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As aves do Estado do Maranhão: Atualização do Conhecimento e Conservação em uma região de ecótono entre a floresta Amazônica e Cerrado

Belém, 2018

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Tese/Dissertação apresentada ao Programa de Pós-Graduação em Zoologia, do convênio da Universidade Federal do Pará e Museu Paraense Emílio Goeldi, como requisito parcial para obtenção do título de Doutor em Zoologia.
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Dedico esta tese a todas as mulheres que lutaram
e lutam pelo direito de estarem onde quiserem,
inclusive na ciência.

Please explain to me the scientific nature of the Whammy (Dana Scully, The X-Files)!.

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SUMÁRIO

ABSTRACT

The state of Maranhão is located between the eastern Amazon and the northern Cerrado, presenting a wide variety of environments in its ecotonal area. Due to this environmental heterogeneity, Maranhão has one of the richest avifaunas in Brazil. Furthermore, this region includes one of the world's most endangered biogeographical provinces. In order to contribute to the knowledge and conservation of avifauna in this region, this study has as its main objectives: 1) review and update the checklist of birds species from Maranhão to identify possiblesampling gaps in the state; 2) test the effectiveness of the State Protected Areas (PAs) and Indigenous Lands (TIs) system in the protection of threatened and endemic bird species using SDMs and; 3) assess the potential impact of climate change on the distribution and conservation of 24 threatened bird taxa occurring in the state, comparing current and future distributions (2070) with the current reserve system, in order to identify potentially stable areas that can serve as dispersal corridors for the evaluated taxa. In chapter 1) we recorded the occurrence of 750 bird species, distributed into 88 families and 30 orders. We added 114 new species (95 residents, 13 migratory and 6 vagrants) to the last list compiled 27 years ago for the same region. In chapter 2) we observed that taxa with wider distributions are protected equally as taxa with smaller distributions and larger PAs are more efficient than smaller. Our results also showed that most Cerrado PAs are poorly allocated. We suggest six priority areas for conservation of Neotropical birds and highlight the importance of indigenous lands in conserving Neotropical biodiversity. In chapter 3) our results indicated that, although threatened Amazon and Cerrado taxa are potentially protected, for both present and future scenarios, most of the taxa are likely to suffer drastic population size declines or even global extinction in the near future. We highlight the importance of creating a system of dispersal corridors that interconnect PAs in this region, as well as the implementation of public policies for maintenance and mitigation of the areas adjacent to these corridors, aiming at the conservation of the richness and diversity of species in this region.

Key-words: Checklist, Species Distribution Models (SDMs), Climate change, Protected Areas, Conservation Planning.

RESUMO

O estado do Maranhão localiza-se entre o leste da Amazônia e o norte do Cerrado, apresentando uma grande variedade de ambientes em sua área ecotonal. Devido a esta heterogeneidade ambiental, o Maranhão possui uma das mais ricas avifauna do Brasil. Contudo toda esta riqueza também está situada entre as províncias biogeográficas mais ameaçadas do mundo. Com o intuito de contribuir para o conhecimento e conservação da avifauna nesta região, este estudo teve como principais objetivos nos seguintes capítulos: 1) a revisão e atualização da lista de espécies de aves do maranhão, buscando identificar lacunas de amostragem ainda existentes no Estado; 2) testar a efetividade do sistema de Áreas protegidas (APs) e Terras Indígenas (TIs) do Estado na proteção de espécies de aves ameaçadas e endêmicas, utilizando SDMs e; 3) avaliar os potenciais impactos das alterações climáticas na distribuição e conservação de 24 táxons de aves ameaçados que ocorrem no Estado, comparando as distribuições atuais e futuras previstas (2070) com o atual sistema de reservas, buscando identificar áreas potencialmente mais estáveis que podem servir como corredores de dispersão das espécies. No capítulo 1) registramos a ocorrência de 750 espécies de aves, distribuídas em 88 famílias e 30 ordens. Assim, adicionamos 114 espécies novas (95 residentes, 13 migratórias e 6 vagantes) à lista reportada 27 anos para a mesma região. No capítulo 2) observamos que táxons com distribuições mais amplas são potencialmente tão protegidos quanto os táxons com distribuições menores e APs maiores são mais eficientes que APs menores. No entanto, as APs do Cerrado são na sua maioria mal alocadas. Sugerimos seis áreas prioritárias para conservação das aves presentes no Estado e destacamos a importância das TIs na conservação da biodiversidade. No capítulo 3) nossos resultados indicaram que, embora os táxons ameaçados da Amazônia e do Cerrado estejam potencialmente protegidos, em ambos os cenários, presente e futuro, a maioria dos táxons provavelmente apresentará declínios drásticos em suas populações e até mesmo a previsão de extinção global em um futuro próximo. Destacamos a possibilidade de criação de um sistema de corredores de dispersão que interliguem APs nesta região, bem como a implementação de políticas públicas para manutenção e mitigação das áreas adjacentes a esses corredores, visando a conservação da riqueza e diversidade de espécies nessa região.

Palavras-chave: Lista de Espécies, Modelos de Distribuição Potencial (MDPs), Mudanças climáticas, Áreas Protegidas, Planejamento de Conservação.

INTRODUÇÃO GERAL

A região Neotropical abriga a maior diversidade de espécies de plantas e animais do planeta (Stotz et al. 1996, Antonelli et al. 2018), e dentre essa enorme diversidade, destacam-se as aves com cerca de 3.750 espécies (Stotz et al. 1996). A maior parte dessa diversidade é encontrada nas áreas de florestas, as quais possuem uma grande importância na estabilidade climática do planeta, estocando carbono (retirada do CO_2 da atmosfera) (Vieira et al. 2004) e consequentemente mitigando as consequências do efeito estufa (Fearnside 2000, Gibbs et al. 2007). No entanto, nas últimas décadas as florestas tropicais vêm sendo drasticamente suprimidas pela ação do homem (Fearnside 2005, Barona et al. 2010, Spracklen et al. 2015), principalmente através do desmatamento ilegal, agricultura, pecuária (Ryder e Brown 2000, Browder et al. 2004, Brown et al. 2005, Barlow et al. 2016) além de queimadas sem controle (Nepstad et al. 1999, Peres 1999). Como consequência direta destas ações, pode ser observada em escala regional a perda de espécies vegetais e animais (extinções locais) (Myers 1988, Southgate e Whitaker 1992, Moutinho e Nepstad 2001), assim como em escala global, impactando no aumento da temperatura do planeta e a extinção de espécies (Turner e Corlett 1996, Fearnside 2005, Joly 2007).

Nesse contexto, as áreas protegidas (APs) desempenham um importante papel na mitigação das consequências dos impactos antrópicos (Ribeiro et al. 2016), como as mudanças climáticas (Lovejoy 2006). As APs são áreas naturais e sítios ecológicos de relevância cultural, criadas pelo poder público especificamente para proteção e conservação de amostras representativas de fauna e flora (IUCN 1994). Existem diferentes categorias de APs, que variam desde a proteção integral até áreas onde a presença humana é permitida por meio do uso sustentável dos recursos naturais (MMA 2018). Os critérios de escolha utilizados para o estabelecimento dessas áreas variam, desde aqueles baseados exclusivamente em informações sobre espécies até àqueles que dão ênfase apenas a heterogeneidade ambiental (Fearnside e Ferraz 1995, Rylands e Pinto 1998, Jennings 2000). No Brasil, a criação da maioria das APs não tem seguido um planejamento prévio, sendo feita com base em questões de terra, recreação, potencial turístico e outros fatores econômicos, sem levar em consideração a conservação da diversidade biológica em todos os seus aspectos (Rylands e Pinto 1998).

Dessa forma, é possível o uso de alguns princípios fundamentais do Planejamento Sistemático da Conservação (PSC) para avaliação do atual sistema e seleção de áreas prioritárias para conservação (Metzger e Casatti 2006, Albernaz e Souza 2007, Loyola e Lewinsohn 2009). O PSC auxilia na composição de cenários de conservação em prol da proteção da biodiversidade e dos ecossistemas com o mínimo de custo e conflitos (Margules e Pressey 2000). O PSC identifica e seleciona um conjunto de áreas prioritárias para a proteção de diferentes aspectos da biodiversidade (espécies, habitats, paisagens, processos ecológicos, etc.) (Margules e Pressey 2000). Diversos estudos têm utilizado os princípios do PSC, entre eles a representatividade (Rodrigues e Brooks 2007, Pinto et al 2008, Silva et al 2008, Grantham et al. 2010, Nóbrega e De Marco Jr. 2011, Oliveira et al. 2017). A representatividade consiste na amostra de todos os objetos de conservação considerados relevantes estarem presentes no conjunto de áreas selecionado (Margules e Pressey 2000). Neste princípio, é necessário que cada objeto de conservação tenha uma área mínima ou um número mínimo de ocorrências para garantir variabilidade genética e sua persistência ao longo do tempo (Margules e Pressey 2000).

Contudo, no planejamento para a conservação há dois problemas a serem considerados nas tomadas de decisão: 1) espécies desconhecidas que não são incluídas como prioritárias devido à falta de informação ou descrição formal, o chamado déficit Linneano (Costello et al. 2013); e 2) a não inclusão devido a falta de conhecimento ou existência de lacunas nas distribuições geográficas de espécies, problema conhecido como déficit Wallaceano (Whittaker et al. 2005). Estes problemas são ainda mais sensíveis na região Neotropical, devido aos registros das espécies serem mais esparsos e desiguais, tanto variando de espécie para espécie, como de região para região (Brooks et al., 2006).

Assim, para efeitos de uma correta ação de conservação, faz-se necessário estimar a distribuição geográfica dessas espécies menos conhecidas (Neto e Loyola 2016). Entre as possibilidades para estimar a distribuição, existe o uso de registros de ocorrência de uma espécie, obtidos em campo, em coleções depositadas em museus ou relatados na literatura (Lemes et al. 2011, Neto e Loyola 2016). Esses registros já foram bastante utilizados em ecologia, constituindo-se como importantes ferramentas para estudos comparativos sobre a riqueza, distribuição e grau de conservação das espécies em diferentes ambientes e submetidos a distintos níveis de pressão antrópica nos quais seus produtos já se tornaram base para a definição de políticas públicas (Santos 2005, Guilherme 2016). Porém, atualmente, estes registros são considerados enviesados e associados a inúmeros problemas de amostragem em amplas escalas geográficas e a amostragem de dados (Lemes et al. 2011). Contudo, estes registros de ocorrência ainda constituem a melhor síntese do conhecimento disponível acerca da composição da faunística em diversas regiões e são a melhor fonte para se estimar a distribuição geográfica de uma espécie pela estimativa por meio de mapas preditivos de distribuição, criados a partir de modelos de distribuição de espécies (De Marco Junior e Siqueira 2009, Franklin et al. 2009, Sales et al. 2017).

Os modelos de distribuição potencial (MDPs) são ferramentas numéricas que combinam dados de ocorrência de um organismo com variáveis ambientais, construindo uma representação das condições requeridas por este organismo, refletindo as áreas potenciais de ocorrência do mesmo (Anderson et al. 2003). Os MDPs têm sido amplamente utilizados como dados de entrada em análises biogeográficas (Siqueira e Durigan, Franklin 2010, mas também em trabalhos voltados à conservação de espécies raras, endêmicas e ou ameaçadas (Raes et al. 2009, Lomba et al. 2010, Zhang et al 2012, Breiner et al. 2015, McCune 2016), reintrodução de espécies (Hirzel et al. 2002, Chauvenet et al. 2013), perda de biodiversidade (Polasky e Solo 2001, Kujala et al. 2015), impactos de mudanças climáticas (Bálint et al. 2011, Silva et al. 2014, Gonzáles-Orozco 2016), previsão potencial de invasão de espécies exóticas (Montoya et al. 2009, Gallagher et al 2013, Kumar et al 2014), auxílio na indicação e avaliação de áreas prioritárias para conservação (Chen 2009, Guisan et al 2013, Ribeiro et al. 2016, Oliveira et al. 2017), assim como em ferramentas de políticas públicas (p. ex. Ferraz et al. 2012), entre outros.

Ainda para efeitos conservacionistas, modelos de corredores de dispersão de espécies tornaram-se uma importante estratégia de conservação (McRae et al. 2016). Os corredores de dispersão representam uma das estratégias mais promissoras para o planejamento regional eficaz de conservação de fauna, constituindo-se como estratégia para mitigar os efeitos da ação antrópica e garantir a manutenção de todos os componentes da biodiversidade (Rouget et al. 2006, Beier et al. 2008). O uso de corredores de dispersão se baseia na teoria de biogeografia de ilhas (MacArthur e Wilson 1963, 1967) e de dinâmica de metapopulações (Levins 1969; Ovaskainen e Hanski 2001). Assim, com a fragmentação florestal, o isolamento de populações de uma espécie pode levar a perda de variabilidade genética e a deriva genética (Hall et al. 1996). O uso de corredores de dispersão pode reduzir os fatores de depressão por endogamia, promover a mobilidade das espécies, reduzir a estocasticidade demográfica, além de promover as taxas de migração (Haddad et al. 2003, Dixon et al. 2006, Roberts e Angermeier 2007). Nesse sentido, modelos de conectividade foram desenvolvidos no intuito de identificar corredores funcionais. A identificação destes corredores depende primeiramente do mapeamento da permeabilidade da paisagem ao movimento das espécies de interesse e da modelagem da trajetória de movimento dos organismos ao longo do mapa (Koen et al. 2010). Estes modelos de conectividade estimam os múltiplos caminhos de movimento (Urban et al. 2009, Pinto e

Keitt 2009) e a resistência da paisagem ao movimento dos organismos (McRae e Beier 2007, McRae et al. 2008).

Uma das regiões mais heterogêneas da região amazônica, situa-se em seus limites com o norte do cerrado, no Estado do Maranhão. Esta região apresenta uma elevada variedade de ambientes que vão desde florestas ombrófilas de terra firme, passando por matas de várzeas, matas de igapós, campinas, regiões alagadas, cerrado, além da sua costa litorânea com extensos manguezais (Ab´Saber 1977, Mello et al. 2000, IBGE 2013). Por outro lado, toda essa diversidade de paisagens vem sofrendo forte pressão antrópica e extensas áreas já foram convertidas em pastos ou plantios de grãos. De acordo com o Ministério do Meio Ambiente (MMA 2011), a intensificação e mudança do uso do solo tem ocasionado altas taxas de desmatamento e queimadas, com expressiva perda de biodiversidade, emissões de gases de efeito estufa e diminuição de territórios de populações tradicionais. Essas pressões antrópicas vêm sendo observadas até mesmo nas Unidades de Conservação de Proteção Integral (MMA 2011, Miotto 2013).

O Maranhão abriga uma das mais ricas avifaunas do país, correspondendo a 39% do número total de espécies no Brasil (Piacentini *et al*. 2015). Destas espécies, várias estão incluídas na lista das espécies da fauna brasileira ameaçadas de extinção (IBAMA 2016), além de vários taxa da BAE apresentarem o nível mais alto de vulnerabilidade local (Oren e Roma 011). O Estado inclui ainda diversas espécies de aves endêmicas dos biomas Caatinga e Cerrado, segundo hotspot de biodiversidade mais ameaçado do Brasil (Myers et al. 2000, Ratter et al 1997, Carvalho et al. 2009).

Nesse contexto, a região de ecótono contida no estado do Maranhão é de grande valor biológico e, assim, é de extrema importância que informações sobre a composição da avifauna do Maranhão sejam trabalhadas, considerando que o Estado constitui um excelente cenário como modelo para o subsídio de ações efetivas para o estabelecimento de políticas públicas voltadas para a conservação da biodiversidade, como a escolha de áreas prioritárias para a conservação, o controle do desmatamento e a gestão integrada da biodiversidade (Silva 1995, Santos 2005, Vieira et al. 2005, Pinto et al. 2008, Aleixo 2009, Guilherme 2012).

Assim, o capítulo 1 desta tese consiste na revisão e atualização da lista de espécies de aves do Maranhão, no intuito de quantificar a real diversidade da avifauna no ecótono e identificar os locais bem amostrados e as lacunas geográficas ainda existentes nessa região, para identificação de quais seriam os *taxa* prioritários para os estudos apresentados nos capítulos seguintes, visando a necessidade de informações para a conservação da biodiversidade. Esse capítulo também é a base fundamental de dados para as análises dos Capítulos 2 e 3. No capítulo 2, testamos a efetividade do sistema de Áreas Protegidas e Terras Indígenas do Estado na proteção de espécies de aves ameaçadas e endêmicas ocorrendo no ecótono, utilizando MDPs. E por fim, no capítulo 3, avaliamos os potenciais impactos das alterações climáticas na distribuição e conservação de aves ameaçadas que ocorrem no ecótono, comparando suas distribuições atuais e futuras (2070) previstas com o atual sistema de reservas (PAs) para detectar eventuais lacunas na proteção das aves e identificação de áreas potencialmente mais estáveis que podem servir como corredores de dispersão das espécies.

Estes capítulos são a seguir apresentados sob a forma de artigos científicos encaminhados para publicação ou já publicados.

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Capítulo 1

Birds of Maranhão: An updated list of bird species for the Brazilian state of Maranhão

O capítulo I desta tese foi elaborado e formatado conforme as normas da publicação científica *Revista Brasileira de Ornitologia - Brazilian Journal of Ornithology,* as quais se encontram em anexo (Anexo I).

Birds of Maranhão: Birds of Maranhão: An updated list of bird species for the Brazilian state of Maranhão

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ABSTRACT

Herein, we present a checklist of birds from the state of Maranhão, northern Brazil. This region is one of the most heterogeneous areas in the country, comprising upland and flooded rainforests, open vegetation cover types typical from Cerrado and Caatinga, and mangroves along a wide coastal line (an important route for many migratory birds). Climate is either equatiorial with dry winter in the savanna-dominated portion, and equatorial monsoonal in the forested part of the ecotone. We compiled from the literature, institutional collections, and virtual databases 14,598 occurrence records, corresponding to 731 species from 88 families and 30 orders. Thus, we add 95 new species (78 resident, 12 migratory, and 9 vagrants) to those reported 27 years ago for the same region. From these, 46 species are endemic to Brazil, 35 represent Amazon forest endemisms, 25 are endemic to the Belem Area of Endemism, 11 are endemic to Cerrado, and 10 are Caatinga endemisms. From the native and resident species, 31 taxa are considered threatened by national laws. These results confirm the up to date nature of this study. Moreover, we consider this work fills a gap of knowledge on avifauna diversity, and confirms the biological relevance of this ecotone region from northern Brazil. Finally, considering the intensive environmental degradation and the high number of endemic and endangered species observed in Maranhão, here we reinforce the need of public policy and civil awareness to engage conservation actions and other activities supporting the maintenance of this biodiversity.

Keywords: Biodiversity, Brazil, Neotropical fauna, rainforest, tropical savanna

INTRODUCTION

The Brazilian avifauna is the third richest in South America after Colombia and Peru, with 1,919 species currently recorded (Piacentini et al. 2015). Despite the growing number of studies, there are still many knowledge gaps concerning the Brazilian avifauna, with large sampling gaps, and many species for which basic biologic information is lacking (Piacentini et al. 2015). In addition, even localities considered as well-sampled still hide important biological data on Brazilian bird species, that when further studied might reveal the discovery of new taxa, the update of the known distribution range of species or a better understanding of their evolutionary histories (Aleixo et al. 2009, Oliveira et al. 2017).

The history of the Brazilian ornithology dates back to the 16th century, but the first avifauna catalogues were only published in the mid-20th century by Pinto (1938, 1944, 1978). Subsequently, Helmut Sick presented in a synthesis book, historical, ecological, behavioral and biogeographic information of the best known species at the time in the Brazilian territory (Sick 1985; 1997).

At the federal state level, efforts have been made to fill the gaps on distribution of birds in almost all Brazilian federal states, albeit at different moments in time: Amapá (Novaes 1974, 1978), Bahia (Souza & Borges 2008, Machado & Borges, 2013), Espírito Santo (Ruschi 1967, Simon 2009), Goiás (Hidasi 1983), Maranhão (Oren 1991), Minas Gerais (Mattos et al. 2013), Paraná (Scherer-Neto & Straube 1995, Scherer-Neto et al. 2011), Pernambuco (Farias et al 1995, Farias et al. 2008), Santa Catarina (Naka and Rodrigues 2000), São Paulo (CEO 2012), Rio de Janeiro (Sick & Pabst 1968, CEO 2011), Rio Grande do Norte (IDEMA 1999), Rio Grande do Sul (Belton 1994, Bencke et al. 2010), Roraima (Santos 2005, Naka et al. 2006), Acre (Guilherme 2012), and Mato Grosso do Sul (Nunes et al. 2017).

In the state of Maranhão, in northern Brazil (Fig. 1), the Dominican bishop Cristóvão de Sá e Lisboa completed the first ornithological work for the state, observing the local fauna between 1625 and 1631, but his records were only published in 1967 (“History of the animals and trees of Maranhão”, Lisboa 1967, Oren 1990a). In 1819, the zoologist Johann Baptist Spix, together with the botanist Carl von Martius, fulfilled the first official ornithological exploration in the state (Pacheco 2004). They sailed the Itapicuru River from Caxias to São Luis, collecting biological material, and describing the few birds collected (Camargo 1957, Narvaes &

Rodrigues 2009). Later, Ferdinand Schwanda, known as an excellent hunter, established himself in the state, and collected avifauna material near the coast, between the years of 1905 to 1910. Schwanda sent most of his collection material to Europe, but some specimens were also sold to museums in the Americas, including the Museu Paulista, São Paulo (Brazil; MP) (Camargo 1957).

In 1914, the ornithologist Emílie Snethlage published the "Catalog of Amazonian birds" (Sanjad et al. 2013, Straube 2017). This second publication on avifauna from Maranhão had, however, no geographic detailing, as the author only refers "Maranhão" as the origin of the specimens included (Oren 1991). During 1923, E. Snethlage and her nephew, Heinrich Snethlage, visited Maranhão, but their field work was also limited to the coastal region. Yet, a year later, H. Snethlage returned to the state, making important collections of biological material in the central region (Santos et al. 2010, Straube 2017). Again, in 1925, after a long expedition to northern Maranhão, H. Snethlage traveled to the south of the state, visiting localities mainly close to the Parnaíba River, near the eastern border of Maranhão, and collected birds in the Codó, Tranqueira and Alto Parnaíba regions (Snethlage 1927, 1928, Hellmayr 1929, Straube 2017). The specimens collected in the three H. Snethlage expeditions were deposited in the Field Museum of Natural History, Chicago (USA; FMNH) (Camargo 1957). This collection was reference for one of the greatest works on birds of Maranhão ever published - (Hellmayr (1929).

