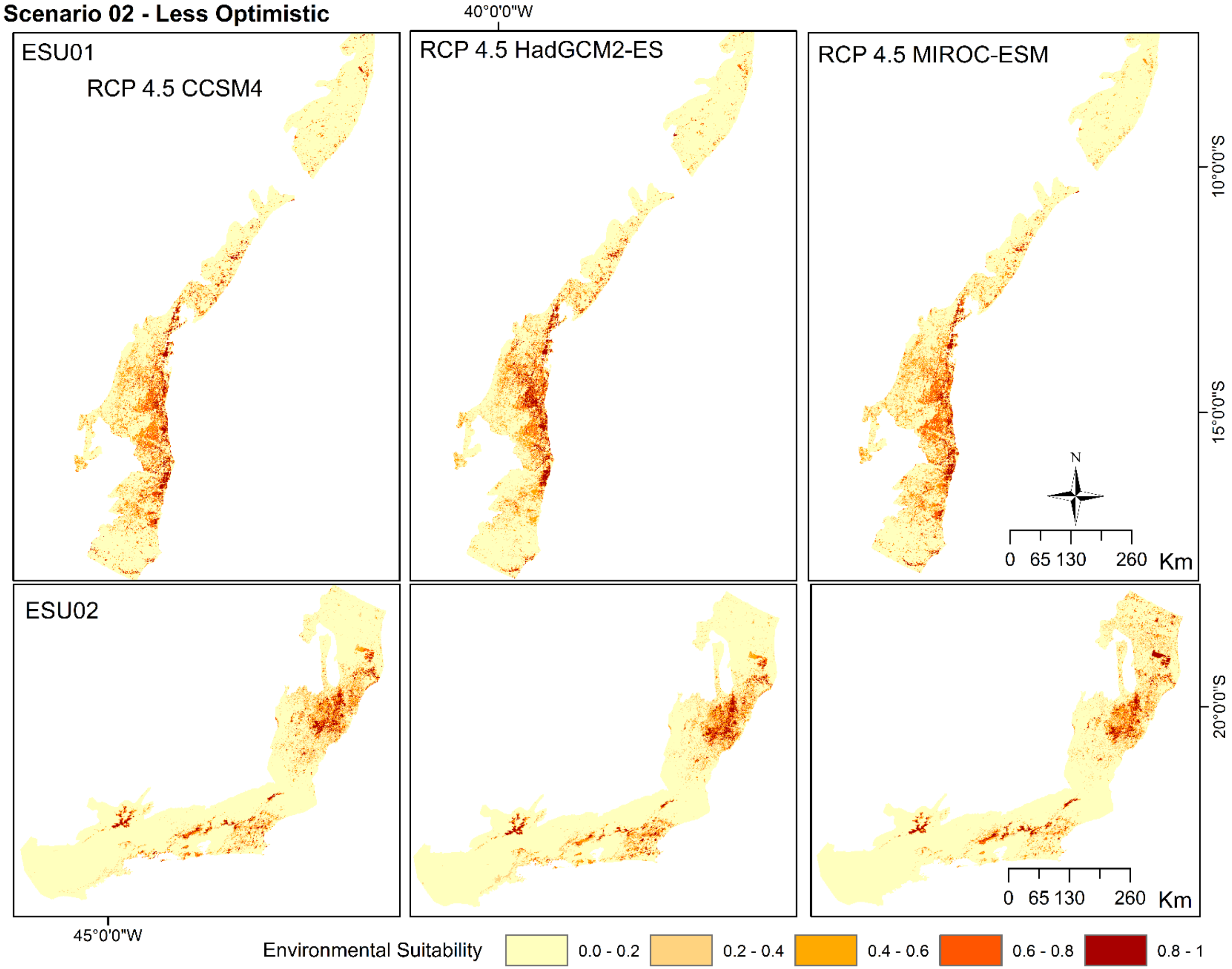
Fig S1

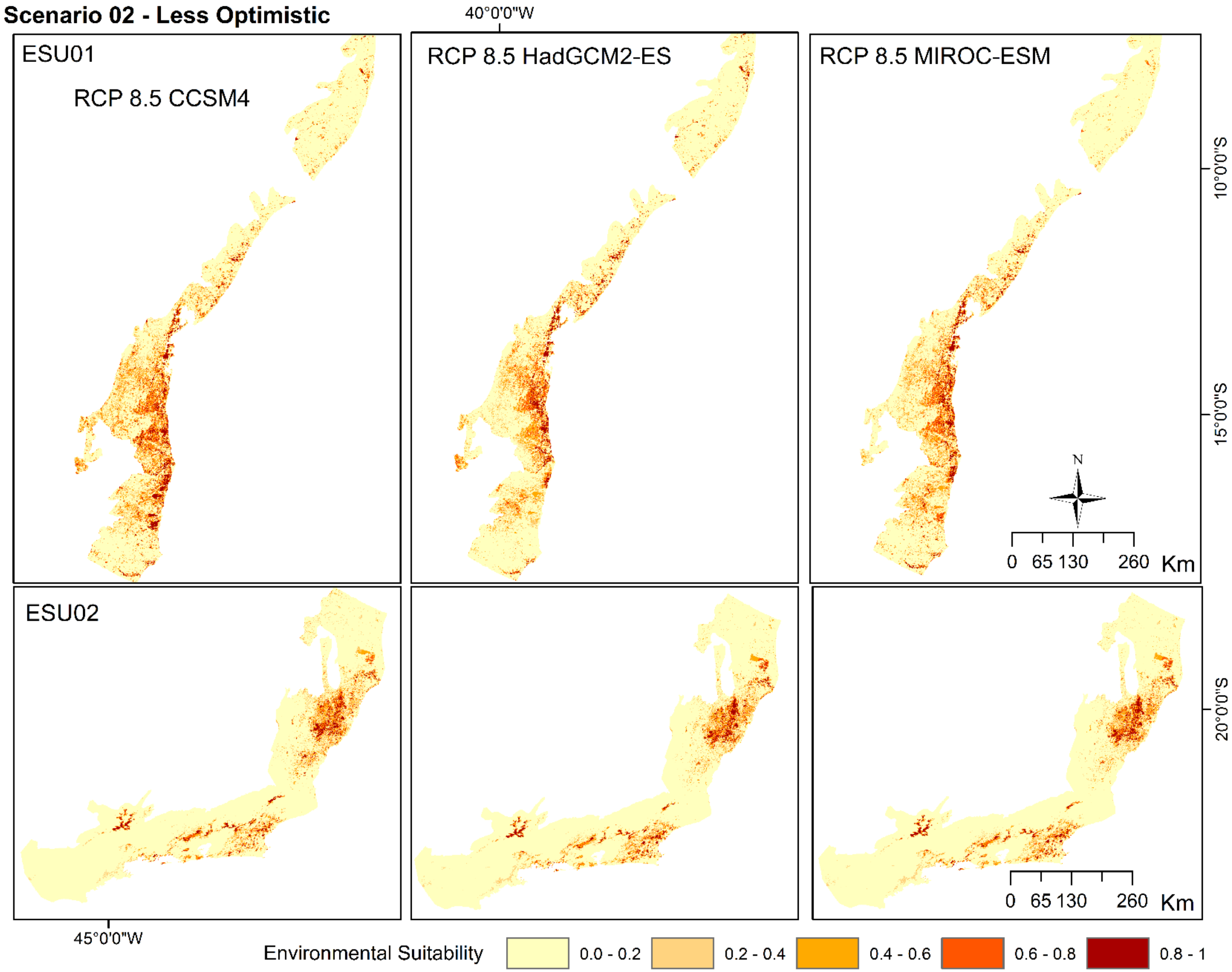

Present
ESU01
ESU02
São Francisco River
Vaza-Barris River
Mucuri River
Doce River
Paraiba do Sul River
10°0'0"S
15°0'0"S
20°0'0"S
0 62.5125 250 Km
0 65 130 260 Km
N
Brazilian States Limits
Main Rivers
Environmental Suitability
0.0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1