Emil Kaempfer, a naturalist in service of the ornithologist Elsie Naumburg, gathered a collection of about 1,200 bird specimens, traveling along the region of Parnaíba River, in 1926 (Naumburg 1928, 1935, Camargo 1962, Straube 2017). Most of the collected material was from the Cerrado region, in the southern and southeast of Maranhão (municipalities of Caxias, Codó, Nova Iorque, São João dos Patos and Matões) (Naumburg 1935). These collected specimens were deposited at the American Museum of Natural History, New York (USA: AMNH).

At the beginning of 1955, the herpetologist Paulo Vanzolini, leading a team from the Zoology Museum of the University of São Paulo, São Paulo (Brazil; MZUSP), collected about 100 bird skins from the central region of Maranhão, in a transition area between Amazon forest and Cerrado (mainly in Barra do Corda, Pedreiras, Ipiranga and along the Mearim River) (Santos et al. 2010).

The first bird list specifically for Maranhão was elaborated by Oren (1991). His work included all species collected in the works abovementioned, and also the following publications: Catalog of Brazilian birds (Olivério Pinto 1938, 1944), studies on parrots by Ridgely (1982), Aguirre and Aldrighi (1983, 1987), personal observations made by Sick (1985) in his book "Ornitologia Brasileira", data on abundance of aquatic and marine birds by Morrison et al. (1986) and Roth and Scott (1987) , the catalog published by Ridgely and Tudor (1989) on birds of South America, and a work done by Oren himself (1990b), adding 70 new bird species for the state (Oren 1990b). Also, Oren visited the museums in which all the material of Maranhão avifauna was deposited: AMNH, Carnegie Museum (Pittsburgh USA; CM), FMNH, Los Angeles County Museum (Los Angeles USA; LACM), Louisiana State University Museum of Zoology (Baton Rouge USA; LSUMZ), Museu Nacional do Rio de Janeiro (Rio de Janeiro Brazil; MNRJ) and Museu Paraense Emílio Goeldi (Belém Brazil; MPEG) (Oren 1991). Finally, the author also used the visual observations cited by Antonio Augusto Ferreira Rodrigues and Edwin O. Willis (Oren 1991). Oren (1991) compiled a list of 636 species of birds recorded and present by that time in Maranhão, corresponding to 40% of all Brazilian bird species known then.

Today, Maranhão has a human population of more than seven million people, distributed along 217 municipalities, in an area of about 332 thousand km². The border between the Amazon forest and Cerrado, a savanna-like vegetation phyto-physiognomy, is located in the center of the state, making this an extensive ecotone area (Fig. 1), where several bird species have their limits of distribution (del Hoyo et al. 2017). Thus, as demonstrated by Oren (1991), this region harbored a valuable diversity of birds currently facing several threats, such as logging, cattle farming, increased urbanization, among others (FIEMA 2009).

Almost three decades have past, since Oren's published his "Checklist of the birds of Maranhão, Brazil". During this time, several studies were performed in the state, covering its different environments, gathering information on Maranhão avifauna, and so, adding new species records to Oren's (1991) former list (e.g. Olmos & Brito 2007, Soares & Rodrigues 2009, Santos et al. 2010, Oren & Roma 2011, Carvalho et al. 2010, Rodrigues et al. 2010, Lima & Raices 2012, Gonsioroski 2014, Lima et al. 2015). In addition, studies aiming to evaluate the environmental impact of great enterprises were performed in the state, and management plans for wildlife conservation were elaborated in the last three decades. Although, these works were not published, they have increased the representativeness of avifauna from Maranhão in many biological collections, where the collected material has been deposited, and is now available to be studied.

Thus, herein we present an updated list of the avifauna of Maranhão, 27 years after Oren's checklist (1991). We performed an analysis of the avifauna research effort, summarizing well-sampled sites and sampling gaps, and highlighting priority areas to support future studies aiming to increase biological knowledge and conservation of birds' diversity.

METHODS

Study area

Maranhão is the eighth largest Brazilian state, bordered to the north by the Atlantic Ocean (639.5 km of coast line), to the south and southwest by the Tocantins River and the state of Tocantins (1,060 km), to the west by the Gurupi River, and the state of Pará (798 km), and to the east and southeast by the Parnaíba River, and the state of Piauí (1,365 km) (MMA, 2011, IBGE 2013) (Fig 1-2).

Maranhão is one of the most heterogeneous regions in Brazil, located between the Amazon region and northern Cerrado biome, and also influenced by Caatinga biome. This region presents a wide variety of environments ranging from "*terra firme*" (upland rain forests) and "*várzea*" (flooded rain forests), but also *campinas* (an open vegetation cover type), and extensive mangroves in its wide coastal border (Ab'Saber 1977, Mello et al. 2000, IBGE 2013). Climate varies between equatorial with dry winter in the savanna-dominated portion, and equatorial monsoonal in the west (Rubel & Kottek 2010).

Species list assembly

The base-reference bibliography used to ground this Maranhão birds' species list was Oren (1991), and references therein. Taxonomy and species nomenclature were revised, and new occurrence records were added, as detailed below. The inclusion of a new record was based on the following sources: 1) scientific papers and specialized literary works already published on the avifauna of Maranhão; 2) bird specimens deposited in museum collections: Museu Paraense Emílio Goeldi (MPEG), Museu Nacional do Rio de Janeiro (MNRJ) and Louisiana Museum of Natural History (LSUMZ); 3) interactive content from web sites, such as Wikiaves (http://www.wikiaves.com.br) and Xeno-canto (http://www.xeno-canto.org); and 4) online databases: VertNet (http://vertnet.org/), Species Link (http://splink.cria.org.br), Global Biodiversity Information Facility (http: //www.gbif.org) which contains information from the institutions: Fonoteca Neotropical Jacques Vielliard (UNICAMP; FNJV), Museu de Zoologia da Universidade Estadual de Campinas (ZUEC), American Museum of Natural History (AMNH), Carnegie Museums (CM), Cornell University Museum of Vertebrates (CUMV), Field Museum Natural History (FMNH), Kansas University Natural History Museum (KU), Los Angeles County Museum (LACM), Museum of Comparative Zoology - Harvard University (MCZ), Museum of Vertebrate Zoology - Berkeley University (MVZ), Museum of Zoology University of Michigan (UMMZ), and Smithsonian National Museum of Natural History (USNM).

Ornithological sites

We produced a georeferenced database with documented, historical and recent ornithological records for Maranhão. We categorized these records in "Revised Oren (1991)" and "Post Oren (1991)". We verified all occurrences and excluded dubious records based on the known distribution of the species (IUCN 2018.1). For the historical records and those documented in museums, the geographical coordinates were obtained directly from the original sources or from the Ornithological Gazetteer of Brazil (Paynter & Traylor 1991). To secure species locations, and attend to the discretion requests by some birdwatchers, most of the geographic coordinates from the interactive sites were obtained from google earth (www.earth.google.com) considering the central point of the locality referenced.

Taxonomic nomenclature

Bird nomenclature followed the Brazilian Ornithological Records Committee (Piacentini *et al*. 2015). This list is largely based on the South American Classification Committee from the American Ornithologists' Union (http://www.museum.lsu.edu/~Remsen/SACCBaseline.html) with some modifications, due to divergences between this committee and the works revised by Piacentini *et al*. (2015).

Geographic distribution status and endemic species

Bird species were classified as residents, migrants and vagrants according to Piacentini *et al*. (2015). Migratory species were classified as: Nearctic (coming from North America), Austral (coming from other areas of South America) (Sick 1997), intra-tropical and longitudinal (del Hoyo *et al*. 2019). Endemic species were classified according to their geographic distribution: endemic to Brazil (Piacentini *et al.* 2015), endemic to the Caatinga Biome (Pacheco & Bauer 2000, Pacheco 2004), endemic to the Cerrado Biome (Silva 1995, Silva 1997, Silva & Bates 2002, Silva *et al*. 2005), endemic to the Amazon Biome (Stotz *et al.* 1996), and endemic to the Belem Area of Endemism (southeastern portion of the Amazon, east of the Xingu River) (Silva *et al*. 2005, Roma 1996).

Conservation Status

Species conservation status followed the Brazilian official list of threatened fauna (IBAMA & MMA 2014) and the IUCN Red List of Threatened Species (www.iucnredlist.org). The Brazilian official list presents the following categories of threat: Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the wild (EW), Extinct (EX), and Regionally Extinct (RE). Moreover, this national list details the level of threat for some subspecies, such as those endemics to the Belem Area of Endemism, and included in our checklist. Therefore, in these cases, we also annotated the subspecies observed. The IUCN Red List categorizes threatened status as: Least Concern (LC), Near threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW), and Extinct (EX).

RESULTS AND DISCUSSION

We compiled 14,598 occurrence records of birds observed or collected in Maranhão, during 1879 to 2018. From these, 4,191 records correspond to specimens deposited in museums, 1,802 were drawn from the literature, 3,348 obtained from online databases, and 5,257 were compiled from interactive sites. These observations comprise 731 species from 88 families and 30 orders (Table 1; Appendix I). Thus, we add 95 (78 resident, 12 migratory, and 9 vagrants) new species to those reported by Oren (1991). Noteworthy, due to the absence of a complete documented record, misidentification on the museum collection and/or dubious location, we excluded *Phoenicopterus ruber, Dendrocygna bicolor*, *Calidris mauri*, *Cyanopsitta spixii*, *Buteo swainsoni*, *Brotogeris versicoluros and Synallaxis infuscata* of the Oren's (1991) checklist.

Non-Passeriformes are represented by 398 species, from which the families Accipitridae (35), Psittacidae (31), Trochilidae (28), Picidae (23) and Scolopacidae (20) obtained the highest number of records; whereas the families Tyrannidae (66), Thraupidae (59), Thamnophilidae (35), Rhyncocyclidae (22), and Dendrocolaptidae (19) represented the highest number of records for Passeriformes, group which comprised a total of 345 species. These families make up 47% of all species ever found in Maranhão.

Resident birds correspond to 90% of the birds of Maranhão, while migratory species constitute 8% of the list. Most migratory breed in the northern hemisphere (Neartic; n= 38), fifteen breeds in the southern hemisphere, five species are intra-continental migrants and only *Casiornis fuscus* makes longitudinal migration. Nonetheless, the northern coast of Brazil is the second most visited area in South America by migratory birds (Rodrigues 2007). Moreover, due to its location with a wide coast line, Maranhão is recognized internationally as crucial to migratory shorebirds (Morrison and Ross 1989, Rodrigues 2000), and is included on the Western Hemisphere Shorebird Reserve Network, since 1993 (https://www.whsrn.org/). Nine species were likely accidental observation or vagrant migrants.

The ecotonal nature of Maranhão enables the presence of a large number of species endemic to the state (n= 75). Moreover, we found 46 species endemics to Brazil, 35 are restricted to the Amazon forest, 25 are endemic to the Belem Area of Endemism (see subspecies in Table 2), 11 are endemic to Cerrado, and 10 are Caatinga endemics. Maranhão also hosts species typical of arid areas of the Caatinga (e.g. *Columbina picui*, *Cyanocorax cyanopogon*, *Nystalus maculatus*, *Formicivora rufa*), as well as singular species related to open areas and associated to Cerrado biome (e.g. *Cariama cristata*, *Aratinga aurea*, *Lepidocolaptes angustirostris*, *Cypsnagra hirundinacea*, and others) (Olmos & Brito 2007, Santos *et al.* 2010).

Conservation statuses of native and resident species varied, but 39 were included in some category of threat by the national list of threatened fauna (IBAMA & MMA 2014) and 31 species are listed in the IUCN Red List of Threatened Species (IUCN 2018.1). Thirty species are also categorized as Near Threatened (NT) (IUCN 2018.1). Of the migratory species observed, five presents some level of threat (IBAMA & MMA 2014).

The Amazon forest within Maranhão is facing high rates of deforestation, due to stronger pressure from economic groups (Vieira *et al*. 2008), and illegal occupation for agricultural exploitation, logging and uncontrolled burning (Couto 2004, De Luca *et al*. 2009, Oren & Roma 2011). Due to this environmental degradation, the loss of more than 120 bird species is expected (Oren & Roma 2011). Northern Cerrado (MATOPIBA frontier) has also become the latest target of agribusiness expansion, which have resulted in large-scale destruction of natural habitats, and in an increase of 86% of agriculture area between 2005 and 2014 (national average is much lower, 29%) (Lahsen *et al.* 2016). Thus, following the model of other Brazilian states [Paraná (Straube *et al*. 2004), Pará (Machado *et al*. 2008), and São Paulo (Silveira *et al*., 2009)], we recommend the establishing of a state list of endangered species for Maranhão (Table 1), to ground a better informed state conservation strategy plane (Gardenfors 2001).

Despite a substantial effort of geographic representation, both set of records [Revised and Post Oren (1991)] are concentrated in the central region of Maranhão, and along the coast (Fig. 2A-B). However, research projects such as the “Programa de Pesquisa em Biodiversidade (PPBio)”, and field expeditions (such as the “Project Biodiversidade Ameaçada”) engaged by teams from the Universidade Federal do Maranhão and Museu Paraense Emílio Goeldi had a great importance to the information here collected, as most efforts were concentrated in the Amazon region and coastal area. Still, large gaps in the knowledge about avifauna distribution of Maranhão remain, especially in the southern region. This region deserves attention in future studies on birds and wildlife surveys, not only due to the potential discovery of new records, but also due to the increasing threat level in this portion of Cerrado (MMA 2015, Salazar et al. 2015, Azevedo et al. 2016).

Noteworthy, the majority of the recent records were obtained from interactive web sites (36% of total records), supporting that the increased interest for birdwatching and wildlife photography has become a fundamental element in recording species and understanding their occurrences, habits and habitats.

The great increase in the amount of new species observed in Maranhão here reported confirms the up to date nature of this study. This result alone assures we do fill a gap of knowledge on avifauna diversity, and confirms the biological relevance of this ecotone region from northern Brazil. Considering the intensive environmental degradation and the high number of endemic and endangered species we report for the state, we reinforce the need of public policy and civil awareness, aiming to engage conservation actions, and activities supporting the maintenance of such unique wild diversity.

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Table 1. Checklist of the birds of Maranhão. Both scientific and common names, and endemism and conservation statuses are given. Conservation statuses classified by Brazilian IBAMA & MMA (2014) are given in brackets whenever different from those classified by the IUCN committee (IUCN 2018.1). Neartic (N), Austral (A), Intra-tropical (IT) and Longitudinal migrants, endemic to Brazil (EB), endemic to Caatinga (CA), endemic to Cerrado (CE), endemic to Amazon (AM), endemic to Belem Area of Endemism (BAE), Least Concern (LC), Near threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the wild (EW), Extinct (EX), resident (R), northern (NV) and southern (SV) vagrant. Species listed as VU, EN, CR, EW and EX by the Brazilian govenerment (IBAMA & MMA 2014) should be included in an official list of endangered species for Maranhão.

Taxa	Brazilian name	English name	Endemism	Distribution	Status
RHEIFORMES Forbes, 1884					
RHEIDAE Bonaparte, 1849					
Rhea americana (Linnaeus, 1758)	ema	Greater Rhea	-	R	NT
TINAMIFORMES Huxley, 1872					
TINAMIDAE Gray 1840					
Tinamus tao (Temminck, 1815)	azulona	Gray Tinamou	-	R	VU (VU)
Tinamus major (Gmelin, 1789)	inambu-serra	Great Tinamou	-	R	NT
Tinamus guttatus (Pelzeln, 1863)	inambu-galinha	White-throated Tinamou	-	R	NT
Crypturellus cinereus (Gmelin, 1789)	inhambu-pixuna	Cinereous Tinamou	-	R	LC
Crypturellus soui (Hermann, 1783)	tururim	Little Tinamou	-	R	LC
Crypturellus undulatus (Temminck, 1815)	jaó	Undulated Tinamou	-	R	LC
Crypturellus strigulosus (Temminck, 1815)	inambu-relógio	Brazilian Tinamou	-	R	LC
Crypturellus variegatus (Gmelin, 1789)	inambu-anhangá	Variegated Tinamou		R	LC
Crypturellus parvirostris (Wagler, 1827)	inambu-chororó	Small-billed Tinamou	-	R	LC
Crypturellus tataupa (Temminck, 1815)	inambu-chintã	Tataupa Tinamou	-	R	LC
Rhynchotus rufescens (Temminck, 1815)	perdiz	Red-winged Tinamou	-	R	LC
Nothura boraquira (Spix, 1825)	codorna-do-nordeste	White-bellied Nothura	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
ANSERIFORMES Linnaeus, 1758					
ANHIMIDAE Stejneger, 1885					
Anhima cornuta (Linnaeus, 1766)	anhuma	Horned Screamer	-	R	LC
ANATIDAE Leach, 1820					
Dendrocygna viduata (Linnaeus, 1766)	irerê	White-faced Whistling-Duck	-	R	LC
Dendrocygna autumnalis (Linnaeus, 1758)	marreca-cabocla	Black-bellied Whistling-Duck	-	R	LC
Cairina moschata (Linnaeus, 1758)	pato-do-mato	Muscovy Duck	-	R	LC
Sarkidiornis sylvicola Ihering & Ihering, 1907	pato-de-crista	Comb Duck	-	R	LC
Amazonetta brasiliensis (Gmelin, 1789)	ananaí	Brazilian Teal		R	
Anas bahamensis (Linnaeus, 1758)	marreca-toicinho	White-cheeked Pintail	-	R	LC
Anas discors (Linnaeus, 1766)	marreca-de-asa-azul	Blue-winged Teal	-	NV	LC
Nomonyx dominicus (Linnaeus, 1766)	marreca-caucau	Masked Duck	-	R	LC
GALLIFORMES Linnaeus, 1758					
CRACIDAE Rafinesque, 1815					
Penelope superciliaris (Temminck, 1815)	jacupemba	Rusty-margined Guan	-	R	LC
Penelope pileata (Wagler, 1830)	jacupiranga	White-crested Guan	EB	R	VU (VU)
Penelope ochrogaster (Pelzeln, 1870)	jacu-de-barriga-castanha	Chestnut-bellied Guan	EB	R	VU (VU)
Penelope jacucaca (Spix, 1825)	jacucaca	White-browed Guan	EB (CA)	R	VU (VU)
Aburria cujubi (Pelzeln, 1858)	cujubi	Red-throated Piping-Guan		R	NT
Ortalis guttata (Spix, 1825)	aracuã-pintado	Speckled Chachalaca	-	R	LC
Ortalis superciliaris (Gray, 1867)*	aracuã-de-sobrancelhas	Buff-browed Chachalaca	EB (BAE)	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Crax fasciolata (Spix, 1825)*	mutum-de-penacho	Bare-faced Curassow	(BAE)	R	VU (CR)
Pauxi tuberosa (Spix, 1825)	mutum-cavalo	Razor-billed Curassow	-	R	LC
Pauxi mitu (Linnaeus, 1766)	mutum-do-nordeste	Alagoas Curassow	EB	R	EW
ODONTOPHORIDAE Gould, 1844					
Odontophorus gujanensis (Gmelin, 1789)	uru-corcovado	Marbled Wood-Quail	-	R	NT
PODICIPEDIFORMES Fürbringer, 1888					
PODICIPEDIDAE Bonaparte, 1831					
Tachybaptus dominicus (Linnaeus, 1766)	mergulhão-pequeno	Least Grebe	-	R	LC
Podilymbus podiceps (Linnaeus, 1758)	mergulhão-caçador	Pied-billed Grebe	-	R	LC
PROCELLARIIFORMES Fürbringer, 1888					
DIOMEDEIDAE Gray, 1840					
Thalassarche chlororhynchos (Gmelin, 1789)	albatroz-de-nariz-amarelo	Yellow-nosed Albatross	-	SV	EN (NT)
Thalassarche melanophris (Temminck, 1828)	albatroz-de-sobrancelha	Black-browed Albatross	-	SV	LC
PROCELLARIIDAE Leach, 1820					
Calonectris borealis (Cory, 1881)	cagarra-grande	Cory's Shearwater	-	N	LC
Puffinus gravis (O'Reilly, 1818)	pardela-de-barrete	Great Shearwater	-	A	LC
PHAETHONTIFORMES Sharpe, 1891					
PHAETHONTIDAE Brandt, 1840					
Phaethon aethereus (Linnaeus, 1758)	rabo-de-palha	Red-billed Tropicbird		R	LC (EN)
CICONIIFORMES Bonaparte, 1854					
CICONIIDAE Sundevall, 1836					
Ciconia maguari (Gmelin, 1789)	maguari	Maguari Stork	-	R	LC
Jabiru mycteria (Lichtenstein, 1819)	tuiuiú	Jabiru	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Mycteria americana (Linnaeus, 1758)	cabeça-seca	Wood Stork	-	R	LC
SULIFORMES Sharpe, 1891					
FREGATIDAE Degland & Gerbe, 1867					
Fregata magnificens (Mathews, 1914)	tesourão	Magnificent Frigatebird	-	R	LC
SULIDAE Reichenbach, 1849			-		
Sula sula (Linnaeus, 1766)	atobá-de-pé-vermelho	Red-footed Booby		IT	LC (EN)
Sula leucogaster (Boddaert, 1783)	atobá	Brown Booby	-	IT	LC
PHALACROCORACIDAE Reichenbach, 1849					
Nannopterum brasilianus (Gmelin, 1789)	biguá	Neotropic Cormorant	-	R	LC
ANHINGIDAE Reichenbach, 1849					
Anhinga anhinga (Linnaeus, 1766)	biguatinga	Anhinga	-	R	LC
PELECANIFORMES Sharpe, 1891					
ARDEIDAE Leach, 1820					
Tigrisoma lineatum (Boddaert, 1783)	socó-boi	Rufescent Tiger-Heron	-	R	LC
Agamia agami (Gmelin, 1789)	garça-da-mata	Agami Heron	-	R	VU
Cochlearius cochlearius (Linnaeus, 1766)	arapapá	Boat-billed Heron	-	R	LC
Zebrilus undulatus (Gmelin, 1789)	socoí-zigue-zague	Zigzag Heron	-	R	NT
Botaurus pinnatus (Wagler, 1829)	socó-boi-baio	Pinnated Bittern	-	R	LC
Ixobrychus exilis (Gmelin, 1789)	socoí-vermelho	Least Bittern	-	R	LC
Ixobrychus involucris (Vieillot, 1823)	socoí-amarelo	Stripe-backed Bittern	-	R	LC
Nycticorax nycticorax (Linnaeus, 1758)	socó-dorminhoco	Black-crowned Night-Heron		R	LC
Nyctanassa violacea (Linnaeus, 1758)	savacu-de-coroa	Yellow-crowned Night-Heron	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Butorides striata (Linnaeus, 1758)	socozinho	Striated Heron	-	R	LC
Bubulcus ibis (Linnaeus, 1758)	garça-vaqueira	Cattle Egret	-	R	LC
Ardea cocoi (Linnaeus, 1766)	garça-moura	Cocoi Heron	-	R	LC
Ardea alba (Linnaeus, 1758)	garça-branca	Great Egret	-	R	LC
Syrigma sibilatrix (Temminck, 1824)	maria-faceira	Whistling Heron	-	R	LC
Pilherodius pileatus (Boddaert, 1783)	garça-real	Capped Heron	-	R	LC
Egretta tricolor (Statius Muller, 1776)	garça-tricolor	Tricolored Heron	-	R	LC
Egretta thula (Molina, 1782)	garça-branca-pequena	Snowy Egret	-	R	LC
Egretta caerulea (Linnaeus, 1758)	garça-azul	Little Blue Heron	-		LC
THRESKIORNITHIDAE Poche, 1904				R	
Eudocimus ruber (Linnaeus, 1758)	guará	Scarlet Ibis	-	R	LC
Mesembrinibis cayennensis (Gmelin, 1789)	coró-coró	Green Ibis	-	R	LC
Phimosus infuscatus (Lichtenstein, 1823)	tapicuru	Bare-faced Ibis	-	R	LC
Theristicus caudatus (Boddaert, 1783)	curicaca	Buff-necked Ibis	-	R	LC
Platalea ajaja Linnaeus, 1758	colhereiro	Roseate Spoonbill	-	R	LC
CATHARTIFORMES Seebohm, 1890					
CATHARTIDAE Lafresnaye, 1839					
Cathartes aura (Linnaeus, 1758)	urubu-de-cabeça-vermelha	Turkey Vulture	-	R	LC
Cathartes burrovianus (Cassin, 1845)	urubu-de-cabeça-amarela	Lesser Yellow-headed Vulture	-	R	LC
Cathartes melambrotus (Wetmore, 1964)	urubu-da-mata	Greater Yellow-headed Vulture	-	R	LC
Coragyps atratus (Bechstein, 1793)	urubu	Black Vulture	-	R	LC
Sarcoramphus papa (Linnaeus, 1758)	urubu-rei	King Vulture	-	R	LC
ACCIPITRIFORMES Bonaparte, 1831					
PANDIONIDAE Bonaparte, 1854					

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Pandion haliaetus (Linnaeus, 1758)	águia-pescadora	Osprey	-	N	LC
ACCIPITRIDAE Vigors, 1824					
Leptodon cayanensis (Latham, 1790)	gavião-gato	Gray-headed Kite	-	R	LC
Chondrohierax uncinatus (Temminck, 1822)	caracoleiro	Hook-billed Kite	-	R	LC
Elanoides forficatus (Linnaeus, 1758)	gavião-tesoura	Swallow-tailed Kite	-	R	LC
Gampsonyx swainsonii (Vigors, 1825)	gaviãozinho	Pearl Kite	-	R	LC
Elanus leucurus (Vieillot, 1818)	gavião-peneira	White-tailed Kite	-	R	LC
Harpagus bidentatus (Latham, 1790)	gavião-ripina	Double-toothed Kite	-	R	LC
Harpagus diodon (Temminck, 1823)	gavião-bombachinha	Rufous-thighed Kite	-	IT	LC
Circus buffoni (Gmelin, 1788)	gavião-do-banhado	Long-winged Harrier	-	IT	LC
Accipiter poliogaster (Temminck, 1824)	tauató-pintado	Gray-bellied Hawk	-	R	NT
Accipiter superciliosus (Linnaeus, 1766)	tauató-passarinho	Tiny Hawk	-	R	LC
Accipiter bicolor (Vieillot, 1817)	gavião-bombachinha-grande	Bicolored Hawk	-	R	LC
Ictinia plumbea (Gmelin, 1788)	sovi	Plumbeous Kite	-	R	LC
Busarellus nigricollis (Latham, 1790)	gavião-belo	Black-collared Hawk	-	R	LC
Rostrhamus sociabilis (Vieillot, 1817)	gavião-caramujeiro	Snail Kite	-	R	LC
Helicolestes hamatus (Temminck, 1821)	gavião-do-igapó	Slender-billed Kite	-	R	LC
Geranospiza caerulescens (Vieillot, 1817)	gavião-pernilongo	Crane Hawk	-	R	LC
Buteogallus schistaceus (Sundevall, 1850)	gavião-azul	Slate-colored Hawk	-	R	LC
Buteogallus aequinoctialis (Gmelin, 1788)	gavião-caranguejeiro	Rufous Crab Hawk	-	R	NT
Heterospizias meridionalis (Latham, 1790)	gavião-caboclo	Savanna Hawk	-	R	LC
Urubitinga urubitinga (Gmelin, 1788)	gavião-preto	Great Black Hawk	-	R	LC
Urubitinga coronata (Vieillot, 1817)	águia-cinzenta	Crowned Eagle	-	R	NT (EN)
Rupornis magnirostris (Gmelin, 1788)	gavião-carijó	Roadside Hawk	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Parabuteo unicinctus (Temminck, 1824)	gavião-asa-de-telha	Harris's Hawk	-	R	LC
Geranoaetus albicaudatus (Vieillot, 1816)	gavião-de-rabo-branco	White-tailed Hawk	-	R	LC
Geranoaetus melanoleucus (Vieillot, 1819)	águia-serrana	Black-chested Buzzard-Eagle	-	R	LC
Pseudastur albicollis (Latham, 1790)	gavião-branco	White Hawk	-	R	LC
Leucopternis kuhli (Bonaparte, 1850)	gavião-vaqueiro	White-browed Hawk	-	R	LC
Buteo nitidus (Latham, 1790)	gavião-pedrês	Gray-lined Hawk	-	R	LC
Buteo platypterus (Vieillot, 1823)	gavião-de-asa-larga	Broad-winged Hawk	-	N	LC
Buteo brachyurus (Vieillot, 1816)	gavião-de-cauda-curta	Short-tailed Hawk	-	R	LC
Buteo albonotatus (Kaup, 1847)	gavião-urubu	Zone-tailed Hawk	-	R	LC
Morphnus guianensis (Daudin, 1800)	uiraçu	Crested Eagle	-	R	NT (VU)
Harpia harpyja (Linnaeus, 1758)	gavião-real	Harpy Eagle	-	R	NT (VU)
Spizaetus tyrannus (Wied, 1820)	gavião-pega-macaco	Black Hawk-Eagle	-	R	LC
Spizaetus melanoleucus (Vieillot, 1816)	gavião-pato	Black-and-white Hawk-Eagle	-	R	LC
EURYPYGIFORMES Fürbringer, 1888					
EURYPYGIDAE Selby, 1840					
Eurypyga helias (Pallas, 1781)	pavãozinho-do-pará	Sunbittern	-	R	LC
GRUIFORMES Bonaparte, 1854					
ARAMIDAE Bonaparte, 1852					
Aramus guarauna (Linnaeus, 1766)	carão	Limpkin	-	R	LC
PSOPHIIDAE Bonaparte, 1831					
Psophia obscura (Pelzeln, 1857)	jacamim-de-costas-escuras	Dark-winged Trumpeter	EB (BAE)	R	LC (CR)
RALLIDAE Rafinesque, 1815					
Rallus longirostris (Boddaert, 1783)	saracura-matraca	Mangrove Rail	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Aramides ypecaha (Vieillot, 1819)	saracuruçu	Giant Wood-Rail	-	R	LC
Aramides mangle (Spix, 1825)	saracura-do-mangue	Little Wood-Rail	-	R	LC
Aramides cajaneus (Statius Muller, 1776)	saracura-três-potes	Gray-necked Wood-Rail	-	R	LC
Laterallus viridis (Statius Muller, 1776)	sanã-castanha	Russet-crowned Crake	-	R	LC
Laterallus melanophaius (Vieillot, 1819)	sanã-parda	Rufous-sided Crake	-	R	LC
Laterallus exilis (Temminck, 1831)	sanã-do-capim	Gray-breasted Crake	-	R	LC
Laterallus jamaicensis (Gmelin, 1789)	sanã-preta	Black Rail	-	R	NT
Porzana flaviventer (Boddaert, 1783)	sanã-amarela	Yellow-breasted Crake	-	R	LC
Mustelirallus albicollis (Vieillot, 1819)	sanã-carijó	Ash-throated Crake	-	R	LC
Neocrex erythrops (Sclater, 1867)	turu-turu	Paint-billed Crake	-	R	LC
Pardirallus maculatus (Boddaert, 1783)	saracura-carijó	Spotted Rail	-	R	LC
Gallinula galeata (Lichtenstein, 1818)	galinha-d'água	Common Gallinule	-	R	LC
Porphyriops melanops (Vieillot, 1819)	galinha-d'água-carijó	Spot-flanked Gallinule	-	R	LC
Porphyrio martinicus (Linnaeus, 1766)	frango-d'água-azul	Purple Gallinule	-	R	LC
Porphyrio flavirostris (Gmelin, 1789)	frango-d'água-pequeno	Azure Gallinule	-	IT	LC
HELIORNITHIDAE Gray, 1840					
Heliornis fulica (Boddaert, 1783)	picaparra	Sungrebe	-	R	LC
CHARADRIIFORMES Huxley, 1867					
CHARADRIIDAE Leach, 1820			-		
Vanellus cayanus (Latham, 1790)	mexeriqueira	Pied Lapwing	-	R	LC
Vanellus chilensis (Molina, 1782)	quero-quero	Southern Lapwing	-	R	LC
Pluvialis dominica (Statius Muller, 1776)	batuiruçu	American Golden-Plover	-	N	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Pluvialis squatarola (Linnaeus, 1758)	batuiruçu-de-axila-preta	Black-bellied Plover	-	N	LC
Charadrius semipalmatus (Bonaparte, 1825)	batuíra-de-bando	Semipalmated Plover	-	N	LC
Charadrius wilsonia (Ord, 1814)	batuíra-bicuda	Wilson's Plover	-	R	LC (VU)
Charadrius collaris (Vieillot, 1818)	batuíra-de-coleira	Collared Plover	-	R	LC
HAEMATOPODIDAE Bonaparte, 1838					
Haematopus palliatus (Temminck, 1820)	piru-piru	American Oystercatcher	-	R	LC
RECURVIROSTRIDAE Bonaparte, 1831					
Himantopus mexicanus (Statius Muller, 1776)	pernilongo-de-costas-negras	Black-necked Stilt	-	R	LC
SCOLOPACIDAE Rafinesque, 1815					
Gallinago paraguaiae (Vieillot, 1816)	narceja	South American Snipe	-	R	LC
Limnodromus griseus (Gmelin, 1789)	maçarico-de-costas-brancas	Short-billed Dowitcher	-	N	LC (CR)
Limosa haemastica (Linnaeus, 1758)	maçarico-de-bico-virado	Hudsonian Godwit	-	N	LC
Limosa lapponica (Linnaeus, 1758)	fuselo	Bar-tailed Godwit	-	NV	NT
Limosa fedoa (Linnaeus, 1758)]	maçarico-marmóreo	Marbled Godwit		N	LC
Numenius hudsonicus (Latham, 1790)	maçarico-de-bico-torto	American Whimbrel	-	N	LC
Bartramia longicauda (Bechstein, 1812)	maçarico-do-campo	Upland Sandpiper	-	N	LC
Actitis macularius (Linnaeus, 1766)	maçarico-pintado	Spotted Sandpiper	-	N	LC
Tringa solitaria (Wilson, 1813)	maçarico-solitário	Solitary Sandpiper	-	N	LC
Tringa melanoleuca (Gmelin, 1789)	maçarico-grande-de-perna-amarela	Greater Yellowlegs	-	N	LC
Tringa semipalmata (Gmelin, 1789)	maçarico-de-asa-branca	Willet	-	N	LC
Tringa flavipes (Gmelin, 1789)	maçarico-de-perna-amarela	Lesser Yellowlegs	-	N	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Arenaria interpres (Linnaeus, 1758)	vira-pedras	Ruddy Turnstone	-	N	LC
Calidris canutus (Linnaeus, 1758)	maçarico-de-papo-vermelho	Red Knot	-	N	NT (CR)
Calidris alba (Pallas, 1764)	maçarico-branco	Sanderling	-	N	LC
Calidris pusilla (Linnaeus, 1766)	maçarico-rasteirinho	Semipalmated Sandpiper	-	N	NT (EN)
Calidris minutilla (Vieillot, 1819)	maçariquinho	Least Sandpiper	-	N	LC
Calidris fuscicollis (Vieillot, 1819)	maçarico-de-sobre-branco	White-rumped Sandpiper	-	N	LC
Calidris melanotos (Vieillot, 1819)	maçarico-de-colete	Pectoral Sandpiper	-	N	LC
Calidris subruficollis (Vieillot, 1819)	maçarico-acanelado	Buff-breasted Sandpiper	-	N	NT (VU)
JACANIDAE Chenu & Des Murs, 1854					
Jacana jacana (Linnaeus, 1766)	jaçanã	Wattled Jacana	-	R	LC
STERCORARIIDAE Gray, 1870					
Stercorarius skua (Brünnich, 1764)	mandrião-grande	Great Skua	-	N	LC
Stercorarius maccormicki (Saunders, 1893)	mandrião-do-sul	South Polar Skua	-	A	LC
Stercorarius pomarinus (Temminck, 1815)	mandrião-pomarino	Pomarine Jaeger	-	N	LC
Stercorarius parasiticus (Linnaeus, 1758)	mandrião-parasítico	Parasitic Jaeger	-	N	LC
LARIDAE Rafinesque, 1815					
Xema sabini (Sabine, 1819)	gaivota-de-sabine	Sabine's Gull	-	NV	LC
Chroicocephalus cirrocephalus (Vieillot, 1818)	gaivota-de-cabeça-cinza	Gray-hooded Gull	-	R	LC
Leucophaeus atricilla (Linnaeus, 1758)	gaivota-alegre	Laughing Gull	-	N	LC
Leucophaeus pipixcan (Wagler, 1831)	gaivota-de-franklin	Franklin's Gull	-	NV	LC
Larus dominicanus Lichtenstein, 1823	gaivotão	Kelp Gull	-	SV	LC
Larus fuscus (Linnaeus, 1758)	gaivota-da-asa-escura	Lesser Black-backed Gull	-	NV	LC
STERNIDAE Vigors, 1825					

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Anous stolidus (Linnaeus, 1758)	trinta-réis-escuro	Brown Noddy	-	NV	LC
Onychoprion fuscatus (Linnaeus, 1766)	trinta-réis-das-rocas	Sooty Tern	-	R	LC
Sternula antillarum (Lesson, 1847)	trinta-réis-miúdo	Least Tern	-	R	LC
Sternula superciliaris (Vieillot, 1819)	trinta-réis-pequeno	Yellow-billed Tern	-	R	LC
Phaetusa simplex (Gmelin, 1789)	trinta-réis-grande	Large-billed Tern	-	R	LC
Gelochelidon nilotica (Gmelin, 1789)	trinta-réis-de-bico-preto	Gull-billed Tern	-	R	LC
Chlidonias niger (Linnaeus, 1758)	trinta-réis-negro	Black Tern	-	N	LC
Sterna hirundo (Linnaeus, 1758)	trinta-réis-boreal	Common Tern	-	N	LC
Sterna dougallii (Montagu, 1813)	trinta-réis-róseo	Roseate Tern	-	N	LC (VU)
Sterna paradisaea (Pontoppidan, 1763)	trinta-réis-ártico	Arctic Tern	-	N	LC
Thalasseus acuflavidus (Cabot, 1847)	trinta-réis-de-bando	Cabot's Tern	-	R	LC
Thalasseus maximus (Boddaert, 1783)	trinta-réis-real	Royal Tern	-	R	LC (EN)
RYNCHOPIDAE Bonaparte, 1838					
Rynchops niger (Linnaeus, 1758)	talha-mar	Black Skimmer	-	R	LC
COLUMBIFORMES Latham, 1790					
COLUMBIDAE Leach, 1820					
Columbina passerina (Linnaeus, 1758)	rolinha-cinzenta	Common Ground-Dove	-	R	LC
Columbina minuta (Linnaeus, 1766)	rolinha-de-asa-canela	Plain-breasted Ground-Dove	-	R	LC
Columbina talpacoti (Temminck, 1810)	rolinha	Ruddy Ground-Dove	-	R	LC
Columbina squammata (Lesson, 1831)	fogo-apagou	Scaled Dove	-	R	LC
Columbina picui (Temminck, 1813)	rolinha-picuí	Picui Ground-Dove	-	R	LC
Claravis pretiosa (Ferrari-Perez, 1886)	pararu-azul	Blue Ground-Dove	-	R	LC
Uropelia campestris (Spix, 1825)	rolinha-vaqueira	Long-tailed Ground-Dove	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Columba livia (Gmelin, 1789)	pombo-doméstico	Rock Pigeon	-	R	LC
Patagioenas speciosa (Gmelin, 1789)	pomba-trocal	Scaled Pigeon	-	R	LC
Patagioenas picazuro (Temminck, 1813)	asa-branca	Picazuro Pigeon	-	R	LC
Patagioenas cayennensis (Bonnaterre, 1792)	pomba-galega	Pale-vented Pigeon	-	R	LC
Patagioenas plumbea (Vieillot, 1818)	pomba-amargosa	Plumbeous Pigeon	-	R	LC
Patagioenas subvinacea (Lawrence, 1868)	pomba-botafogo	Ruddy Pigeon	-	R	VU
Zenaida auriculata (Des Murs, 1847)	avoante	Eared Dove	-	R	LC
Leptotila verreauxi Bonaparte, 1855	juriti-pupu	White-tipped Dove	-	R	LC
Leptotila rufaxilla (Richard & Bernard, 1792)	juriti-de-testa-branca	Gray-fronted Dove	-	R	LC
Geotrygon montana (Linnaeus, 1758)	pariri	Ruddy Quail-Dove	-	R	LC
OPISTHOCOMIFORMES Sclater, 1880					
OPISTHOCOMIDAE Swainson, 1837					
Opisthocomus hoazin (Statius Muller, 1776)	cigana	Hoatzin	-	R	LC
CUCULIFORMES Wagler, 1830					
CUCULIDAE Leach, 1820					
Coccycua minuta (Vieillot, 1817)	chincoã-pequeno	Little Cuckoo	-	R	LC
Piaya cayana (Linnaeus, 1766)	alma-de-gato	Squirrel Cuckoo	-	R	LC
Coccyzus melacoryphus (Vieillot, 1817)	papa-lagarta	Dark-billed Cuckoo	-	A	LC
Coccyzus americanus (Linnaeus, 1758)	papa-lagarta-de-asa-vermelha	Yellow-billed Cuckoo	-	R	LC
Coccyzus euleri (Cabanis, 1873)	papa-lagarta-de-euler	Pearly-breasted Cuckoo	-	R	LC
Coccyzus minor (Gmelin, 1788)	papa-lagarta-do-mangue	Mangrove Cuckoo	-	R	LC
Crotophaga major (Gmelin, 1788)	anu-coroca	Greater Ani	-	R	LC
Crotophaga ani (Linnaeus, 1758)	anu-preto	Smooth-billed Ani	-	R	LC
Guira guira (Gmelin, 1788)	anu-branco	Guira Cuckoo	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Tapera naevia (Linnaeus, 1766)	saci	Striped Cuckoo	-	R	LC
Dromococcyx phasianellus (Spix, 1824)	peixe-frito	Pheasant Cuckoo	-	R	LC
Dromococcyx pavoninus Pelzeln, 1870	peixe-frito-pavonino	Pavonine Cuckoo	-	R	LC
Neomorphus geoffroyi (Temminck, 1820)	jacu-estalo	Rufous-vented Ground-Cuckoo	-	R	VU (VU)
STRIGIFORMES Wagler, 1830					
TYTONIDAE Mathews, 1912					
Tyto furcata (Temminck, 1827)	suindara	American Barn Owl	-	R	LC
STRIGIDAE Leach, 1820					
Megascops choliba (Vieillot, 1817)	corujinha-do-mato	Tropical Screech-Owl	-	R	LC
Megascops usta (Sclater, 1858)	corujinha-relógio	Austral Screech-Owl	-	R	
Lophostrix cristata (Daudin, 1800)	coruja-de-crista	Crested Owl	-	R	LC
Pulsatrix perspicillata (Latham, 1790)	murucututu	Spectacled Owl	-	R	LC
Bubo virginianus (Gmelin, 1788)	jacurutu	Great Horned Owl	-	R	LC
Strix virgata (Cassin, 1849)	coruja-do-mato	Mottled Owl	-	R	LC
Strix huhula (Daudin, 1800)	coruja-preta	Black-banded Owl	-	R	LC
Glaucidium hardyi (Vielliard, 1990)	caburé-da-amazônia	Amazonian Pygmy-Owl	-	R	LC
Glaucidium brasilianum (Gmelin, 1788)	caburé	Ferruginous Pygmy-Owl	-	R	LC
Athene cunicularia (Molina, 1782)	coruja-buraqueira	Burrowing Owl	-	R	LC
Asio clamator (Vieillot, 1808)	coruja-orelhuda	Striped Owl	-	R	LC
NYCTIBIIFORMES Yuri, Kimball, Harshman, Bowie, Braun, Chojnowski, Hackett, Huddleston, Moore, Reddy, Sheldon, Steadman, Witt & Braun, 2013					
NYCTIBIIDAE Chenu & Des Murs, 1851					
Nyctibius grandis (Gmelin, 1789)	urutau-grande	Great Potoo	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Nyctibius aethereus (Wied, 1820)	urutau-pardo	Long-tailed Potoo	-	R	LC
Nyctibius griseus (Gmelin, 1789)	urutau	Common Potoo	-	R	LC
Nyctibius leucopterus (Wied, 1821)	urutau-de-asa-branca	White-winged Potoo	-	R	LC (CR)
CAPRIMULGIFORMES Ridgway, 1881					
CAPRIMULGIDAE Vigors, 1825					
Nyctiphrynus ocellatus (Tschudi, 1844)	bacurau-ocelado	Ocellated Poorwill	-	R	LC
Antrostomus rufus (Boddaert, 1783)	joão-corta-pau	Rufous Nightjar	-	A	LC
Antrostomus sericocaudatus (Cassin, 1849)	bacurau-rabo-de-seda	Silky-tailed Nightjar	-	R	LC
Lurocalis semitorquatus (Gmelin, 1789)	tuju	Short-tailed Nighthawk	-	R	LC
Nyctiprogne leucopyga (Spix, 1825)	bacurau-de-cauda-barrada	Band-tailed Nighthawk	-	R	LC
Nyctidromus nigrescens (Cabanis, 1849)	bacurau-de-lajeado	Blackish Nightjar	-	R	LC
Nyctidromus albicollis (Gmelin, 1789)	bacurau	Common Pauraque	-	R	LC
Hydropsalis parvula (Gould, 1837)	bacurau-chintã	Little Nightjar	-	R	LC
Hydropsalis maculicaudus (Lawrence, 1862)	bacurau-de-rabo-maculado	Spot-tailed Nightjar	-	R	LC
Hydropsalis torquata (Gmelin, 1789)	bacurau-tesoura	Scissor-tailed Nightjar	-	R	LC
Nannochordeiles pusillus (Gould, 1861)	bacurauzinho	Least Nighthawk	-	R	LC
Podager nacunda (Vieillot, 1817)	corucão	Nacunda Nighthawk	-	R	LC
Chordeiles minor (Forster, 1771)	bacurau-norte-americano	Common Nighthawk	-	N	LC
Chordeiles rupestris (Spix, 1825)	bacurau-da-praia	Sand-colored Nighthawk	-	R	LC
Chordeiles acutipennis (Hermann, 1783)	bacurau-de-asa-fina	Lesser Nighthawk	-	R	LC