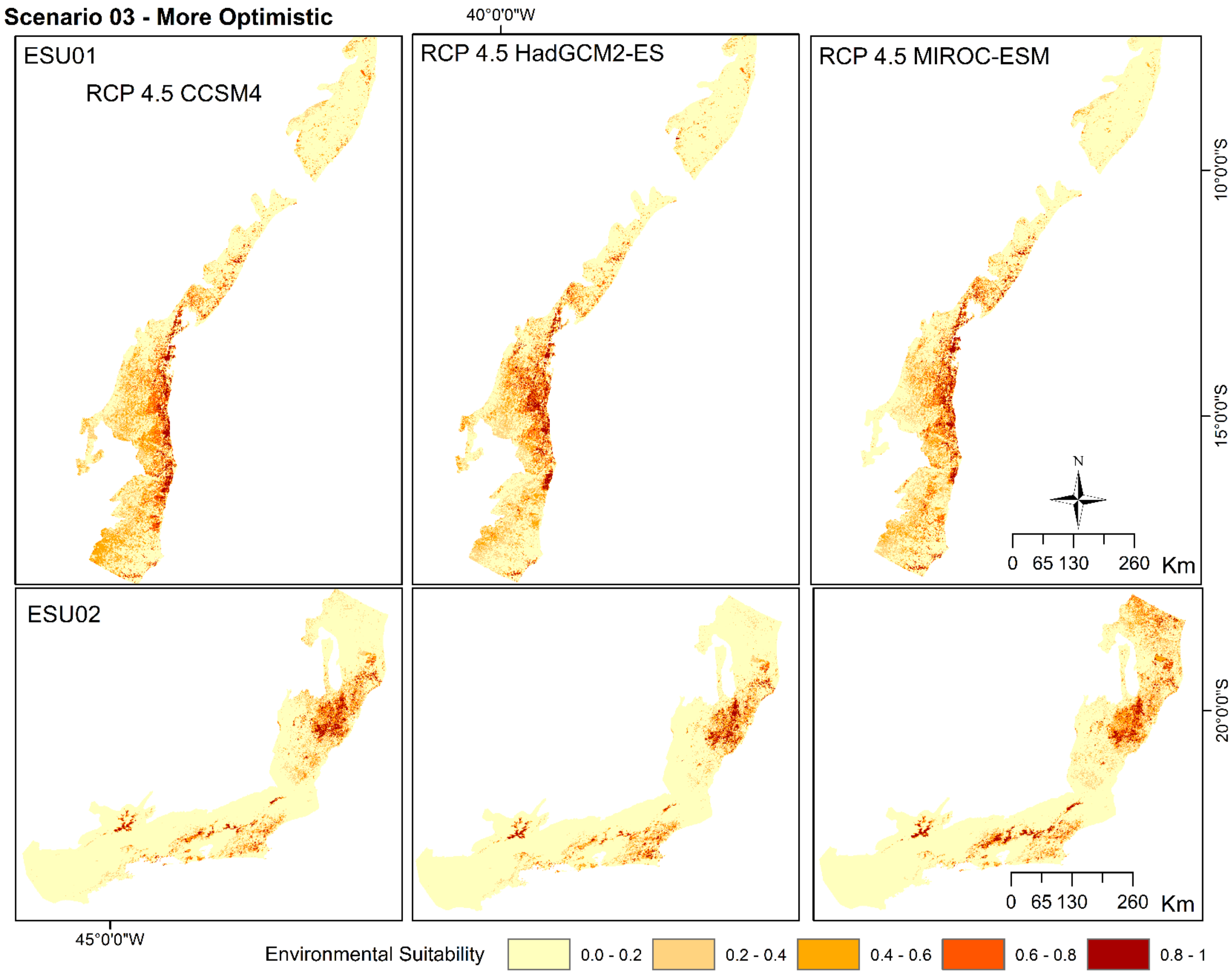

BAU scenario
40°0'0"W
ESU01
RCP 4.5 CCSM4
RCP 4.5 HadGCM2-ES
RCP 4.5 MIROC-ESM
10°0'0"S
15°0'0"S
N
0 65 130 260 Km
ESU02
20°0'0"S
0 65 130 260 Km
45°0'0"W
Environmental Suitability
0.0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1