APODIFORMES Peters, 1940

APODIDAE Olphe-Galliard, 1887

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Cypseloides senex (Temminck, 1826)	taperuçu-velho	Great Dusky Swift	-	R	LC
Streptoprocne zonaris (Shaw, 1796)	taperuçu-de-coleira-branca	White-collared Swift	-	R	LC
Chaetura spinicaudus (Temminck, 1839)	andorinhão-de-sobre-branco	Band-rumped Swift	-	R	LC
Chaetura chapmani (Hellmayr, 1907)	andorinhão-de-chapman	Chapman's Swift	-	R	LC
Chaetura meridionalis (Hellmayr, 1907)	andorinhão-do-temporal	Sick's Swift	-	A	LC
Chaetura brachyura (Jardine, 1846)	andorinhão-de-rabo-curto	Short-tailed Swift	-	R	LC
Tachornis squamata (Cassin, 1853)	andorinhão-do-buriti	Fork-tailed Palm-Swift	-	R	LC
Panyptila cayennensis (Gmelin, 1789)	andorinhão-estofador	Lesser Swallow-tailed Swift	-	R	LC
Panyptila cayennensis (Gmelin, 1789)					
TROCHILIDAE Vigors, 1825					
Glaucis hirsutus (Gmelin, 1788)	balança-rabo-de-bico-torto	Rufous-breasted Hermit	-	R	LC
Threnetes leucurus (Linnaeus, 1766)*	balança-rabo-de-garganta-preta	Pale-tailed Barbthroat	(BAE)	R	LC
*Phaethornis maranhaoensis (*Grantsau, 1968)	rabo-branco-do-maranhão	Maranhao Hermit	EB	R	LC
Phaethornis ruber (Linnaeus, 1758)	rabo-branco-rubro	Reddish Hermit	-	R	LC
Phaethornis pretrei (Lesson & Delattre, 1839)	rabo-branco-acanelado	Planalto Hermit	-	R	LC
Phaethornis superciliosus (Linnaeus, 1766)	rabo-branco-de-bigodes	Long-tailed Hermit	-	R	LC
Campylopterus largipennis (Boddaert, 1783)	asa-de-sabre-cinza	Gray-breasted Sabrewing	-	R	LC
Eupetomena macroura (Gmelin, 1788)	beija-flor-tesoura	Swallow-tailed Hummingbird	-	R	LC
Florisuga mellivora (Linnaeus, 1758)	beija-flor-azul-de-rabo-branco	White-necked Jacobin	-	R	LC
Anthracothorax nigricollis (Vieillot, 1817)	beija-flor-de-veste-preta	Black-throated Mango	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Avocettula recurvirostris (Swainson, 1822)	beija-flor-de-bico-virado	Fiery-tailed Awlbill	-	R	LC
Topaza pella (Linnaeus, 1758)*	beija-flor-brilho-de-fogo	Crimson Topaz	(BAE)	R	LC
Chrysolampis mosquitus (Linnaeus, 1758)	beija-flor-vermelho	Ruby-topaz Hummingbird	-	A	LC
Lophornis gouldii (Lesson, 1832)	topetinho-do-brasil-central	Dot-eared Coquette	-	R	VU (VU)
Chlorestes notata (Reich, 1793)	beija-flor-de-garganta-azul	Blue-chinned Sapphire	-	R	LC
Chlorostilbon mellisugus (Linnaeus, 1758)	esmeralda-de-cauda-azul	Blue-tailed Emerald	-	R	LC
Chlorostilbon lucidus (Shaw, 1812)	besourinho-de-bico-vermelho	Glittering-bellied Emerald	-	R	LC
Thalurania furcata (Gmelin, 1788)	beija-flor-tesoura-verde	Fork-tailed Woodnymph	-	R	LC
Hylocharis cyanus (Vieillot, 1818)	beija-flor-roxo	White-chinned Sapphire	-	R	LC
Polytmus guainumbi (Pallas, 1764)	beija-flor-de-bico-curvo	White-tailed Goldenthroat	-	R	LC
Polytmus theresiae (Da Silva Maia, 1843)	beija-flor-verde	Green-tailed Goldenthroat	-	R	LC
Amazilia leucogaster (Gmelin, 1788)	beija-flor-de-barriga-branca	Plain-bellied Emerald	-	R	LC
Amazilia versicolor (Vieillot, 1818)	beija-flor-de-banda-branca	Versicolored Emerald	-	R	LC
Amazilia fimbriata (Gmelin, 1788)	beija-flor-de-garganta-verde	Glittering-throated Emerald	-	R	LC
Heliothryx auritus (Gmelin, 1788)	beija-flor-de-bochecha-azul	Black-eared Fairy	-	R	LC
Heliactin bilophus (Temminck, 1820)	chifre-de-ouro	Horned Sungem	-	R	LC
Heliomaster longirostris (Audebert & Vieillot, 1801)	bico-reto-cinzento	Long-billed Starthroat	-	R	LC
Calliphlox amethystina (Boddaert, 1783)	estrelinha-ametista	Amethyst Woodstar	-	R	LC

TROGONIFORMES A. O. U., 1886

Taxa	Brazilian name	English name	Endemism	Distribution	Status
TROGONIDAE Lesson, 1828					
Trogon melanurus (Swainson, 1838)	surucuá-de-cauda-preta	Black-tailed Trogon	-	R	LC
Trogon viridis (Linnaeus, 1766)	surucuá-de-barriga-amarela	Green-backed Trogon	-	R	LC
Trogon ramonianus (Deville & DesMurs, 1849)	surucuá-pequeno	Amazonian Trogon	-	R	
Trogon curucui (Linnaeus, 1766)	surucuá-de-barriga-vermelha	Blue-crowned Trogon	-	R	LC
Trogon rufus (Gmelin, 1788)	surucuá-dourado	Black-throated Trogon	-	R	LC
CORACIIFORMES Forbes, 1844					
ALCEDINIDAE Rafinesque, 1815					
Megaceryle torquata (Linnaeus, 1766)	martim-pescador-grande	Ringed Kingfisher	-	R	LC
Chloroceryle amazona (Latham, 1790)	martim-pescador-verde	Amazon Kingfisher	-	R	LC
Chloroceryle aenea (Pallas, 1764)	martim-pescador-miúdo	American Pygmy Kingfisher	-	R	LC
Chloroceryle americana (Gmelin, 1788)	martim-pescador-pequeno	Green Kingfisher	-	R	LC
Chloroceryle inda (Linnaeus, 1766)	martim-pescador-da-mata	Green-and-rufous Kingfisher	-	R	LC
MOMOTIDAE Gray, 1840					
Momotus momota (Linnaeus, 1766)	udu	Amazonian Motmot	-		
GALBULIFORMES Fürbringer, 1888					
GALBULIDAE Vigors, 1825					
Brachygalba lugubris (Swainson, 1838)	ariramba-preta	Brown Jacamar	-	R	LC
Galbula cyanicollis (Cassin, 1851)	ariramba-da-mata	Blue-cheeked Jacamar	-	R	LC
Galbula ruficauda (Cuvier, 1816)	ariramba	Rufous-tailed Jacamar	-	R	LC
Galbula dea (Linnaeus, 1758)	ariramba-do-paraíso	Paradise Jacamar	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Jacamerops aureus (Statius Muller, 1776)	jacamaraçu	Great Jacamar	-	R	LC
BUCCONIDAE Horsfield, 1821					
Notharchus hyperrhynchus (Sclater, 1856)	macuru-de-testa-branca	White-necked Puffbird	-	R	LC
Notharchus tectus (Boddaert, 1783)	macuru-pintado	Pied Puffbird	-	R	LC
*Bucco tamatia (*Gmelin, 1788)	rapazinho-carijó	Spotted Puffbird	-	R	LC
Bucco capensis (Linnaeus, 1766)	rapazinho-de-colar	Collared Puffbird	-	R	LC
*Nystalus torridus (*Bond & Meyer de Schauensee, 1940)	rapazinho-estriado-do-leste	Eastern Striolated-Puffbird	-	R	LC
Nystalus chacuru (Vieillot, 1816)	joão-bobo	White-eared Puffbird	-	R	LC
Nystalus maculatus (Gmelin, 1788)	rapazinho-dos-velhos	Spot-backed Puffbird	-	R	LC
Malacoptila striata (Spix, 1824)	barbudo-rajado	Crescent-chested Puffbird	-	R	NT
Malacoptila rufa (Spix, 1824)	barbudo-de-pescoço-ferrugem	Rufous-necked Puffbird	-	R	LC
Nonnula rubecula (Spix, 1824)	macuru	Rusty-breasted Nunlet	-	R	LC
Monasa nigrifrons (Spix, 1824)	chora-chuva-preto	Black-fronted Nunbird	-	R	LC
Monasa morphoeus (Hahn & Küster, 1823)	chora-chuva-de-cara-branca	White-fronted Nunbird	-	R	LC
Chelidoptera tenebrosa (Pallas, 1782)	urubuzinho	Swallow-winged Puffbird	-	R	LC
PICIFORMES Meyer & Wolf, 1810					
RAMPHASTIDAE Vigors, 1825					
Ramphastos toco (Statius Muller, 1776)	tucanuçu	Toco Toucan	-	R	LC
Ramphastos tucanus (Linnaeus, 1758)	tucano-de-papo-branco	White-throated Toucan	-	R	VU
Ramphastos vitellinus (Lichtenstein, 1823)	tucano-de-bico-preto	Channel-billed Toucan	-	R	VU
Selenidera gouldii (Natterer, 1837)	saripoca-de-gould	Gould's Toucanet	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Pteroglossus inscriptus (Swainson, 1822)	araçari-de-bico-riscado	Lettered Aracari	-	R	LC
Pteroglossus bitorquatus (Vigors, 1826)*	araçari-de-pescoço-vermelho	Red-necked Aracari	(BAE)	R	EN (VU)
Pteroglossus aracari (Linnaeus, 1758)	araçari-de-bico-branco	Black-necked Aracari	-	R	LC
PICIDAE Leach, 1820					
Picumnus buffonii (Lafresnaye, 1845)	picapauzinho-de-costas-pintadas	Buffon's Piculet	-	R	LC
Picumnus pygmaeus (Lichtenstein, 1823)	picapauzinho-pintado	Spotted Piculet	EB (CA)	R	LC
Picumnus cirratus (Temminck, 1825)	picapauzinho-barrado	White-barred Piculet	-	R	LC
Picumnus albosquamatus (d'Orbigny, 1840)	picapauzinho-escamoso	White-wedged Piculet	-	R	LC
Melanerpes candidus (Otto, 1796)	pica-pau-branco	White Woodpecker	-	R	LC
Melanerpes cruentatus (Boddaert, 1783)	benedito-de-testa-vermelha	Yellow-tufted Woodpecker	-	R	LC
Veniliornis affinis (Swainson, 1821)	picapauzinho-avermelhado	Red-stained Woodpecker	-	R	LC
Veniliornis passerinus (Linnaeus, 1766)	pica-pau-pequeno	Little Woodpecker	-	R	LC
Veniliornis mixtus (Boddaert, 1783)	pica-pau-chorão	Checkered Woodpecker	-	R	LC
Piculus flavigula (Boddaert, 1783)	pica-pau-bufador	Yellow-throated Woodpecker	-	R	LC
Piculus paraensis (Snethlage, 1907)	pica-pau-dourado-de-belém	Belem Woodpecker	EB (BAE)	R	LC (EN)
Piculus chrysochloros (Vieillot, 1818)	pica-pau-dourado-escuro	Golden-green Woodpecker	-	R	LC
Colaptes melanochloros (Gmelin, 1788)	pica-pau-verde-barrado	Green-barred Woodpecker	-	R	LC
Colaptes campestris (Vieillot, 1818)	pica-pau-do-campo	Campo Flicker	-	R	LC
Celeus torquatus (Boddaert, 1783)*	pica-pau-de-coleira	Ringed Woodpecker	(BAE)	R	NT (EN)
Celeus ochraceus (Spix, 1824)	pica-pau-ocráceo	Ochre-backed Woodpecker	EB	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Celeus elegans (Statius Muller, 1776)	pica-pau-chocolate	Chestnut Woodpecker	-	R	LC
Celeus undatus (Linnaeus, 1766)	pica-pau-barrado	Waved Woodpecker	-	R	LC
Celeus flavus (Statius Muller, 1776)	pica-pau-amarelo	Cream-colored Woodpecker	-	R	LC
*Celeus obrieni (*Short, 1973)	pica-pau-do-parnaíba	Kaempfer's Woodpecker	EB (CE)	R	EN (VU)
Dryocopus lineatus (Linnaeus, 1766)	pica-pau-de-banda-branca	Lineated Woodpecker	-	R	LC
Campephilus rubricollis (Boddaert, 1783)	pica-pau-de-barriga-vermelha	Red-necked Woodpecker	-	R	LC
Campephilus melanoleucos (Gmelin, 1788)	pica-pau-de-topete-vermelho	Crimson-crested Woodpecker	-	R	LC
CARIAMIFORMES Fürbringer, 1888					
CARIAMIDAE Bonaparte, 1850					
Cariama cristata (Linnaeus, 1766)	seriema	Red-legged Seriema	-	R	LC
FALCONIFORMES Bonaparte, 1831					
FALCONIDAE Leach, 1820					
Daptrius ater (Vieillot, 1816)	gavião-de-anta	Black Caracara	-	R	LC
Ibycter americanus (Boddaert, 1783)	cancão	Red-throated Caracara	-	R	LC
Caracara plancus (Miller, 1777)	carcará	Southern Caracara	-	R	LC
Milvago chimachima (Vieillot, 1816)	carrapateiro	Yellow-headed Caracara	-	R	LC
Herpetotheres cachinnans (Linnaeus, 1758)	acauã	Laughing Falcon	-	R	LC
Micrastur ruficollis (Vieillot, 1817)	falcão-caburé	Barred Forest-Falcon	-	R	LC
Micrastur mintoni (Whittaker, 2003)	falcão-críptico	Cryptic Forest-Falcon	-	R	LC
Micrastur semitorquatus (Vieillot, 1817)	falcão-relógio	Collared Forest-Falcon	-	R	LC
Falco sparverius (Linnaeus, 1758)	quiriquiri	American Kestrel	-	R	LC
Falco rufigularis (Daudin, 1800)	cauré	Bat Falcon	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Falco deiroleucus (Temminck, 1825)	falcão-de-peito-laranja	Orange-breasted Falcon	-	R	NT
Falco femoralis (Temminck, 1822)	falcão-de-coleira	Aplomado Falcon	-	R	LC
Falco peregrinus (Tunstall, 1771)	falcão-peregrino	Peregrine Falcon	-	N	LC
PSITTACIFORMES Wagler, 1830					
PSITTACIDAE Rafinesque, 1815					
Anodorhynchus hyacinthinus (Latham, 1790)	arara-azul	Hyacinth Macaw	-	R	VU
Ara ararauna (Linnaeus, 1758)	arara-canindé	Blue-and-yellow Macaw	-	R	LC
Ara macao (Linnaeus, 1758)	araracanga	Scarlet Macaw	-	R	LC
Ara chloropterus Gray, 1859	arara-vermelha	Red-and-green Macaw	-	R	LC
Ara severus (Linnaeus, 1758)	maracanã-guaçu	Chestnut-fronted Macaw	-	R	LC
Orthopsittaca manilatus (Boddaert, 1783)	maracanã-do-buriti	Red-bellied Macaw	-	R	LC
Primolius maracana (Vieillot, 1816)	maracanã	Blue-winged Macaw	-	R	NT
Diopsittaca nobilis (Linnaeus, 1758)	maracanã-pequena	Red-shouldered Macaw	-	R	LC
Guaruba guarouba (Gmelin, 1788)	ararajuba	Golden Parakeet	EB (AM)	R	VU (VU)
Thectocercus acuticaudatus (Vieillot, 1818)	aratinga-de-testa-azul	Blue-crowned Parakeet	-	R	LC
Psittacara leucophthalmus (Statius Muller, 1776)	periquitão	White-eyed Parakeet	-	R	LC
Aratinga jandaya (Gmelin, 1788)	jandaia	Jandaya Parakeet	EB	R	LC
Eupsittula aurea (Gmelin, 1788)	periquito-rei	Peach-fronted Parakeet	-	R	LC
Eupsittula cactorum (Kuhl, 1820)	periquito-da-caatinga	Cactus Parakeet	EB (CA)	R	LC
Pyrrhura coerulescens (Neumann, 1927)	tiriba-pérola	Pearly Parakeet	EB (BAE)	R	VU (VU)
Pyrrhura amazonum (Hellmayr, 1906)	tiriba-de-hellmayr	Santarem Parakeet	EB	R	EN

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Forpus xanthopterygius (Spix, 1824)	tuim	Blue-winged Parrotlet	-	R	LC
Brotogeris chiriri (Vieillot, 1818)	periquito-de-encontro-amarelo	Yellow-chevroned Parakeet	-	R	LC
Brotogeris chrysoptera (Linnaeus, 1766)	periquito-de-asa-dourada	Golden-winged Parakeet	-	R	LC
Touit huetii (Temminck, 1830)	apuim-de-asa-vermelha	Scarlet-shouldered Parrotlet	-	R	VU
Pionites leucogaster (Kuhl, 1820)	marianinha-de-cabeça-amarela	White-bellied Parrot	-	R	EN
Pyrilia vulturina (Kuhl, 1820)	curica-urubu	Vulturine Parrot	EB (AM)	R	VU (VU)
Alipiopsitta xanthops (Spix, 1824)	papagaio-galego	Yellow-faced Parrot	(CE)	R	NT
Pionus menstruus (Linnaeus, 1766)	maitaca-de-cabeça-azul	Blue-headed Parrot	-	R	LC
Pionus maximiliani (Kuhl, 1820)	maitaca	Scaly-headed Parrot	-	R	LC
Pionus fuscus (Statius Muller, 1776)	maitaca-roxa	Dusky Parrot	-	R	LC
Amazona farinosa (Boddaert, 1783)	papagaio-moleiro	Mealy Parrot	-	R	NT
Amazona amazonica (Linnaeus, 1766)	curica	Orange-winged Parrot	-	R	LC
Amazona ochrocephala (Gmelin, 1788)	papagaio-campeiro	Yellow-crowned Parrot	-	R	LC
Amazona aestiva (Linnaeus, 1758)	papagaio	Turquoise-fronted Parrot	-	R	LC
Deroptyus accipitrinus (Linnaeus, 1758)	anacã	Red-fan Parrot	-	R	LC
PASSERIFORMES Linnaeus, 1758					
THAMNOPHILIDAE Swainson, 1824					
Myrmornis torquata (Boddaert, 1783)	pinto-do-mato-carijó	Wing-banded Antbird	-	R	LC
Pygiptila stellaris (Spix, 1825)	choca-cantadora	Spot-winged Antshrike	-	R	LC
Myrmorchilus strigilatus (Wied, 1831)	tem-farinha-aí	Stripe-backed Antbird	-	R	LC
Myrmotherula multostriata (Sclater, 1858)	choquinha-estriada-da-amazônia	Amazonian Streaked-Antwren	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Myrmotherula axillaris (Vieillot, 1817)	choquinha-de-flanco-branco	White-flanked Antwren	-	R	LC
Myrmotherula longipennis (Pelzeln, 1868)	choquinha-de-asa-comprida	Long-winged Antwren	-	R	LC
Myrmotherula menetriesii (d'Orbigny, 1837)	choquinha-de-garganta-cinza	Gray Antwren	-	R	LC
Formicivora melanogaster (Pelzeln, 1868)	formigueiro-de-barriga-preta	Black-bellied Antwren	-	R	LC
Formicivora rufa (Wied, 1831)	papa-formiga-vermelho	Rusty-backed Antwren	-	R	LC
Isleria hauxwelli (Sclater, 1857)	choquinha-de-garganta-clara	Plain-throated Antwren	-	R	LC
Thamnomanes caesius (Temminck, 1820)	ipecuá	Cinereous Antshrike	-	R	LC
Dysithamnus mentalis (Temminck, 1823)	choquinha-lisa	Plain Antvireo	-	R	LC
Herpsilochmus sellowi (Whitney & Pacheco, 2000)	chorozinho-da-caatinga	Caatinga Antwren	EB (CA)	R	LC
Herpsilochmus atricapillus (Pelzeln, 1868)	chorozinho-de-chapéu-preto	Black-capped Antwren	-	R	LC
Herpsilochmus pectoralis (Sclater, 1857)	chorozinho-de-papo-preto	Pectoral Antwren	EB	R	VU
Herpsilochmus longirostris (Pelzeln, 1868)	chorozinho-de-bico-comprido	Large-billed Antwren	(CE)	R	LC
Herpsilochmus rufimarginatus (Temminck, 1822)	chorozinho-de-asa-vermelha	Rufous-winged Antwren	-	R	LC
Sakesphorus luctuosus (Lichtenstein, 1823)	choca-d'água	Glossy Antshrike	EB (AM)	R	LC
Thamnophilus doliatus (Linnaeus, 1764)	choca-barrada	Barred Antshrike	-	R	LC
Thamnophilus capistratus (Lesson, 1840)	choca-barrada-do-nordeste	Caatinga Antshrike	EB	R	LC
Thamnophilus torquatus (Swainson, 1825)	choca-de-asa-vermelha	Rufous-winged Antshrike	-	R	LC
Thamnophilus palliatus (Lichtenstein, 1823)	choca-listrada	Chestnut-backed Antshrike	-	R	LC
Thamnophilus pelzelni (Hellmayr, 1924)	choca-do-planalto	Planalto Slaty-Antshrike	EB	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Thamnophilus aethiops (Sclater, 1858)*	choca-lisa	White-shouldered Antshrike	(BAE)	R	LC
Thamnophilus amazonicus (Sclater, 1858)	choca-canela	Amazonian Antshrike	-	R	LC
Taraba major (Vieillot, 1816)	choró-boi	Great Antshrike	-	R	LC
Hypocnemoides maculicauda (Pelzeln, 1868)	solta-asa	Band-tailed Antbird	-	R	LC
Sclateria naevia (Gmelin, 1788)	papa-formiga-do-igarapé	Silvered Antbird	-	R	LC
Pyriglena leuconota (Spix, 1824)*	papa-taoca	White-backed Fire-eye	(BAE)	R	LC
Cercomacra manu (Fitzpatrick & Willard, 1990)	chororó-de-manu	Manu Antbird	-	R	LC
Cercomacra cinerascens (Sclater, 1857)	chororó-pocuá	Gray Antbird	-	R	LC
Cercomacra ferdinandi Snethlage, 1928	chororó-de-goiás	Bananal Antbird	EB (CE)	R	VU (VU)
Cercomacroides laeta (Todd, 1920)	chororó-didi	Willis's Antbird	EB	R	LC
Willisornis vidua (Hellmayr, 1905)	rendadinho-do-xingu	Xingu Scale-backed Antbird	EB	R	LC
Phlegopsis nigromaculata (d'Orbigny & Lafresnaye, 1837)*	mãe-de-taoca	Black-spotted Bare-eye	(BAE)	R	LC (VU)
MELANOPAREIIDAE Ericson, Olson, Irested, Alvarenga & Fjeldså, 2010					
Melanopareia torquata (Wied, 1831)	tapaculo-de-colarinho	Collared Crescentchest	(CE)	R	LC
CONOPOPHAGIDAE Sclater & Salvin, 1873					
Conopophaga roberti (Hellmayr, 1905)	chupa-dente-de-capuz	Hooded Gnateater	EB	R	LC
GRALLARIIDAE Sclater & Salvin, 1873					
*Hylopezus paraensis (*Snethlage, 1910)	torom-do-pará	Snethlage's Antpitta	EB (BAE)	R	LC (VU)
FORMICARIIDAE Gray, 1840					
Formicarius colma (Boddaert, 1783)	galinha-do-mato	Rufous-capped Antthrush	-	R	LC
Formicarius analis (d'Orbigny & Lafresnaye, 1837)	pinto-do-mato-de-cara-preta	Black-faced Antthrush	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
SCLERURIDAE Swainson, 1827					
Sclerurus macconnelli (Chubb, 1919)	vira-folha-de-peito-vermelho	Tawny-throated Leaftosser	-	R	LC
Sclerurus rufigularis (Pelzeln, 1868)	vira-folha-de-bico-curto	Short-billed Leaftosser	-	R	LC
Sclerurus caudacutus (Vieillot, 1816)	vira-folha-pardo	Black-tailed Leaftosser	-	R	LC
					LC
DENDROCOLAPTIDAE Gray, 1840					
Dendrocincla fuliginosa (Vieillot, 1818)	arapaçu-pardo	Plain-brown Woodcreeper	-	R	LC
Dendrocincla merula (Lichtenstein, 1829)*	arapaçu-da-taoca	White-chinned Woodcreeper	EB (BAE)	R	LC (VU)
Deconychura longicauda (Pelzeln, 1868)	arapaçu-rabudo	Long-tailed Woodcreeper	-	R	LC
Sittasomus griseicapillus (Vieillot, 1818)	arapaçu-verde	Olivaceous Woodcreeper	-	R	LC
Certhiasomus stictolaemus (Pelzeln, 1868)	arapaçu-de-garganta-pintada	Spot-throated Woodcreeper	-	R	LC
Glyphorynchus spirurus (Vieillot, 1819)	arapaçu-bico-de-cunha	Wedge-billed Woodcreeper	-	R	LC
Xiphorhynchus spixii (Lesson, 1830)	arapaçu-de-spix	Spix's Woodcreeper	EB (AM)	R	LC
Xiphorhynchus obsoletus (Lichtenstein, 1820)	arapaçu-riscado	Striped Woodcreeper	-	R	LC
Xiphorhynchus guttatoides (Lafresnaye, 1850)	arapaçu-de-lafresnaye	Lafresnaye's Woodcreeper	-	R	LC
Campylorhamphus trochilirostris (Lichtenstein, 1820)	arapaçu-beija-flor	Red-billed Scythebill	-	R	LC
Dendroplex picus (Gmelin, 1788)	arapaçu-de-bico-branco	Straight-billed Woodcreeper	-	R	LC
Lepidocolaptes angustirostris (Vieillot, 1818)	arapaçu-de-cerrado	Narrow-billed Woodcreeper	-	R	LC
Lepidocolaptes layardi (Sclater, 1873)	arapaçu-de-listras-brancas-do-leste	Layard's Woodcreeper	EB	R	
Nasica longirostris (Vieillot, 1818)	arapaçu-de-bico-comprido	Long-billed Woodcreeper	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Dendrexetastes rufigula (Lesson, 1844)*	arapaçu-galinha	Cinnamon-throated Woodcreeper	(BAE)	R	LC (EN)
*Dendrocolaptes medius (*Todd, 1920)	arapaçu-barrado-do-leste	Todd's Woodcreeper	EB (BAE)	R	(VU)
Dendrocolaptes platyrostris (Spix, 1825)	arapaçu-grande	Planalto Woodcreeper	-	R	LC
Xiphocolaptes promeropirhynchus (Lesson, 1840)	arapaçu-vermelho	Strong-billed Woodcreeper	-	R	LC
Xiphocolaptes falcirostris (Spix, 1824)	arapaçu-do-nordeste	Moustached Woodcreeper	EB (CA)	R	VU (VU)
XENOPIDAE Bonaparte, 1854					
Xenops minutus (Sparrman, 1788)	bico-virado-miúdo	Plain Xenops	-	R	LC
Xenops rutilans (Temminck, 1821)	bico-virado-carijó	Streaked Xenops	-	R	LC
FURNARIIDAE Gray, 1840					LC
Berlepschia rikeri (Ridgway, 1886)	limpa-folha-do-buriti	Point-tailed Palmcreeper	-	R	LC
Furnarius figulus (Lichtenstein, 1823)	casaca-de-couro-da-lama	Wing-banded Hornero	EB	R	LC
Furnarius leucopus (Swainson, 1838)	casaca-de-couro-amarelo	Pale-legged Hornero	-	R	LC
Furnarius rufus (Gmelin, 1788)	joão-de-barro	Rufous Hornero	-	R	LC
Automolus rufipileatus (Pelzeln, 1859)	barranqueiro-de-coroa-castanha	Chestnut-crowned Foliage-gleaner	-	R	LC
Automolus paraensis (Hartert, 1902)	barranqueiro-do-pará	Para Foliage-gleaner	EB (AM)	R	LC
Anabacerthia ruficaudata (d'Orbigny & Lafresnaye, 1838)	limpa-folha-de-cauda-ruiva	Rufous-tailed Foliage-gleaner	-	R	LC
Philydor erythrocercum (Pelzeln, 1859)	limpa-folha-de-sobre-ruivo	Rufous-rumped Foliage-gleaner	-	R	LC
Philydor pyrrhodes (Cabanis, 1848)	limpa-folha-vermelho	Cinnamon-rumped Foliage-gleaner	-	R	LC
Pseudoseisura cristata (Spix, 1824)	casaca-de-couro	Caatinga Cacholote	EB (CA)	R	LC
Phacellodomus rufifrons (Wied, 1821)	joão-de-pau	Rufous-fronted Thornbird	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Certhiaxis cinnamomeus (Gmelin, 1788)	curutié	Yellow-chinned Spinetail	-	R	LC
Synallaxis sp. novum (Vieillot, 1819)	pichororé	Rufous-capped Spinetail	-	R	LC
Synallaxis frontalis (Pelzeln, 1859)	petrim	Sooty-fronted Spinetail	-	R	LC
Synallaxis albescens (Temminck, 1823)	uí-pi	Pale-breasted Spinetail	-	R	LC
Synallaxis rutilans (Temminck, 1823)*	joão-teneném-castanho	Ruddy Spinetail	(BAE)	R	LC
Synallaxis gujanensis (Gmelin, 1789)	joão-teneném-becuá	Plain-crowned Spinetail	-	R	LC
Cranioleuca vulpina (Pelzeln, 1856)	arredio-do-rio	Rusty-backed Spinetail	-	R	LC
PIPRIDAE Rafinesque, 1815					
Neopelma pallescens (Lafresnaye, 1853)	fruxu-do-cerradão	Pale-bellied Tyrant-Manakin	-	R	LC
Tyranneutes stolzmanni (Hellmayr, 1906)	uirapuruzinho	Dwarf Tyrant-Manakin	-	R	LC
Pipra fasciicauda (Hellmayr, 1906)	uirapuru-laranja	Band-tailed Manakin	-	R	LC
Ceratopipra rubrocapilla (Temminck, 1821)	cabeça-encarnada	Red-headed Manakin	-	R	VU
Lepidothrix iris (Schinz, 1851)*	cabeça-de-prata	Opal-crowned Manakin	EB (AM)	R	VU (EN)
Manacus manacus (Linnaeus, 1766)*	rendeira	White-bearded Manakin	(BAE)	R	LC
Machaeropterus pyrocephalus (Sclater, 1852)	uirapuru-cigarra	Fiery-capped Manakin	-	R	LC
Dixiphia pipra (Linnaeus, 1758)	cabeça-branca	White-crowned Manakin	-	R	LC
Chiroxiphia pareola (Linnaeus, 1766)	tangará-príncipe	Blue-backed Manakin	-	R	LC
Antilophia galeata (Lichtenstein, 1823)	soldadinho	Helmeted Manakin	(CE)	R	LC
ONYCHORHYNCHIDAE Tello, Moyle, Marchese & Cracraft, 2009					
Onychorhynchus coronatus (Statius Muller, 1776)	maria-leque	Royal Flycatcher	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Terenotriccus erythrurus (Cabanis, 1847)*	papa-moscas-uirapuru	Ruddy-tailed Flycatcher	(BAE)	R	LC
Myiobius barbatus (Gmelin, 1789)	assanhadinho	Whiskered Flycatcher	-	R	LC
Myiobius atricaudus (Lawrence, 1863)	assanhadinho-de-cauda-preta	Black-tailed Flycatcher	-	R	LC
TITYRIDAE Gray, 1840					
Schiffornis turdina (Wied, 1831)	flautim-marrom	Thrush-like Schiffornis	EB	R	LC
Laniocera hypopyrra (Vieillot, 1817)	chorona-cinza	Cinereous Mourner	-	R	LC
Iodopleura isabellae Parzudaki, 1847	anambé-de-coroa	White-browed Purpletuft	-	R	LC
Tityra inquisitor (Lichtenstein, 1823)	anambé-branco-de-bochecha-parda	Black-crowned Tityra	-	R	LC
Tityra cayana (Linnaeus, 1766)	anambé-branco-de-rabo-preto	Black-tailed Tityra	-	R	LC
Tityra semifasciata (Spix, 1825)	anambé-branco-de-máscara-negra	Masked Tityra	-	R	LC
Pachyramphus viridis (Vieillot, 1816)	caneleiro-verde	Green-backed Becard	-	R	LC
Pachyramphus rufus (Boddaert, 1783)	caneleiro-cinzento	Cinereous Becard	-	R	LC
Pachyramphus castaneus (Jardine & Selby, 1827)	caneleiro	Chestnut-crowned Becard	-	R	LC
Pachyramphus polychopterus (Vieillot, 1818)	caneleiro-preto	White-winged Becard	-	R	LC
Pachyramphus marginatus (Lichtenstein, 1823)	caneleiro-bordado	Black-capped Becard	-	R	LC
Pachyramphus minor (Lesson, 1830)	caneleiro-pequeno	Pink-throated Becard	-	R	LC
Pachyramphus validus (Lichtenstein, 1823)	caneleiro-de-chapéu-preto	Crested Becard	-	R	LC
Xenopsaris albinucha (Burmeister, 1869)	tijerila	White-naped Xenopsaris	-	R	LC
COTINGIDAE Bonaparte, 1849					
Phoenicircus carnifex (Linnaeus, 1758)	saurá	Guianan Red-Cotinga	-	R	LC
Haematoderus militaris (Shaw, 1792)	anambé-militar	Crimson Fruitcrow	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Querula purpurata (Statius Muller, 1776)	anambé-una	Purple-throated Fruitcrow	-	R	LC
Lipaugus vociferans (Wied, 1820)	cricrió	Screaming Piha	-	R	LC
Procnias averano (Hermann, 1783)	araponga-do-nordeste	Bearded Bellbird	-	R	LC
Cotinga cayana (Linnaeus, 1766)	anambé-azul	Spangled Cotinga	-	R	LC
Cotinga cotinga (Linnaeus, 1766)	anambé-de-peito-roxo	Purple-breasted Cotinga	-	R	LC
Gymnoderus foetidus (Linnaeus, 1758)	anambé-pombo	Bare-necked Fruitcrow	-	R	LC
Xipholena lamellipennis (Lafresnaye, 1839)	bacacu-preto	White-tailed Cotinga	EB (AM)	R	NT
PIPRITIDAE Ohlson, Irestedt, Ericson & Fjeldså, 2013					
Piprites chloris (Temminck, 1822)*	papinho-amarelo	Wing-barred Piprites	(BAE)	R	LC (VU)
PLATYRINCHIDAE Bonaparte, 1854					
Platyrinchus saturatus (Salvin & Godman, 1882)	patinho-escuro	Cinnamon-crested Spadebill	-	R	LC
Platyrinchus mystaceus (Vieillot, 1818)	patinho	White-throated Spadebill	-	R	LC
Platyrinchus platyrhynchos (Gmelin, 1788)	patinho-de-coroa-branca	White-crested Spadebill	-	R	LC
RHYNCHOCYCLIDAE Berlepsch, 1907					
Taeniotriccus andrei (Berlepsch & Hartert, 1902)	maria-bonita	Black-chested Tyrant	-	R	LC
Mionectes amazonus (Todd, 1921)	abre-asa-do-acre	Western McConnell's Flycatcher	-	R[P]	
Mionectes oleagineus (Lichtenstein, 1823)	abre-asa	Ochre-bellied Flycatcher	-	R	LC
Mionectes macconnelli (Chubb, 1919)	abre-asa-da-mata	McConnell's Flycatcher	-	R	LC
Leptopogon amaurocephalus (Tschudi, 1846)	cabeçudo	Sepia-capped Flycatcher	-	R	LC
Corythopis torquatus (Tschudi, 1844)	estalador-do-norte	Ringed Antpipit	-	R	LC
Corythopis delalandi (Lesson, 1830)	estalador	Southern Antpipit	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Phylloscartes virescens (Todd, 1925)	borboletinha-guianense	Olive-green Tyrannulet	-	R	LC
Rhynchocyclus olivaceus (Temminck, 1820)	bico-chato-grande	Olivaceous Flatbill	-	R	LC
Tolmomyias sulphurescens (Spix, 1825)	bico-chato-de-orelha-preta	Yellow-olive Flycatcher	-	R	LC
Tolmomyias assimilis (Pelzeln, 1868)	bico-chato-da-copa	Yellow-margined Flycatcher	-	R	LC
Tolmomyias poliocephalus (Taczanowski, 1884)	bico-chato-de-cabeça-cinza	Gray-crowned Flycatcher	-	R	LC
Tolmomyias flaviventris (Wied, 1831)	bico-chato-amarelo	Yellow-breasted Flycatcher	-	R	LC
Todirostrum maculatum (Desmarest, 1806)	ferreirinho-estriado	Spotted Tody-Flycatcher	-	R	LC
Todirostrum cinereum (Linnaeus, 1766)	ferreirinho-relógio	Common Tody-Flycatcher	-	R	LC
Todirostrum chrysocrotaphum (Strickland, 1850)*	ferreirinho-de-sobrancelha	Yellow-browed Tody-Flycatcher	(BAE)	R	LC
Poecilotriccus fumifrons (Hartlaub, 1853)	ferreirinho-de-testa-parda	Smoky-fronted Tody-Flycatcher	-	R	LC
Poecilotriccus sylvia (Desmarest, 1806)	ferreirinho-da-capoeira	Slate-headed Tody-Flycatcher	-	R	LC
Myiornis ecaudatus (d'Orbigny & Lafresnaye, 1837)	caçula	Short-tailed Pygmy-Tyrant	-	R	LC
Hemitriccus striaticollis (Lafresnaye, 1853)	sebinho-rajado-amarelo	Stripe-necked Tody-Tyrant	-	R	LC
Hemitriccus margaritaceiventer (d'Orbigny & Lafresnaye, 1837)	sebinho-de-olho-de-ouro	Pearly-vented Tody-tyrant	-	R	LC
Lophotriccus galeatus (Boddaert, 1783)	caga-sebinho-de-penacho	Helmeted Pygmy-Tyrant	-	R	LC
TYRANNIDAE Vigors, 1825					
Hirundinea ferruginea (Gmelin, 1788)	gibão-de-couro	Cliff Flycatcher	-	R	LC
Zimmerius acer (Salvin & Godman, 1883)	poiaeiro-da-guiana	Guianan Tyrannulet	-	R	LC
Inezia subflava (Sclater & Salvin, 1873)	amarelinho	Amazonian Tyrannulet	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Euscarthmus meloryphus (Wied, 1831)	barulhento	Tawny-crowned Pygmy-Tyrant	-	R	LC
Euscarthmus rufomarginatus (Pelzeln, 1868)	maria-corruíra	Rufous-sided Pygmy-Tyrant	-	R	NT
Ornithion inerme (Hartlaub, 1853)	poiaeiro-de-sobrancelha	White-lored Tyrannulet	-	R	LC
Camptostoma obsoletum (Temminck, 1824)	risadinha	Southern Beardless-Tyrannulet	-	R	LC
Elaenia flavogaster (Thunberg, 1822)	guaracava-de-barriga-amarela	Yellow-bellied Elaenia	-	R	LC
Elaenia spectabilis (Pelzeln, 1868)	guaracava-grande	Large Elaenia	-	A	LC
Elaenia parvirostris (Pelzeln, 1868)	tuque-pium	Small-billed Elaenia	-	R	LC
Elaenia cristata (Pelzeln, 1868)	guaracava-de-topete-uniforme	Plain-crested Elaenia	-	R	LC
Elaenia chiriquensis (Lawrence, 1865)	chibum	Lesser Elaenia	-	R	LC
Suiriri suiriri (Vieillot, 1818)	suiriri-cinzento	Suiriri Flycatcher	-	R	LC
Suiriri affinis (Burmeister, 1856)	suiriri-da-chapada	Chapada Flycatcher	(CE)	R	NT
Myiopagis gaimardii (d'Orbigny, 1839)	maria-pechim	Forest Elaenia	-	R	LC
Myiopagis caniceps (Swainson, 1835)	guaracava-cinzenta	Gray Elaenia	-	R	LC
Myiopagis viridicata (Vieillot, 1817)	guaracava-de-crista-alaranjada	Greenish Elaenia	-	R	LC
Tyrannulus elatus (Latham, 1790)	maria-te-viu	Yellow-crowned Tyrannulet	-	R	LC
Capsiempis flaveola (Lichtenstein, 1823)	marianinha-amarela	Yellow Tyrannulet	-	R	LC
Phaeomyias murina (Spix, 1825)	bagageiro	Mouse-colored Tyrannulet	-	R	LC
Phyllomyias fasciatus (Thunberg, 1822)	piolhinho	Planalto Tyrannulet	-	R	LC
Culicivora caudacuta (Vieillot, 1818)	papa-moscas-do-campo	Sharp-tailed Tyrant	-	R	VU
Pseudocolopteryx sclateri (Oustalet, 1892)	tricolino	Crested Doradito	-	R	LC
Serpophaga subcristata (Vieillot, 1817)	alegrinho	White-crested Tyrannulet	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Attila cinnamomeus (Gmelin, 1789)	tinguaçu-ferrugem	Cinnamon Attila	-	R	LC
Attila spadiceus (Gmelin, 1789)	capitão-de-saíra-amarelo	Bright-rumped Attila	-	R	LC
Legatus leucophaius (Vieillot, 1818)	bem-te-vi-pirata	Piratic Flycatcher	-	R	LC
Ramphotrigon megacephalum (Swainson, 1835)	maria-cabeçuda	Large-headed Flatbill	-	R	LC
Ramphotrigon ruficauda (Spix, 1825)	bico-chato-de-rabo-vermelho	Rufous-tailed Flatbill	-	R	LC
Myiarchus tuberculifer (d'Orbigny & Lafresnaye, 1837)	maria-cavaleira-pequena	Dusky-capped Flycatcher	-	R	LC
Myiarchus swainsoni (Cabanis & Heine, 1859)	irré	Swainson's Flycatcher	-	A	LC
Myiarchus ferox (Gmelin, 1789)	maria-cavaleira	Short-crested Flycatcher	-	R	LC
Myiarchus tyrannulus (Statius Muller, 1776)	maria-cavaleira-de-rabo-enferrujado	Brown-crested Flycatcher	-	R	LC
Sirystes sibilator (Vieillot, 1818)	gritador	Sibilant Sirystes	-	R	LC
Rhytipterna simplex (Lichtenstein, 1823)	vissiá	Grayish Mourner	-	R	LC
Casiornis rufus (Vieillot, 1816)	maria-ferrugem	Rufous Casiornis	-	R	LC
Casiornis fuscus (Sclater & Salvin, 1873)	caneleiro-enxofre	Ash-throated Casiornis	EB	L	LC
Pitangus sulphuratus (Linnaeus, 1766)	bem-te-vi	Great Kiskadee	-	R	LC
Philohydor lictor (Lichtenstein, 1823)	bentevizinho-do-brejo	Lesser Kiskadee	-	R	LC
Machetornis rixosa (Vieillot, 1819)	suiriri-cavaleiro	Cattle Tyrant	-	R	LC
Myiodynastes maculatus (Statius Muller, 1776)	bem-te-vi-rajado	Streaked Flycatcher	-	R	LC
Tyrannopsis sulphurea (Spix, 1825)	suiriri-de-garganta-rajada	Sulphury Flycatcher	-	R	LC
Megarynchus pitangua (Linnaeus, 1766)	neinei	Boat-billed Flycatcher	-	R	LC
Myiozetetes cayanensis (Linnaeus, 1766)	bentevizinho-de-asa-ferrugínea	Rusty-margined Flycatcher	-	R	LC
Myiozetetes similis (Spix, 1825)	bentevizinho-de-penacho-vermelho	Social Flycatcher	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Tyrannus albogularis (Burmeister, 1856)	suiriri-de-garganta-branca	White-throated Kingbird	-	A	LC
Tyrannus melancholicus (Vieillot, 1819)	suiriri	Tropical Kingbird	-	R	LC
Tyrannus savana (Daudin, 1802)	tesourinha	Fork-tailed Flycatcher	-	R	LC
Griseotyrannus aurantioatrocristatus (d'Orbigny & Lafresnaye, 1837)	peitica-de-chapéu-preto	Crowned Slaty Flycatcher	-	R	LC
Empidonomus varius (Vieillot, 1818)	peitica	Variegated Flycatcher	-	R	LC
Conopias trivirgatus (Wied, 1831)	bem-te-vi-pequeno	Three-striped Flycatcher	-	R	LC
Colonia colonus (Vieillot, 1818)	viuvinha	Long-tailed Tyrant	-	R	LC
Myiophobus fasciatus (Statius Muller, 1776)	filipe	Bran-colored Flycatcher	-	R	LC
Sublegatus modestus (Wied, 1831)	guaracava-modesta	Southern Scrub-Flycatcher	-	A	LC
Pyrocephalus rubinus (Boddaert, 1783)	príncipe	Vermilion Flycatcher	-	R	LC
Fluvicola albiventer (Spix, 1825)	lavadeira-de-cara-branca	Black-backed Water-Tyrant	-	R	LC
Fluvicola nengeta (Linnaeus, 1766)	lavadeira-mascarada	Masked Water-Tyrant	-	R	LC
Arundinicola leucocephala (Linnaeus, 1764)	freirinha	White-headed Marsh Tyrant	-	R	LC
Cnemotriccus fuscatus (Wied, 1831)	guaracavuçu	Fuscous Flycatcher	-	R	LC
Lathrotriccus euleri (Cabanis, 1868)	enferrujado	Euler's Flycatcher	-	A	LC
Contopus cinereus (Spix, 1825)	papa-moscas-cinzento	Tropical Pewee	-	R	LC
Contopus nigrescens (Sclater & Salvin, 1880)	piui-preto	Blackish Pewee	-	R	LC
Knipolegus lophotes Boie, 1828	maria-preta-de-penacho	Crested Black-Tyrant	-	R	LC
Satrapa icterophrys (Vieillot, 1818)	suiriri-pequeno	Yellow-browed Tyrant	-	A	LC
Xolmis cinereus (Vieillot, 1816)	primavera	Gray Monjita	-	R	LC
Xolmis velatus (Lichtenstein, 1823)	noivinha-branca	White-rumped Monjita	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
VIREONIDAE Swainson, 1837					
Cyclarhis gujanensis (Gmelin, 1789)	pitiguari	Rufous-browed Peppershrike	-	R	LC
Hylophilus pectoralis (Sclater, 1866)	vite-vite-de-cabeça-cinza	Ashy-headed Greenlet	-	R	LC
Hylophilus semicinereus (Sclater & Salvin, 1867)	verdinho-da-várzea	Gray-chested Greenlet	-	R	LC
Tunchiornis ochraceiceps (Sclater, 1860)*	vite-vite-uirapuru	Tawny-crowned Greenlet	(BAE)	R	LC (VU)
Vireo olivaceus (Linnaeus, 1766)	juruviara-boreal	Red-eyed Vireo	-	N	LC
Vireo chivi (Vieillot, 1817)	juruviara	Chivi Vireo	-	A	
CORVIDAE Leach, 1820					
Cyanocorax cristatellus (Temminck, 1823)	gralha-do-campo	Curl-crested Jay	(CE)	R	LC
Cyanocorax cyanopogon (Wied, 1821)	gralha-cancã	White-naped Jay	EB	R	LC
HIRUNDINIDAE Rafinesque, 1815					
Pygochelidon cyanoleuca (Vieillot, 1817)	andorinha-pequena-de-casa	Blue-and-white Swallow	-	R	LC
Pygochelidon melanoleuca (Wied, 1820)	andorinha-de-coleira	Black-collared Swallow	-	R	LC
Stelgidopteryx ruficollis (Vieillot, 1817)	andorinha-serradora	Southern Rough-winged Swallow	-	R	LC
Progne tapera (Vieillot, 1817)	andorinha-do-campo	Brown-chested Martin	-	R	LC
Progne subis (Linnaeus, 1758)	andorinha-azul	Purple Martin	-	N	LC
Progne chalybea (Gmelin, 1789)	andorinha-grande	Gray-breasted Martin	-	R	LC
Tachycineta albiventer (Boddaert, 1783)	andorinha-do-rio	White-winged Swallow	-	R	LC
Hirundo rustica (Linnaeus, 1758)	andorinha-de-bando	Barn Swallow	-	N	LC
TROGLODYTIDAE Swainson, 1831					
Microcerculus marginatus (Sclater, 1855)	uirapuru-veado	Scaly-breasted Wren	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Troglodytes musculus (Naumann, 1823)	corruíra	Southern House Wren	-	R	
Campylorhynchus turdinus (Wied, 1831)	catatau	Thrush-like Wren	-	R	LC
Pheugopedius genibarbis (Swainson, 1838)	garrinchão-pai-avô	Moustached Wren	-	R	LC
Cantorchilus leucotis (Lafresnaye, 1845)	garrinchão-de-barriga-vermelha	Buff-breasted Wren	-	R	LC
Cantorchilus longirostris (Vieillot, 1819)	garrinchão-de-bico-grande	Long-billed Wren	EB	R	LC
DONACOBIIDAE Aleixo & Pacheco, 2006					
Donacobius atricapilla (Linnaeus, 1766)	japacanim	Black-capped Donacobius	-	R	LC
POLIOPTILIDAE Baird, 1858					
Ramphocaenus melanurus (Vieillot, 1819)*	chirito	Long-billed Gnatwren	(BAE)	R	LC
Polioptila plumbea (Gmelin, 1788)	balança-rabo-de-chapéu-preto	Tropical Gnatcatcher	-	R	LC
Polioptila paraensis (Todd, 1937)	balança-rabo-paraense	Para Gnatcatcher	EB	R	
Polioptila dumicola (Vieillot, 1817)	balança-rabo-de-máscara	Masked Gnatcatcher	-	R	LC
TURDIDAE Rafinesque, 1815					
Turdus leucomelas (Vieillot, 1818)	sabiá-branco	Pale-breasted Thrush	-	R	LC
Turdus fumigatus (Lichtenstein, 1823)	sabiá-da-mata	Cocoa Thrush	-	R	LC
Turdus rufiventris (Vieillot, 1818)	sabiá-laranjeira	Rufous-bellied Thrush	-	R	LC
Turdus nudigenis (Lafresnaye, 1848)	caraxué	Spectacled Thrush	-	R	LC
Turdus amaurochalinus (Cabanis, 1850)	sabiá-poca	Creamy-bellied Thrush	-	A	LC
Turdus albicollis (Vieillot, 1818)	sabiá-coleira	White-necked Thrush	-	R	LC
MIMIDAE Bonaparte, 1853					
Mimus gilvus (Vieillot, 1807)	sabiá-da-praia	Tropical Mockingbird	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Mimus saturninus (Lichtenstein, 1823)	sabiá-do-campo	Chalk-browed Mockingbird	-	R	LC
MOTACILLIDAE Horsfield, 1821					
Anthus lutescens (Pucheran, 1855)	caminheiro-zumbidor	Yellowish Pipit	-	R	LC
PASSERELLIDAE Cabanis & Heine, 1850					
Zonotrichia capensis (Statius Muller, 1776)	tico-tico	Rufous-collared Sparrow	-	R	LC
Ammodramus humeralis (Bosc, 1792)	tico-tico-do-campo	Grassland Sparrow	-	R	LC
Ammodramus aurifrons (Spix, 1825)	cigarrinha-do-campo	Yellow-browed Sparrow	-	R	LC
Arremon taciturnus (Hermann, 1783)	tico-tico-de-bico-preto	Pectoral Sparrow	-	R	LC
Arremon flavirostris (Swainson, 1838)	tico-tico-de-bico-amarelo	Saffron-billed Sparrow	-	R	LC
PARULIDAE Wetmore, Friedmann, Lincoln, Miller, Peters, van Rossem, Van Tyne & Zimmer 1947					
Setophaga pitiayumi (Vieillot, 1817)	mariquita	Tropical Parula	-	R	LC
Geothlypis aequinoctialis (Gmelin, 1789)	pia-cobra	Masked Yellowthroat	-	R	LC
Basileuterus culicivorus (Deppe, 1830)	pula-pula	Golden-crowned Warbler	-	R	LC
Myiothlypis flaveola (Baird, 1865)	canário-do-mato	Flavescent Warbler	-	R	LC
Myiothlypis mesoleuca (Sclater, 1866)	pula-pula-ribeirinho	Neotropical River Warbler	-	R	LC
ICTERIDAE Vigors, 1825					
Psarocolius viridis (Statius Muller, 1776)	japu-verde	Green Oropendola	-	R	LC
Psarocolius decumanus (Pallas, 1769)	japu	Crested Oropendola	-	R	LC
Psarocolius bifasciatus (Spix, 1824)	japuguaçu	Olive Oropendola	-	R	LC
Procacicus solitarius (Vieillot, 1816)	iraúna-de-bico-branco	Solitary Black Cacique	-	R	LC
Cacicus haemorrhous (Linnaeus, 1766)	guaxe	Red-rumped Cacique	-	R	LC
Cacicus cela (Linnaeus, 1758)	xexéu	Yellow-rumped Cacique	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Icterus cayanensis (Linnaeus, 1766)	inhapim	Epaulet Oriole	-	R	LC
Icterus jamacaii (Gmelin, 1788)	corrupião	Campo Troupial	EB (CA)	R	LC
Gnorimopsar chopi (Vieillot, 1819)	pássaro-preto	Chopi Blackbird	-	R	LC
Agelasticus cyanopus (Vieillot, 1819)	carretão	Unicolored Blackbird	-	R	LC
Chrysomus ruficapillus (Vieillot, 1819)	garibaldi	Chestnut-capped Blackbird	-	R	LC
Molothrus oryzivorus (Gmelin, 1788)	iraúna-grande	Giant Cowbird	-	R	LC
Molothrus bonariensis (Gmelin, 1789)	chupim	Shiny Cowbird	-	R	LC
Sturnella militaris (Linnaeus, 1758)	polícia-inglesa-do-norte	Red-breasted Meadowlark	-	R	LC
Sturnella superciliaris (Bonaparte, 1850)	polícia-inglesa-do-sul	White-browed Meadowlark	-	R	LC
MITROSPINGIDAE Barker, Burns, Klicka, Lanyon & Lovette, 2013					
Lamprospiza melanoleuca (Vieillot, 1817)	pipira-de-bico-vermelho	Red-billed Pied Tanager	-	R	LC
THRAUPIDAE Cabanis, 1847					
Porphyrospiza caerulescens (Wied, 1830)	campainha-azul	Blue Finch	(CE)	R	NT
Parkerthraustes humeralis (Lawrence, 1867)	furriel-de-encontro	Yellow-shouldered Grosbeak	-	R	LC
Neothraupis fasciata (Lichtenstein, 1823)	cigarra-do-campo	White-banded Tanager	-	R	NT
Cissopis leverianus (Gmelin, 1788)	tietinga	Magpie Tanager	-	R	LC
Schistochlamys melanopis (Latham, 1790)	sanhaço-de-coleira	Black-faced Tanager	-	R	LC
Schistochlamys ruficapillus (Vieillot, 1817)	bico-de-veludo	Cinnamon Tanager	-	R	LC
Paroaria dominicana (Linnaeus, 1758)	cardeal-do-nordeste	Red-cowled Cardinal	EB (CA)	R	LC
Paroaria gularis (Linnaeus, 1766)	cardeal-da-amazônia	Red-capped Cardinal	-	R	LC
Tangara mexicana (Linnaeus, 1766)	saíra-de-bando	Turquoise Tanager	-	R	LC
Tangara punctata (Linnaeus, 1766)	saíra-negaça	Spotted Tanager	-	R	LC
Tangara episcopus (Linnaeus, 1766)	sanhaço-da-amazônia	Blue-gray Tanager	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Tangara sayaca (Linnaeus, 1766)	sanhaço-cinzento	Sayaca Tanager	-	R	LC
Tangara palmarum (Wied, 1821)	sanhaço-do-coqueiro	Palm Tanager	-	R	LC
Tangara cayana (Linnaeus, 1766)	saíra-amarela	Burnished-buff Tanager	-	R	LC
Nemosia pileata (Boddaert, 1783)	saíra-de-chapéu-preto	Hooded Tanager	-	R	LC
Compsothraupis loricata (Lichtenstein, 1819)	tiê-caburé	Scarlet-throated Tanager	EB	R	LC
Conirostrum speciosum (Temminck, 1824)	figuinha-de-rabo-castanho	Chestnut-vented Conebill	-	R	LC
Conirostrum bicolor (Vieillot, 1809)	figuinha-do-mangue	Bicolored Conebill	-	R	NT
Sicalis citrina (Pelzeln, 1870)	canário-rasteiro	Stripe-tailed Yellow-Finch	-	R	LC
Sicalis flaveola (Linnaeus, 1766)	canário-da-terra	Saffron Finch	-	R	LC
Sicalis columbiana Cabanis, 1851	canário-do-amazonas	Orange-fronted Yellow-Finch	-	R	LC
Chlorophanes spiza (Linnaeus, 1758)	saí-verde	Green Honeycreeper	-	R	LC
Hemithraupis guira (Linnaeus, 1766)	saíra-de-papo-preto	Guira Tanager	-	R	LC
Volatinia jacarina (Linnaeus, 1766)	tiziu	Blue-black Grassquit	-	R	LC
Eucometis penicillata (Spix, 1825)	pipira-da-taoca	Gray-headed Tanager	-	R	LC
Coryphospingus pileatus (Wied, 1821)	tico-tico-rei-cinza	Pileated Finch	-	R	LC
Coryphospingus cucullatus (Statius Muller, 1776)	tico-tico-rei	Red-crested Finch	-	R	LC
Lanio surinamus (Linnaeus, 1766)	tem-tem-de-topete-ferrugíneo	Fulvous-crested Tanager	-	R	LC
Lanio luctuosus (d'Orbigny & Lafresnaye, 1837)	tem-tem-de-dragona-branca	White-shouldered Tanager	-	R	LC
Lanio cristatus (Linnaeus, 1766)*	tiê-galo	Flame-crested Tanager	(BAE)	R	LC
Tachyphonus rufus (Boddaert, 1783)	pipira-preta	White-lined Tanager	-	R	LC
Ramphocelus carbo (Pallas, 1764)	pipira-vermelha	Silver-beaked Tanager	-	R	LC
Charitospiza eucosma (Oberholser, 1905)	mineirinho	Coal-crested Finch	(CE)	R	NT