BAU scenario
ESU01
RCP 8.5 CCSM4
RCP 8.5 HadGCM2-ES
RCP 8.5 MIROC-ESM
ESU02
40°0'0"W
45°0'0"W
10°0'0"S
15°0'0"S
20°0'0"S
N
0 65 130 260 Km
0 65 130 260 Km
Environmental Suitability
0.0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1

Scenario 02 - Less Optimistic




Scenario 02 - Less Optimistic
40°0'0"W
ESU01
RCP 8.5 CCSM4
RCP 8.5 HadGCM2-ES
RCP 8.5 MIROC-ESM
10°0'0"S
15°0'0"S
N
0 65 130 260 Km
ESU02
20°0'0"S
0 65 130 260 Km
45°0'0"W
Environmental Suitability
0.0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1


Scenario 03 - More Optimistic
40°0'0"W
ESU01
RCP 4.5 CCSM4
RCP 4.5 HadGCM2-ES
RCP 4.5 MIROC-ESM
10°0'0"S
15°0'0"S
N
0 65 130 260 Km
ESU02
20°0'0"S
0 65 130 260 Km
45°0'0"W
Environmental Suitability
0.0 - 0.2
0.2 - 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1

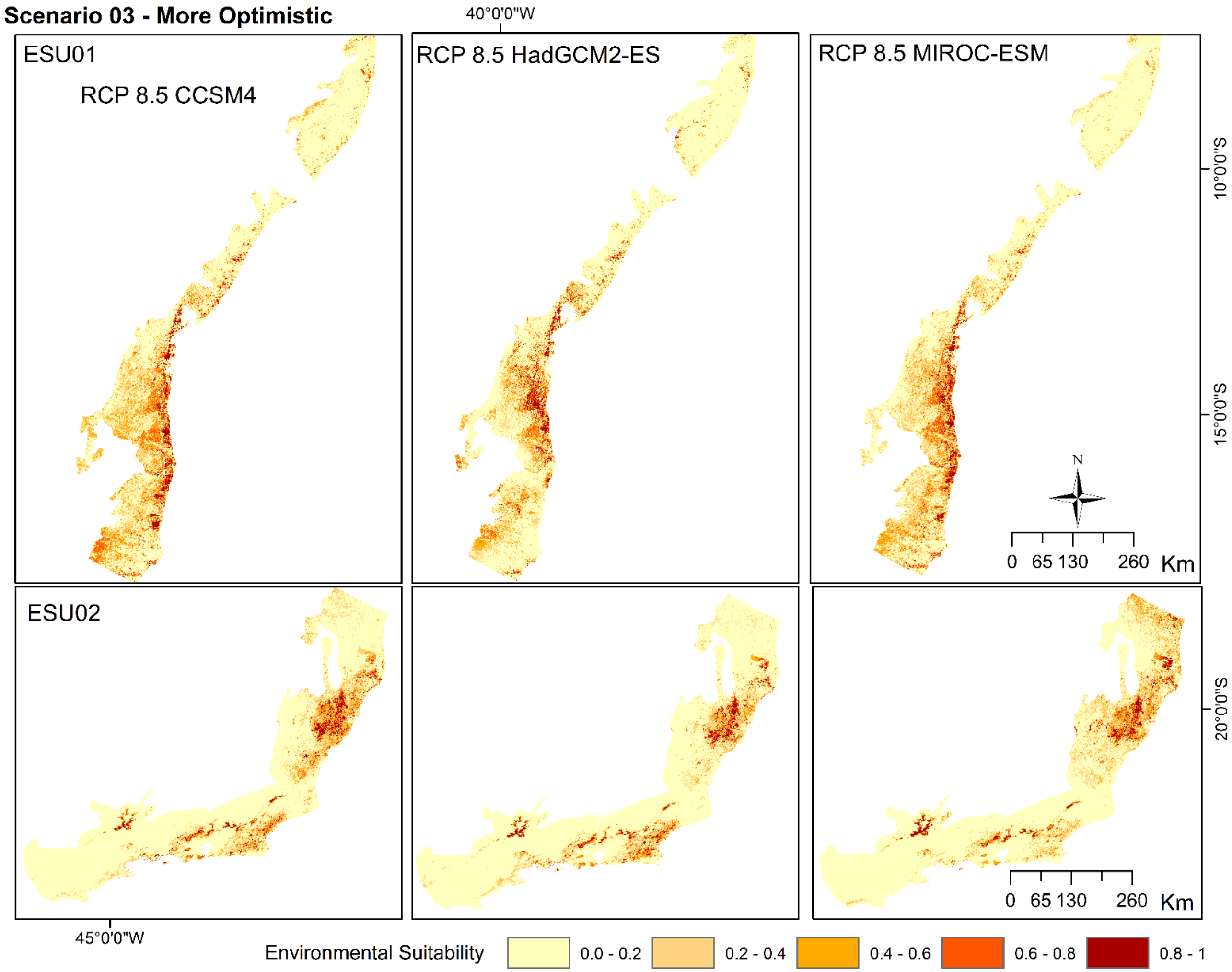


Fig S1 Current and future environmental suitability for both populations of *B.torquatus*. The environmental suitability is separated in different classes, and all results from the different circulations models are represented here.

Conclusões Gerais

Nesta tese, buscamos identificar a influências de variáveis ambientais na ocupação da preguiça de coleira e na disposição das áreas mais adequadas para a espécies por meio de análises multi-espaciais e temporais. De modo geral, a ocupação da espécie em uma dada região irá depender de fatores múltiplos, como o ambiente local e a composição espacial dos elementos da paisagem. O futuro da espécie irá depender principalmente da dinâmica florestal e da climática. Além disso, a tese resultou em uma grande contribuição com a geração e o uso de dados abertos.