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Tersina viridis (Illiger, 1811)	saí-andorinha	Swallow Tanager	-	R	LC
Cyanerpes caeruleus (Linnaeus, 1758)	saí-de-perna-amarela	Purple Honeycreeper	-	R	LC
Cyanerpes cyaneus (Linnaeus, 1766)	saíra-beija-flor	Red-legged Honeycreeper	-	R	LC
Dacnis cayana (Linnaeus, 1766)	saí-azul	Blue Dacnis	-	R	LC
Coereba flaveola (Linnaeus, 1758)	cambacica	Bananaquit	-	R	LC
Tiaris fuliginosus (Wied, 1830)	cigarra-preta	Sooty Grassquit	-	R	LC
Sporophila lineola (Linnaeus, 1758)	bigodinho	Lined Seedeater	-	R	LC
Sporophila plumbea (Wied, 1830)	patativa	Plumbeous Seedeater	-	R	LC
Sporophila americana (Gmelin, 1789)	coleiro-do-norte	Wing-barred Seedeater	-	R	LC
Sporophila collaris (Boddaert, 1783)	coleiro-do-brejo	Rusty-collared Seedeater	-	R	LC
Sporophila nigricollis (Vieillot, 1823)	baiano	Yellow-bellied Seedeater	-	R	LC
Sporophila caerulescens (Vieillot, 1823)	coleirinho	Double-collared Seedeater	-	R	LC
Sporophila albogularis (Spix, 1825)	golinho	White-throated Seedeater	EB (CA)	R	LC
Sporophila leucoptera (Vieillot, 1817)	chorão	White-bellied Seedeater	-	R	LC
Sporophila bouvreuil (Statius Muller, 1776)	caboclinho	Copper Seedeater	-	R	LC
Sporophila minuta (Linnaeus, 1758)	caboclinho-lindo	Ruddy-breasted Seedeater	-	R	LC
Sporophila angolensis (Linnaeus, 1766)	curió	Chestnut-bellied Seed-Finch	-	R	LC
Sporophila maximiliani (Cabanis, 1851)	bicudo	Great-billed Seed-Finch		R	EN (CR)
Emberizoides herbicola (Vieillot, 1817)	canário-do-campo	Wedge-tailed Grass-Finch	-	R	LC
Saltatricula atricollis (Vieillot, 1817)	batuqueiro	Black-throated Saltator	(CE)	R	LC
Saltator maximus (Statius Muller, 1776)	tempera-viola	Buff-throated Saltator	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
Saltator coerulescens (Vieillot, 1817)	sabiá-gongá	Grayish Saltator	-	R	LC
Saltator similis (d'Orbigny & Lafresnaye, 1837)	trinca-ferro	Green-winged Saltator	-	R	LC
Saltator grossus (Linnaeus, 1766)	bico-encarnado	Slate-colored Grosbeak	-	R	LC
Thlypopsis sordida (d'Orbigny & Lafresnaye, 1837)	saí-canário	Orange-headed Tanager	-	R	LC
Cypsnagra hirundinacea (Lesson, 1831)	bandoleta	White-rumped Tanager	-	R	LC
CARDINALIDAE Ridgway, 1901					
Piranga flava (Vieillot, 1822)	sanhaço-de-fogo	Hepatic Tanager	-	R	LC
Granatellus pelzelni Sclater, 1865*	polícia-do-mato	Rose-breasted Chat	(BAE)	R	LC
Caryothraustes canadensis (Linnaeus, 1766)	furriel	Yellow-green Grosbeak	-	R	LC
Periporphyrus erythromelas (Gmelin, 1789)	bicudo-encarnado	Red-and-black Grosbeak	-	R	NT
Amaurospiza moesta (Hartlaub, 1853)	negrinho-do-mato	Blackish-blue Seedeater	-	R	LC
Cyanoloxia rothschildii (Bartlett, 1890)	azulão-da-amazônia	Rothschild's Blue Grosbeak	-	R	LC
Cyanoloxia brissonii (Lichtenstein, 1823)	azulão	Ultramarine Grosbeak	-	R	LC
FRINGILLIDAE Leach, 1820					
Spinus yarrellii (Audubon, 1839)	pintassilgo-do-nordeste	Yellow-faced Siskin	-	R	VU (VU)
Euphonia chlorotica (Linnaeus, 1766)	fim-fim	Purple-throated Euphonia	-	R	LC
Euphonia violacea (Linnaeus, 1758)	gaturamo	Violaceous Euphonia	-	R	LC
Euphonia cayennensis (Gmelin, 1789)	gaturamo-preto	Golden-sided Euphonia	-	R	LC
ESTRILDIDAE Bonaparte, 1850					
Estrilda astrild (Linnaeus, 1758)	bico-de-lacre	Common Waxbill	-	R	LC

Taxa	Brazilian name	English name	Endemism	Distribution	Status
PASSERIDAE Rafinesque, 1815					
Passer domesticus (Linnaeus, 1758)	pardal	House Sparrow	-	R	LC

* Endemic subspecies to Belem Area of Endemism listed in Table 2.

Table 2. Species and their respective subspecies from Belem Area of Endemism.

Taxa	Subspecies
Ortalis superciliaris	*superciliaris*
Crax fasciolata	*pinima*
Threnetes leucurus	*medianus*
Topaza pella	*microrhynchus*
Pteroglossus bitorquatus	*bitorquatus*
Celeus torquatus	*pieteroyensi*
Thamnophilus aethiops	*pieteroyensi*
Pyriglena leuconota	*leuconota*
Phlegopsis nigromaculata	*paraensis*
Dendrocincla merula	*badia*
Dendrexetastes rufigula	*paraensis*
Synallaxis rutilans	*omissa*
Manacus manacus	*purissimus*
Terenotriccus erythrurus	*hellmayri*
Piprites chloris	*grisescens*
Todirostrum chrysocrotaphum	*illigeri*
Tunchiornis ochraceiceps	*rubrifrons*
Ramphocaenus melanurus	*austerus*
Lanio cristatus	*pallidigula*

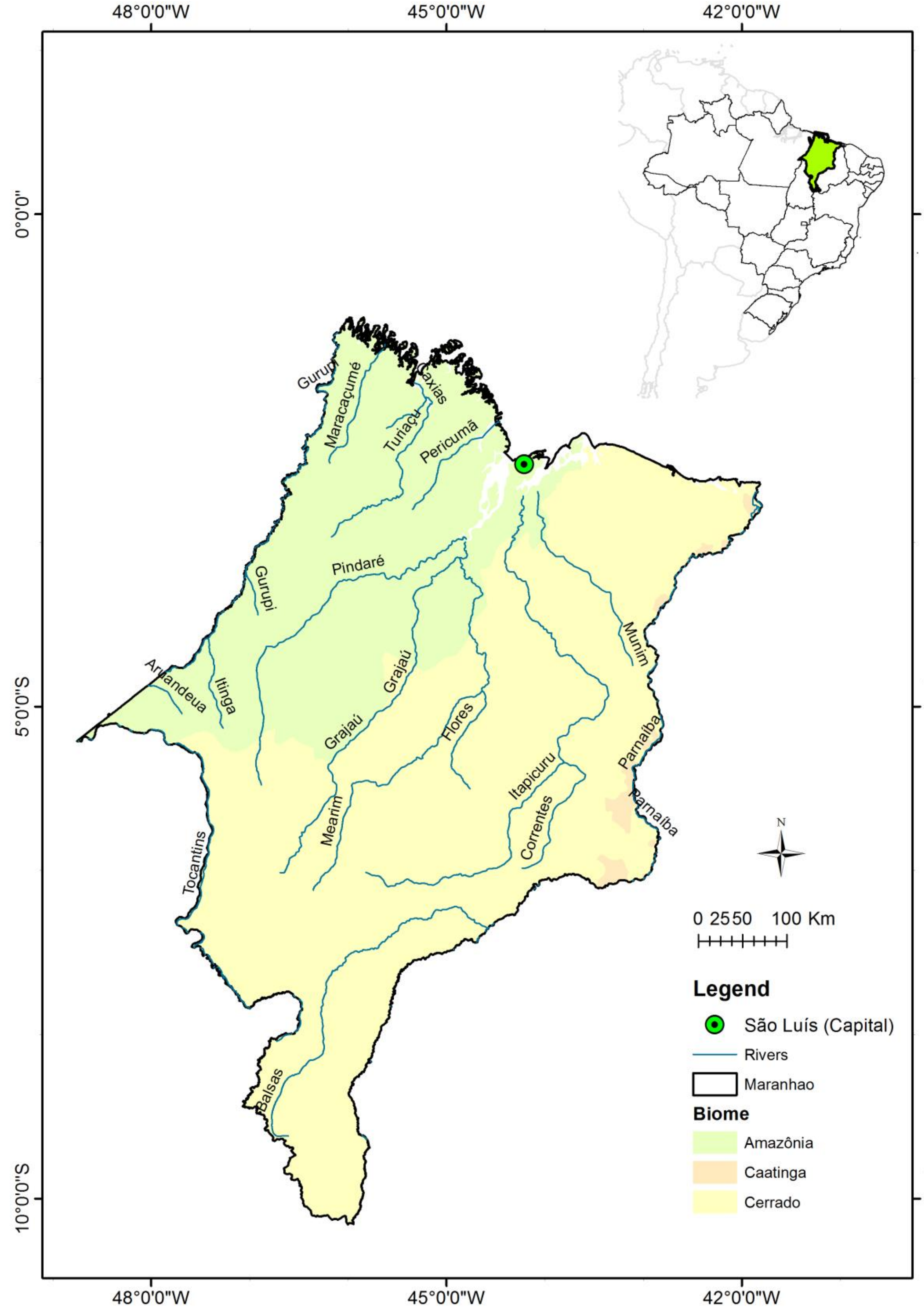

Figure 1. Map depicting the study area, the state of Maranhão. Main rivers and phyto-physiognomies are also depicted.