Embora a preguiça ocupe ambientes alterados – porém com boa cobertura floresta (> 35%), a sua ausência em áreas com menos de 20% de cobertura florestal acende um alerta em relação a sua conservação. Além disso, a presença de áreas abertas – mesmo em menor proporção – inviabiliza a presença da espécie em determinadas áreas. O alto requerimento energético para atravessar tais áreas e as ameaças intrínsecas nesses ambientes, como a predação oportunística, são as principais barreiras. Por outro lado, como já salientado em estudo anterior (SANTOS *et al.*, 2016), as preguiças preferem determinados tipos de ambientes florestais, como locais que possua um dossel alto e conectado e que abrange árvores importantes para a sua dieta. As preguiças passam boa parte de sua vida nos dosséis e utiliza a conexão da copa entre as árvores para o seu deslocamento (MONTGOMERY; SUNQUIST, 1975). Assim, árvores altas são essenciais, por cumprirem função fundamental no comportamento termo regulatórios desempenhado pelas preguiças, de subir no topo das árvores para se aquecer (MONTGOMERY; SUNQUIST, 1975; NAGY; MONTGOMERY, 1980). Assim, é possível concluir que existe uma série de fatores multi-escala responsáveis pela ocupação da espécie em determinado fragmento de mata.

A necessidade de se obter mais dados sobre a preguiça-de-coleira nos levou a um importante passo nessa tese – o NEOTROPICAL XENARTHRAS. A compilação e padronização das informações de ocorrência de espécies de xernatros, com mais de 30 mil registros de tatus, tamanduás e preguiças, produziu o maior banco de dados existentes para esse grupo ainda tão desconhecido. A análise desse banco de dados deixa clara a grande densidade de registros que se encontravam indisponíveis para o acesso do público em geral e o quanto ainda precisamos avançar nas pesquisas sobre o grupo. Todos os dados do NeoXen estão disponíveis no Github e a base de dados será alimentada à medida em que novos registros forem surgindo.