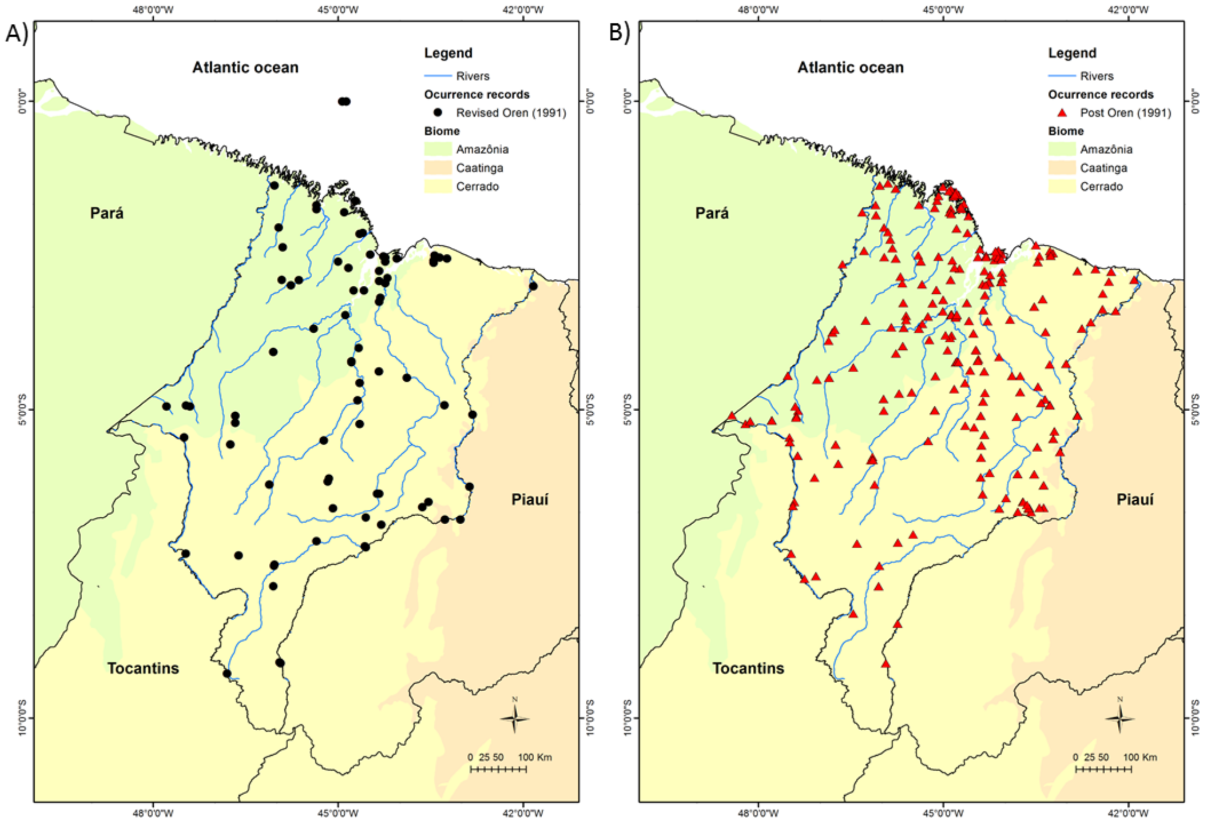

Figure 2. Maps showing location of all occurrence records compiled in the a) Revised (*black circle*) and b) Post (*red triangle)* Oren (1991) subsets.

Appendix I

Checklist of the birds of Maranhão. Both codes of localities and sources of occurrence records are given.

Taxa	Locality	Source
RHEIFORMES		
RHEIDAE		
Rhea americana	23IS; 25IS; 39IS; 57IS; 8IS; 129IS; NS	GZ 9:10; WA
TINAMIFORMES		
TINAMIDAE		
Tinamus tao	11LM; 86LM; 46IS	MPEG 38709; RBO 22(4):324; WA
Tinamus major	86LM	RBO 22(4):324
Tinamus guttatus	1LM; 91LM; 46IS	FNJV 11662; MPEG 22417
Crypturellus cinereus	25LM; 91LM; 86LM; 136LM; 39IS; 48IS; 124IS	LACM 42105-42106; MPEG 42238-42239, 50708; RBO 22(4):325; WA
Crypturellus soui	127LM; 136LM; 143IS; 144IS; 147IS; 17IS; 25LM; 34IS; 40LM; 41IS; 59LM; 66IS; 7IS; 83LM; 86LM; 89LM; 91LM; 1IS; 20IS; 101IS	LACM 42081 - 42092; FNJV 35; Helmmayr (1929):475; MNRJ 4529, 4534, 39723, 39724; MPEG 17967-17968, 37660, 42240-42243, 50711; RBO^{+} 11(1):171; RBO 22(4):325; XC; WA
Crypturellus undulatus	25LM; 48LM; 50LM; 59LM; 77LM; 91LM; 120IS; 122LM; 127LM; 154LM; 172LM; 173LM; 183LM	AMNH 240965, 240966; FMNH 404237; FNJV 85, 86; Helmmayr (1929):476; MNRJ 39734; MPEG 50712, 50713, 43380, 15900, 50714; RBO^{+} 11(1):171; WA
Crypturellus strigulosus	40LM; 40LM; 86LM; 174LM; 46IS; 65IS	FNJV 120-121; MPEG 37551; RBO 22(4):325
Crypturellus variegatus	86LM	RBO 22(4):325

Taxa	Locality	Source
Crypturellus parvirostris	31LM; 37LM; 59LM; 61LM; 77LM; 98LM; 9LM; 83LM; 86LM; 91LM; 100LM; 109LM; 111LM; 121LM; 127LM; 133IS; 136LM; 140LM; 154LM; 169LM; 25IS; 34IS; 40IS; 59IS; 7IS; 8IS; 95IS; 101IS; 152IS	AMNH 240979, 240983-240985, 240987, FMNH 64043, 404236; Helmmayr (1929)478; LACM42072, 42074-42080; LSUM Z28793; MNRJ 17966, 37659, 39748, 41945, 42244, 43381; RBO4(1):58; 15(1): 44; 22(4): 325; RBO$^+$11(1): 171; WA; XC
Crypturellus tataupa	59LM; 61LM; 62LM; 98LM; 109LM	RBO$^+$ 11(1):171; RBO 4(1):58; RBO 15(1):44
Rhynchotus rufescens	30LM; 59LM; 60LM; 23IS; 39IS; 41IS; 95IS; 133IS	FNJV 160; FMNH 403209, 03210, 403211; RBO$^+$11(1): 171; WA
Nothura boraquira	36LM; 100LM; 101LM; 41IS; 101IS; 108IS; 132IS; 120IS; 17IS	MPEG 43382; AMNH 241004; RBO 15(1): 44; WA
ANSERIFORMES		
ANHIMIDAE		
Anhima cornuta	42LM; 58LM; 59LM; 86LM; 121LM; 122LM; 154LM; 1IS; 16IS; 25IS; 30IS; 31IS; 34IS; 39IS; 41IS; 46IS; 55IS; 5IS; 62IS; 69IS; 72IS; 74IS; 75IS; 7IS; 101IS; 102IS; 106IS; 10IS; 120IS; 125IS; 139IS; 147IS; 155IS; 164IS	AMNH 241464-241466; RBO+ 11(1):169; RBO 4(1):58; RBO 22(4):325; MPEG 76893; XC; WA
ANATIDAE		
Dendrocygna viduata	86LM; 100LM; 147LM; 148LM; 149LM; 168LM; 26IS; 39IS; 40IS; 41IS; 58IS; 70IS; 72IS; 87IS; 90IS; 92IS; 101IS; 103IS; 115IS; 120IS; 131IS; 143IS; 15IS; 17IS	RBO17(3-4):177; RBO 15(1): 44; RBO22(4):325; AMNH 241470; WA

Taxa	Locality	Source
Dendrocygna autumnalis	86LM; 133LM; 147LM; 148LM; 26IS; 31IS; 41IS; 58IS; 70IS; 87IS; 90IS; 98IS; 101IS; 129IS; 143IS; 144IS; 147IS; 155IS	Pinto (1938):49; RBO22(4): 325; RBO17(3-4):177; WA
Cairina moschata	46LM; 86LM; 17IS; 26IS; 3IS; 34IS; 40IS; 55IS; 58IS; 120IS; 131IS; 149IS	MPEG 46369; RBO22(4):325; WA
Sarkidiornis sylvicola	133LM	Pinto (1938):50
Amazonetta brasiliensis		
Anas bahamensis	147LM; 148LM; 149LM; 26IS; 131IS; 15IS	RBO 17(3-4):177; WA
Anas discors	165IS; NS	GZ9: 13; WA
Nomonyx dominicus	41IS	WA
GALLIFORMES		
CRACIDAE		
Penelope superciliaris	9LM; 17LM; 36LM; 42LM; 58LM; 59LM; 77LM; 89LM; 94LM; 133LM; 136LM; 154LM; 169LM; 173LM; 1IS; 25IS; 26IS; 41IS; 46IS; 8IS	AMNH 241016, 241015; FMNH 404240, 404241, 64019, 404238; MPEG 50724, 43386, 43388, 77030, 77031, 43387, 8325, 8326, 37325, 46370, 42246; RBO22(4): 325; RBO[+]11(1): 171; ZUEC665; WA
Penelope pileata	58LM; 59LM; 1IS; 30IS	RBO22(4):325; RBO[+]11(1):171; WA
Penelope ochrogaster	55IS	WA
Penelope jacucaca	15IS	WA
Aburria cujubi	86LM	WA
Ortalis guttata	146LM	AMNH 471445-471449

Taxa	Locality	Source
Ortalis superciliaris	59LM; 60LM; 61LM; 86LM; 89LM; 91LM; 121LM; 127LM; 146LM; 15LM; 168LM; 1IS; 15IS; 17IS; 20IS; 26IS; 30IS; 34IS; 39IS; 40IS; 41IS; 46IS; 48IS; 70IS; 76IS; 133IS; 139IS; 147IS; 153IS	AMNH241017; FMNH403205; LACM42151-42154; MNRJ9429, 9430, 44234; MPEG37799-37803, 8327; Pinto (1938):100; RBO4(1):58; RBO22(4):325; RBO+11(1):171; WA
Crax fasciolata	36LM; 133LM; 146LM; 46IS	MPEG 44456; Pinto (1938):96; WA
Pauxi tuberosa	42LM; 46IS	RBO 22(4):325; WA
Pauxi mitu	11LM	MPEG 38563
ODONTOPHORIDAE		
Odontophorus gujanensis	4LM; 11LM; 86LM; 41IS; 151IS	MPEG 38422-38564; RBO22(4):325; WA
PODICIPEDIFORMES		
PODICIPEDIDAE		
Tachybaptus dominicus	86LM; 1IS; 40IS; 41IS; 55IS; 66IS; 67IS; 107IS; 144IS; 153IS	RBO 22(4):325; WA
Podilymbus podiceps	42LM; 122LM; 146LM; 168LM; 110IS; 39IS; 41IS; 106IS; 144IS	RBO 22(4):325; AMNH 241219-241220; Pinto (1938):17; WA
PROCELLARIIFORMES		
DIOMEDEIDAE		
Thalassarche chlororhynchos	90LM	RBO (258)
Thalassarche melanophris	145LM	RBO (33)
PROCELLARIIDAE		
Calonectris borealis	26IS; 144IS	WA
Puffinus gravis	26IS	WA

Taxa	Locality	Source
PHAETHONTIFORMES		
PHAETHONTIDAE		
Phaethon aethereus	132IS	GZ 9:11; WA
CICONIIFORMES		
CICONIIDAE		
Ciconia maguari	59LM; 58IS	RBO[+] 11(1):165; WA
Jabiru mycteria	89LM; NS; 17IS	GZ 9:12; MNRJ 3659; WA
Mycteria americana	58LM; 15IS; 28IS; 39IS; 41IS; 120IS; 155IS	RBO 22(4):325; WA
SULIFORMES		
FREGATIDAE		
Fregata magnificens	NS; 26IS; 40IS; 58IS; 64IS; 143IS; 144IS	GZ 9:13; WA
SULIDAE		
Sula sula	108LM; 144IS	MPEG 34426; WA
Sula leucogaster	26IS	WA
PHALACROCORACIDAE		
Nannopterum brasilianus	45LM; 59LM; 147LM; 148LM; NS; 15IS; 17IS; 26IS; 40IS; 41IS; 106IS; 13IS; 144IS; 147IS; 153IS	Helmmayr (1929):500; RBO 15(1): 45; RBO[+] 11(1): 165; RBO 17(3-4):177; WA
ANHINGIDAE		
Anhinga anhinga	45LM; 58LM; 59LM; 127LM; 31IS; 39IS; 41IS; 106IS; 120IS; 124IS	MNRJ 39771; RBO 15(1):45; RBO 22(4):325; RBO[+] 11(1):165; WA
PELECANIFORMES		

Taxa	Locality	Source
ARDEIDAE		
Tigrisoma lineatum	31LM; 45LM; 59LM; 85LM; 86LM; 89LM; 91LM; 133LM; 1IS; 31IS; 34IS; 39IS; 40IS; 41IS; 55IS; 68IS; 6IS; 70IS; 71IS; 101IS; 110IS; 120IS; 125IS; 132IS; 139IS; 144IS; 147IS; 162IS	AMNH 469576-241460; LACM 42116-42117; MNRJ 6468; MPEG 2564; MPEG 7405; RBO15(1):45; RBO22(4):325; RBO+11(1):165; WA
Agamia agami	NS; 55IS	GZ 9:12; WA
Cochlearius cochlearius	15LM; 86LM; 89LM; 91LM; 15IS; 160IS; 46IS	MPEG 8332; 15916; 37805; RBO22(4):325; WA
Zebrilus undulatus	39IS	WA
Botaurus pinnatus	18LM; 59LM; 133LM; 17IS; 58IS	AMNH 469508; BMPEG 9(1):139; RBO+11(1): 165; WA
Ixobrychus exilis	147LM; 151LM; 170LM; 17IS	FMNH 64067-64068 ; MNRJ 6603; MPEG 67789; RBO17(3-4):177; WA
Ixobrychus involucris	151LM; 170IS	MNRJ 6604; WA
Nycticorax nycticorax		
Nyctanassa violacea	84LM; 89LM; 120LM; 26IS; 3IS; 40IS; 58IS; 64IS; 119IS; 143IS; 144IS; 15IS; 160IS	AMNH 241444; MNRJ 6574; MPEG 2562, 7404; Pinto (1938):36; WA
Butorides striata	1IS; 22IS; 25IS; 26IS; 34IS; 36IS; 39IS; 3IS; 40IS; 41IS; 55IS; 58IS; 70IS; 90IS; 92IS; 119IS; 120IS; 127IS; 131IS; 132IS; 133IS; 139IS; 144IS; 153IS; 155IS; 165IS; 17IS; 23LM; 32LM; 45LM; 59LM; 62LM; 84LM; 91LM; 147LM; 148LM; 149LM; 86LM; 151LM; 168LM; 169LM; 183LM	AMNH 241449-241454; FMNH 64070, 64071; LACM 42111-42114; MNRJ 6587; MPEG 2563, 15908, 15909, 50715, 50716; RBO 15(1):45; RBO 4(1):58; RBO 17(3-4):177; RBO 22(4): 325; RBO+ 11(1):165; WA

Taxa	Locality	Source
Bubulcus ibis	45LM; 86LM; 147LM; 148LM; 149LM; 15IS; 17IS; 25IS; 32IS; 36IS; 37IS; 39IS; 40IS; 55IS; 85IS; 101IS; 103IS; 120IS; 128IS; 143IS; 144IS	RBO 15(1):45; RBO 17(3-4):177; RBO 22(4):325; WA
Ardea cocoi	45LM; 59LM; 91LM; 148LM; 168LM; 1IS; 26IS; 27IS; 39IS; 40IS; 41IS; 55IS; 131IS; 132IS; 13IS; 15IS; 160IS	AMNH 241414; LACM 42115; RBO 17(3-4):177; RBO 15(1):45; RBO+ 11(1):165; WA
Ardea alba	45LM; 59LM; 86LM; 147LM; 148LM; 149LM; 26IS; 37IS; 3IS; 41IS; 55IS; 67IS; 68IS; 70IS; 85IS; 90IS; 98IS; 103IS; 105IS; 106IS; 119IS; 132IS; 143IS; 144IS; 153IS; 156IS; 159IS; 15IS; 165IS	RBO 17(3-4):177; RBO 15(1): 45; RBO 22(4):325; RBO+ 11(1):165; WA
Syrigma sibilatrix	8IS; 152IS	WA
Pilherodius pileatus	42LM; 59LM; 1IS; 30IS; 30IS; 30IS; 30IS; 34IS; 39IS; 41IS; 70IS; 101IS; 153IS	RBO 22(4):325; RBO+ 11(1):165; WA
Egretta tricolor	77LM; 133LM; 146LM; 165LM; 176LM; 26IS; 3IS; 40IS; 54IS; 58IS; 64IS; 103IS; 119IS; 13IS; 144IS; 15IS; 160IS	AMNH 241429-241431; Pinto (1938):33; FMNH 64022; WA
Egretta thula	45LM; 68LM; 73LM; 86LM; 88LM; 91LM; 130LM; 147LM; 148LM; 149LM; 15IS; 17IS; 20IS; 26IS; 37IS; 3IS; 40IS; 41IS; 58IS; 67IS; 92IS; 113IS; 119IS; 131IS; 143IS; 144IS; 153IS	LACM 42109; MPEG 40655; RBO 15(1):45; RBO 15(2): 160; RBO 17(3-4):177; RBO 22(4):325; WA
Egretta caerulea	120LM; 160LM; 162LM; 25IS; 26IS; 37IS; 3IS; 40IS; 58IS; 67IS; 113IS; 119IS; 131IS; 143IS; 144IS; 15IS; 160IS	AMNH 241422-241428; WA
THRESKIORNITHIDAE		

Taxa	Locality	Source
Eudocimus ruber	68LM; 71LM; 73LM; 77LM; 89LM; 103LM; 118LM; 133LM; 146LM; 15IS; 160IS; 20IS; 26IS; 3IS; 40IS; 54IS; 58IS; 84IS; 94IS; 113IS; 119IS; 131IS; 13IS; 143IS; 144IS	AMNH 241407-241408, 350076; FMNH 64021; MCZ 308993-308996; MNRJ 6448, 6449; MPEG 6849, 7401, 8328-8331; Pinto (1938):44; RBO15(2):160; WA
Mesembrinibis cayennensis	86LM; 20IS; 34IS	RBO 22(4):325; WA
Phimosus infuscatus	17IS; 39IS; 41IS	WA
Theristicus caudatus	39LM; 86LM; 133LM; 147LM; 23IS; 25IS; 25IS; 26IS; 39IS; 95IS; 103IS; 120IS; 152IS; 15IS	AMNH 241393; RBO 17(3-4):177; Pinto(1938):42; RBO22(4):325; WA
Platalea ajaja	89LM; 149LM; 13IS; 15IS; 26IS; 40IS; 55IS; 119IS	MPEG 7402, 7403; RBO17(3-4):177; WA
CATHARTIFORMES		
CATHARTIDAE		
Cathartes aura	45LM; 59LM; 61LM; 62LM; 86LM; 86LM; 98LM; 100LM; 111LM; 121LM; 3IS; 1IS; 17IS; 20IS; 23IS; 25IS; 26IS; 28IS; 34IS; 37IS; 39IS; 40IS; 48IS; 62IS; 9IS; 119IS; 131IS; 132IS; 133IS; 139IS; 144IS; 147IS; 151IS; 153IS; 15IS; 160IS; 163IS; 165IS	RBO[+]11(1):169; RBO4(1):58; RBO15(1):45; RBO22(4):325; WA
Cathartes burrovianus	45LM; 59LM; 86LM; 100LM; 138LM; 15IS; 160IS; 165IS; 17IS; 21IS; 26IS; 31IS; 3IS; 40IS; 41IS; 48IS; 50IS; 58IS; 66IS; 79IS; 7IS; 90IS; 92IS; 101IS; 103IS; 106IS; 109IS; 116IS; 125IS; 131IS; 133IS; 143IS; 144IS	RBO[+] 11(1):169; RBO 15(1):45; RBO 22(4):325; AMNH 241497; WA
Cathartes melambrotus	42LM; 1IS; 31IS; 40IS; 46IS; 7IS; 72IS;	RBO 22(4):326; WA