Com os resultados do capítulo 01 e com a compilação de dados do capítulo 02 foi possível gerar modelos de distribuição de espécie voltados para a avaliação da adequabilidade do habitat para as preguiças. A presença de florestas, mais uma vez, se mostrou como a principal preditora da espécie, uma vez que a disponibilidade de boas áreas está relacionada com a presença de uma boa cobertura florestal. Adicionalmente, a alta cobertura de florestas também se mostra bastante importante para mitigar os efeitos das mudanças climáticas sobre a espécie – contribuindo na conservação de uma boa proporção de áreas adequadas.

O estabelecimento de novas Unidades de conservação e a manutenção das já existentes é um importante passo para garantir a proteção das áreas naturais. Além disso, as Reservas Legais podem ser cruciais para resguardar áreas naturais, uma vez que, conforme mostrado nos capítulos 02 e 03, grande parte das áreas ocupadas e adequadas para a *B.torquatus* estão localizadas em propriedades particulares. Porém, para potencializar as suas funções, precisaria destituir as Áreas de Preservação Permanente do cálculo das RLs, uma vez que as duas categorias atuam em complementariedade na conservação e preservação de florestas. Da mesma forma, é necessário garantir o amparo legal das áreas potenciais para regeneração natural – ou as que já estão em processo de regeneração, a fim de evitar seu corte e a supressão

Por fim, uma característica dessa tese é a sua ação conservacionista aplicada. Todo o escopo dessa tese está relacionado com diversas metas do Plano de Ação Nacional para a Conservação de Primatas e Preguiças (PPMA) - identificar áreas importantes, ampliar o conhecimento de ocorrência e ocupação e seus preditores ambientais - e os resultados gerados aqui irão integrar a avaliação da espécie. Além disso, todos os dados compilados no NEOTROPICAL XENARTHRAS já estão sendo utilizados pelos órgãos ambientais. O Centro Nacional de Conservação dos Primatas Brasileiros (CPB/ICMBio), responsável por avaliar os xenartros, tem utilizado os dados de ocorrência do *datapaper* para desenvolver as fichas de avaliação das espécies, por meio de seu portal SALVE. O Instituto Nacional da Mata Atlântica (INMA) também utilizou os dados referentes aos xenartros no estado do Espírito Santo para elaborar o a lista estadual de espécie ameaçadas (INMA, 2019). Assim, essa tese vem cumprindo seu papel na conservação da biodiversidade, ao integrar academia, ações de organizações conservacionistas e órgãos públicos, federal e estaduais.

Referências

INMA, Instituto Nacional da Mata Atlântica. Fauna e flora ameaçadas de extinção no estado do Espírito Santo. 1. ed. Santa Teresa, ES: [s.n.], 2019.

MONTGOMERY, G G; SUNQUIST, M E. Impact of sloths on Neotropical forest energy flow and nutrient cycling. Tropical Ecology Systems, Trends in Terrestrial and Aquatic Research, p. 69–98, 1975.

NAGY, Kenneth A.; MONTGOMERY, G Gene. Field Metabolic Rate , Water Flux , and Food Consumption in Three-Toed Sloths (Bradypus Variegatus). Journal of Mammalogy, v. 61, n. 3, p. 465–472, 1980. Disponível em: <http://www.jstor.org/stable/1379840>.

SANTOS, Paloma Marques et al. Local and landscape influences on the habitat occupancy of the endangered Maned Sloth Bradypus torquatus within fragmented landscapes. Mammalian Biology - Zeitschrift für Säugetierkunde, v. 81, p. 447–454, 2016. Disponível em: <http://linkinghub.elsevier.com/retrieve/pii/S1616504716300416>.