Taxa	Locality	Source
	147IS	
Coragyps atratus	45LM; 59LM; 86LM; 100LM; 160LM; 3IS; 7IS; 8IS; 17IS; 21IS; 25IS; 26IS; 31IS; 37IS; 40IS; 41IS; 48IS; 54IS; 66IS; 71IS; 93IS; 104IS; 109IS; 119IS; 120IS; 131IS; 133IS; 135IS; 137IS; 143IS; 144IS; 160IS; 165IS	AMNH 241495; RBO$^+$ 11(1):169; RBO 15(1):45; RBO 22(4):326; WA
Sarcoramphus papa	86LM; 136LM; 168LM; 1IS; 8IS; 26IS; 39IS; 41IS; 62IS; 66IS; 89IS; 102IS; 147IS; 153IS	AMNH 241494; MPEG 42440; RBO 22(4):326; WA
ACCIPITRIFORMES		
PANDIONIDAE		
Pandion haliaetus	15IS; 26IS; 31IS; 34IS; 39IS; 41IS; 55IS; 70IS; 92IS; 106IS; 119IS; 133IS; 144IS; 153IS	WA
ACCIPITRIDAE		
Leptodon cayanensis	34LM; 42LM; 59LM; 85LM; 98LM; 17IS; 34IS; 41IS; 106IS; 153IS	MPEG 2507; MPEG 50723; RBO 4(1):58; RBO 22(4):326; RBO$^+$ 11(1):166; WA
Chondrohierax uncinatus	86LM; 89LM; 174LM; 1IS; 17IS; 20IS; 25IS; 144IS; 147IS	Helmmayr (1929):456; MPEG 37553-37555; RBO 22(4):326; WA
Elanoides forficatus	42LM; 59LM; 89LM; 109LM; 1IS; 30IS; 37IS; 39IS; 40IS; 41IS; 46IS; 55IS; 101IS; 110IS; 133IS; 151IS; 152IS; 153IS; 162IS	MPEG 8319; RBO+ 11(1):165; RBO 15(1):45; RBO 22(4):326; WA
Gampsonyx swainsonii	39LM; 59LM; 86LM; 89LM; 91LM; 95LM; 127LM; 146LM; 152LM; 154LM; 1IS; 20IS; 26IS; 28IS; 31IS; 39IS; 40IS; 41IS; 46IS; 60IS; 66IS; 70IS; 71IS; 77IS; 94IS;	AMNH 241584-241586; FMNH 64003; LACM 42143-42147; MNRJ 44300; MPEG 8321, 17971; Pinto (1938):89; RBO 22(4):326; RBO$^+$ 11(1):165; WA

Taxa	Locality	Source
	119IS; 120IS; 147IS; 153IS; 164IS	
Elanus leucurus	59LM; 61LM; 62LM; 86LM; 25IS; 40IS; 94IS; 144IS; 17IS	RBO[+] 11(1):165; RBO 4(1):58; RBO 22(4):326; WA
Harpagus bidentatus	58LM; 89LM; 176LM; 178LM; 40IS; 70IS	FMNH 64012; Helmmayr (1929):457; MPEG 34931; Pinto (1938): 64; RBO 22(4):326; WA
Harpagus diodon	86LM; 113LM; 40IS; 41IS; 89IS; 144IS; 147IS; 153IS	MPEG 70056; RBO 22(4):326; WA
Circus buffoni	17IS	WA
Accipiter poliogaster	89LM; 41IS	MPEG 7408; WA
Accipiter superciliosus	58LM; 83LM; 86LM; 89LM; 91LM; 93LM; 174LM; 41IS	Helmmayr (1929): 459; LACM 42148; MPEG 15733, 37552, 37661, 76948; RBO22(4):326; WA
Accipiter bicolor	38LM; 44LM; 62LM; 86LM; 91LM; 133LM; 172LM; 25IS; 40IS; 41IS	FMNH 64005; LACM 42149; MNRJ 42149; MPEG 6834, 37324, Pinto (1938):66; RBO 4(1):58; RBO 22(4):326; WA
Ictinia plumbea	59LM; 61LM; 62LM; 86LM; 172LM; 1IS; 34IS; 39IS; 40IS; 41IS; 62IS; 72IS; 101IS	FMNH 64004; RBO[+] 11(1): 165; RBO 4(1):58; RBO 22(4):326; WA
Busarellus nigricollis	86LM; 1IS; 28IS; 31IS; 37IS; 40IS; 41IS; 58IS; 62IS; 75IS; 92IS; 101IS	RBO 22(4):326; WA

Taxa	Locality	Source
Rostrhamus sociabilis	37LM; 62LM; 86LM; 89LM; 91LM; 146LM; 147LM; 148LM; 151LM; 15IS; 17IS; 20IS; 22IS; 23IS; 32IS; 36IS; 39IS; 41IS; 53IS; 55IS; 58IS; 62IS; 70IS; 7IS; 92IS; 101IS; 103IS; 106IS; 120IS; 125IS; 131IS; 139IS; 147IS; 153IS; 165IS	AMNH 241558, 241559; FMNH64017; LACM 42122; MNRJ8516; MPEG8320; Pinto(1938):65; RBO 4(1):58; RBO 17(3-4):177; RBO 22(4):326; WA
Helicolestes hamatus	106IS; 147IS; 17IS	WA
Geranospiza caerulescens	59LM; 62LM; 64LM; 86LM; 89LM; 111LM; 133LM; 155LM; 15IS; 39IS; 40IS; 41IS; 101IS; 132IS; 133IS; 139IS; 144IS; 153IS; 158IS	Helmmayr (1929):457, 458; LSUMZ 71582; MPEG 7407, 67791; Pinto (1938):82; RBO 4(1):58; RBO 22(4):326; RBO^{+} 11(1):165; WA
Buteogallus schistaceus	NS	GZ 9:15
Buteogallus aequinoctialis	89LM; 146LM; NS; 15IS; 20IS; 40IS; 54IS; 119IS; 13IS; 144IS; 159IS	Helmmayr (1929):461; MPEG 8316; Pinto (1938):77; WA
Heterospizias meridionalis	59LM; 61LM; 62LM; 86LM; 146LM; 168LM; 1IS; 5IS; 6IS; 23IS; 25IS; 27IS; 36IS; 40IS; 41IS; 49IS; 57IS; 70IS; 73IS; 87IS; 92IS; 101IS; 103IS; 109IS; 111IS; 120IS; 125IS; 131IS; 132IS; 146IS; 147IS; 152IS; 15IS; 161IS; 164IS; 17IS; 19IS	AMNH 241520; Pinto (1938): 68; RBO^{+} 11(1):165; RBO 4(1):58; RBO 22(4):326; WA
Urubitinga urubitinga	58LM; 59LM; 89LM; 1IS; 25IS; 31IS; 40IS; 46IS; 58IS; 147IS	MPEG 8317; RBO 22(4):326; RBO^{+} 11(1):165; WA
Urubitinga coronata	100LM; 8IS	RBO 15(1):45; WA

Taxa	Locality	Source
Rupornis magnirostris	1IS; 23IS; 25IS; 26IS; 27IS; 28IS; 2IS; 31IS; 33IS; 34IS; 39IS; 3IS; 40IS; 41IS; 46IS; 48IS; 49IS; 51IS; 55IS; 60IS; 6IS; 70IS; 71IS; 72IS; 80IS; 87IS; 90IS; 101IS; 119IS; 121IS; 131IS; 133IS; 139IS; 143IS; 144IS; 149IS; 153IS; 15IS; 163IS; 165IS; 17IS; 20LM; 21LM; 32LM; 36LM; 45LM; 59LM; 61LM; 62LM; 85LM; 86LM; 89LM; 91LM; 93LM; 97LM; 98LM; 99LM; 100LM; 101LM; 109LM; 110LM; 111LM; 121LM; 133LM; 142LM; 14LM; 151LM; 154LM; 167LM; 168LM; 169LM; 176LM; 184LM; NS	AMNH 241526-241528, 241531-241535, 241541, 241542; CUMV 3847; FMNH 64013, 64014; LACM 42128; LACM 42129-42132; MCZ 92418; MPEG 2506, 8314, 8315, 15705, 31531, 36855, 40795, 43383, 50719-50722, 67795; Pinto (1938):72; RBO 15(1): 45; RBO 4(1):58; RBO 4(1):65; RBO 22(4):326; RBO^{+} 11(1): 165; WA
Parabuteo unicinctus	146LM	Pinto (1938): 74
Geranoaetus albicaudatus	30LM; 86LM; 1IS; 22IS; 23IS; 25IS; 31IS; 39IS; 40IS; 41IS; 46IS; 57IS; 58IS; 87IS; 101IS; 103IS; 152IS	FNJV 301; RBO 22(4):326; WA
Geranoaetus melanoleucus	39IS; 120IS	WA
Pseudastur albicollis	4LM; 12LM; 38LM; 58LM; 177LM; 1IS; 30IS; 39IS; 40IS; 46IS; 48IS; 89IS; 164IS	MNRJ 8526; MPEG 6836, 38405, 40794; RBO22(4):326; WA
Leucopternis kuhli	59LM	RBO^{+} 11(1):166
Buteo nitidus	23LM; 42LM; 59LM; 91LM; 100LM; 121LM; 184LM; 1IS; 20IS; 26IS; 30IS; 31IS; 34IS; 40IS; 41IS; 48IS; 49IS; 58IS; 60IS; 73IS; 90IS; 95IS; 101IS; 133IS; 143IS; 144IS; 147IS; 153IS; 17IS	LACM 42123-42127; MPEG 50717; MPEG 50718; RBO 4(1):58; RBO 15(1):45; RBO 22(4):326; RBO^{+} 11(1):165; WA
Buteo platypterus	62LM	RBO 4(1):58

Taxa	Locality	Source
Buteo brachyurus	59LM; 86LM; 89LM; 3IS; 1IS; 20IS; 25IS; 26IS; 34IS; 41IS; 68IS; 79IS; 87IS; 101IS; 133IS; 144IS; 153IS; 160IS	FMNH 124184; RBO[+] 11(1): 165; RBO 22(4):326
Buteo albonotatus	86LM; 100LM; 15IS; 17IS; 20IS; 25IS; 33IS; 34IS; 41IS; 46IS; 49IS; 90IS; 101IS; 108IS; 153IS	RBO 15(1): 45; RBO 22(4):326, WA
Morphnus guianensis	127LM	MNRJ 44312
Harpia harpyja	86LM	RBO 22(4):323
Spizaetus tyrannus	86LM; 1IS; 17IS; 41IS; 101IS; 120IS; 133IS; 144IS; 153IS	RBO 22(4):326; WA
Spizaetus melanoleucus	58LM; 100LM; 1IS; 41IS; 46IS; 8IS; 120IS	RBO 15(1):45; RBO 22(4):323; WA
EURYPYGIFORMES		
EURYPYGIDAE		
Eurypyga helias	77LM; 89LM; 146LM; 160LM; 30IS; 143IS; 144IS; 133IS; 15IS	AMNH241385-241387; MNRJ7763; MPEG7406; Pinto (1938):123; WA
GRUIFORMES		
ARAMIDAE		
Aramus guarauna	86LM; 91LM; 147LM; 148LM; 30IS; 41IS; 49IS; 58IS; 70IS; 75IS; 103IS; 131IS	LACM 42156; RBO 17(3-4):177; RBO 22(4):326; WA
PSOPHIIDAE		
Psophia obscura	42LM; 44LM; 87LM; 46IS	MPEG 37338; RBO 22(4):323; Ornithologia 5(1):40; WA
RALLIDAE		
Rallus longirostris	65LM; 71LM; 13IS; 20IS; 3IS; 40IS; 119IS;	FMNH 64066, 403197; WA

Taxa	Locality	Source
	143IS; 145IS	
Aramides ypecaha	NS	GZ 9: 17
Aramides mangle	155LM; 3IS; 119IS; 144IS; 15IS	MPEG 67808; WA
Aramides cajaneus	48LM; 58LM; 60LM; 77LM; 86LM; 91LM; 136LM; 146LM; 154LM; 27IS; 3IS; 41IS; 59IS; 62IS; 94IS; 139IS; 143IS; 144IS; 153IS	AMNH 241194, 241197; FMNH 400618, 403198; MPEG 15915, 42245, 50725, 76927; RBO22(4):326; WA
Laterallus viridis	9LM; 22LM; 59LM; 86LM; 131LM; 7IS; 1IS; 41IS; 77IS; 144IS; 17IS	FMNH 64042, 404234, 404235; MPEG 49767; RBO 22(4):326; RBO+ 11(1): 166; WA; XC
Laterallus melanophaius	40LM; 86LM; 7IS; 15IS; 17IS; 41IS; 46IS; 132IS	FNJV 562, 563; RBO 22(4):326; WA; XC
Laterallus exilis	19LM; 7IS; 17IS; 41IS; 71IS; 137IS	MPEG 76695, 76696; XC; WA
Laterallus jamaicensis	19LM; 17IS; 146IS	MPEG 77871; WA; XC
Porzana flaviventer	19LM; 42LM; 17IS; 30IS	MPEG 77872; RBO 22(4):326; WA; XC
Mustelirallus albicollis	59LM; 1IS; 17IS; 46IS; 103IS; 137IS	RBO+ 11(1): 171; WA
Neocrex erythrops	17IS; 25IS; 48IS; 104IS; 153IS	WA
Pardirallus maculatus	19LM; 151LM; 17IS	MPEG76697; MNRJ34674-34685; WA; XC
Gallinula galeata	44LM; 86LM; 154LM; 1IS; 144IS; 153IS	MPEG 37326; RBO 22(4):326; AMNH 241209, 241210; WA
Porphyriops melanops	NS	GZ 9: 17
Porphyrio martinicus	39LM; 42LM; 45LM; 54LM; 91LM; 147LM; 148LM; 162LM; 1IS; 17IS; 22IS; 36IS; 39IS; 41IS; 58IS; 70IS; 82IS; 85IS; 93IS; 101IS; 108IS; 120IS; 131IS; 135IS;	AMNH 241214, 241215; MPEG 15910-15912, 50727; RBO 22(4):326; RBO 15(1): 46; RBO 17(3-4):177

Taxa	Locality	Source
	153IS; 163IS	
Porphyrio flavirostris	147LM; 17IS; 22IS; 25IS; 40IS; 44IS; 70IS; 92IS	RBO 17(3-4):177; WA
HELIORNITHIDAE		
Heliornis fulica	36LM; 89LM; 127LM; 106IS; 120IS; 153IS	MPEG 43389; MNR J45350; Pinto (1938):122; WA
CHARADRIIFORMES		
CHARADRIIDAE		
Vanellus cayanus	59LM; 91LM; 138LM; 146LM; 7IS; 1IS; 28IS; 30IS; 35IS; 41IS; 48IS; 62IS; 103IS; 131IS; 133IS; 147IS; 153IS; 155IS; 15IS	AMNH 241242-241246; LACM 42159, 42160; Pinto (1938):128; RBO+11(1):169; WA
Vanellus chilensis	45LM; 77LM; 86LM; 89LM; 91LM; 98LM; 110LM; 121LM; 146LM; 15IS; 20IS; 23IS; 25IS; 26IS; 27IS; 31IS; 37IS; 40IS; 41IS; 46IS; 48IS; 55IS; 58IS; 62IS; 70IS; 92IS; 101IS; 103IS; 119IS; 131IS; 132IS; 153IS; 160IS	AMNH241260-241262; FMNH401657, 401658; MPEG15907; Pinto (1938):127; RBO 4(1):59; RBO 15(1): 46; RBO 22(4):326; WA
Pluvialis dominica	30IS	WA
Pluvialis squatarola	67LM; 68LM; 70LM; 73LM; 80LM; 162LM; 149LM; 182LM; 3IS; 15IS; 160IS; 26IS; 30IS; 101IS; 119IS; 143IS; 144IS	AMNH 241267-241270; JFO 71(4):669; RBO 7(3-4):177; RBO 15(2):160; WA
Charadrius semipalmatus	47LM; 68LM; 70LM; 74LM; 77LM; 80LM; 147LM; 148LM; 149LM; 160LM; 161LM; 26IS; 3IS; 40IS; 58IS; 70IS; 106IS; 119IS;	AMNH241272-241276, 241277; RBO 15(2):160; RBO 17(3-4):177; JFO 71(4):669; WA

Taxa	Locality	Source
	131IS; 143IS; 144IS; 15IS; 160IS	
Charadrius wilsonia	7LM; 68LM; 70LM; 71LM; 160LM; 3IS; 13IS; 26IS; 40IS; 54IS; 119IS; 143IS	AMNH 241271; FMNH 64049;MPEG 52697; RBO 15(2):160;WA
Charadrius collaris	7LM; 91LM; 146LM; 147LM; 148LM; 149LM; 160LM; 161LM; 3IS; 13IS; 15IS; 160IS; 25IS; 26IS; 39IS; 40IS; 41IS; 48IS; 92IS; 103IS; 106IS; 119IS; 131IS; 143IS; 144IS; 147IS; 153IS; 159IS	AMNH 241278-241282; FMNH 64058; LACM 42161-42166; MPEG5 2695, 52696; RBO 17(3-4):177; UMMZ 241732, 241733; WA
HAEMATOPODIDAE		
Haematopus palliatus	68LM; 73LM; 133LM; 149LM; 3IS; 13IS; 15IS; 26IS; 40IS; 119IS; 131IS; 143IS; 144IS; 160IS	Pinto (1938):127; RBO 15(2): 160; RBO 17(3-4):177; WA
RECURVIROSTRIDAE		
Himantopus mexicanus	71LM; 133LM; 147LM; 148LM; 149LM; 26IS; 3IS; 41IS; 68IS; 85IS; 103IS; 106IS; 119IS; 131IS; 144IS; 15IS; 17IS	FMNH 64081; Pinto (1938):144; RBO 17(3-4):177; WA
SCOLOPACIDAE		
Gallinago paraguaiae	1IS; 17IS; 40IS; 146LM; 151LM; 164LM	AMNH 241357-241360; FMNH 64046, 64047; MNRJ 6682; Pinto (1938):138; WA
Limnodromus griseus	3IS; 13IS; 15IS; 26IS; 54IS; 119IS; 143IS; 144IS; 160IS; 7LM; 68LM; 70LM; 71LM; 73LM; 74LM; 75LM; 76LM; 80LM; 130LM; 148LM; 149LM	FMNH 64050 64051; JFO 71(4):669; MPEG 52691-52694; RBO 15(2):160; RBO 17(3-4):177; WA
Limosa haemastica	NS	GZ 9:19

Taxa	Locality	Source
Limosa lapponica	13IS	WA
Limosa fedoa	13IS	WA
Numenius hudsonicus	67LM; 68LM; 70LM; 72LM; 73LM; 75LM; 76LM; 80LM; 84LM; 118LM; 130LM; 133LM; 165LM; 3IS; 13IS; 15IS; 26IS; 40IS; 113IS; 119IS; 143IS; 144IS; 160IS	AMNH 241314-241318; JFO 71(4):669; MNRJ 6667; MPEG 2559 2560; Pinto (1938):132; RBO 15(2):160; WA
Bartramia longicauda	164LM	AMNH 241331, 241332
Actitis macularius	84LM; 86LM; 86LM; 147LM; 148LM; 149LM; 160LM; 176LM; 3IS; 15IS; 18IS; 26IS; 40IS; 46IS; 94IS; 103IS; 106IS; 119IS; 143IS; 144IS; 160IS	AMNH 241330; FMNH 99763; MPEG 2561; RBO 17(3-4):177; RBO 22(4):327; WA
Tringa solitaria	57LM; 111LM; 121LM; 160LM; 164LM; 17IS; 19IS; 25IS; 27IS; 31IS; 34IS; 39IS; 41IS; 70IS; 106IS; 120IS; 132IS; 139IS; 147IS; 155IS	AMNH 241326-241329; RBO 4(1):59; RBO 22(4):327; WA
Tringa melanoleuca	67LM; 68LM; 80LM; 147LM; 148LM; 149LM; 3IS; 13IS; 15IS; 17IS; 26IS; 40IS; 103IS; 106IS; 119IS; 123IS; 131IS; 144IS	RBO 15(2):160; RBO 17(3-4):177; JFO 71(4):669; WA
Tringa semipalmata	67LM; 68LM; 70LM; 72LM; 73LM; 75LM; 76LM; 80LM; 120LM; 147LM; 149LM	AMNH 241319; JFO 71(4): 669; RBO 17(3-4):177; RBO 15(2): 160; WA
Tringa flavipes	80LM; 147LM; 148LM; 149LM; 13IS; 15IS; 26IS; 40IS; 106IS; 119IS; 131IS; 144IS	JFO 71(4): 669; RBO 17(3-4):177; WA
Arenaria interpres	68LM; 70LM; 73LM; 74LM; 80LM; 84LM; 130LM; 147LM; 148LM; 149LM; 161LM; 176LM; 3IS; 13IS; 26IS; 40IS; 119IS; 143IS; 144IS; 160IS	AMNH 241233-241239; JFO 71(4): 669; MNRJ 6690; MPEG 2557

Taxa	Locality	Source
Calidris canutus	68LM; 80LM; 148LM; 149LM; 26IS; 15IS; 103IS; 119IS; 143IS; 160IS	JFO 71(4): 669; RBO 15(2): 160; RBO 17(3-4):177; WA
Calidris alba	80LM; 149LM; 3IS; 26IS; 40IS; 103IS; 119IS; 143IS; 144IS	JFO 71(4):669; RBO 17(3-4):177; WA
Calidris pusilla	7LM; 67LM; 68LM; 70LM; 72LM; 73LM; 74LM; 76LM; 80LM; 116LM; 148LM; 149LM; 160LM; 165LM; 3IS; 13IS; 26IS; 40IS; 54IS; 103IS; 119IS; 143IS; 144IS; 153IS	AMNH 241333-241345; JFO 71(4): 669; MPEG 52698-52703; ON 19:3; RBO 15(2):160; RBO 17(3-4):177; WA
Calidris minutilla	71LM; 80LM; 148LM; 149LM; 13IS; 17IS; 40IS; 92IS; 103IS; 106IS; 119IS; 143IS; 144IS	FMNH 64052; JFO 71(4): 669; RBO 17(3-4):177; WA
Calidris fuscicollis	50LM; 80LM; 148LM; 149LM; 41IS; 119IS; 106IS	FMNH 404226-404228; JFO 71(4):669; RBO 17(3-4):177; WA
Calidris melanotos	106IS; 144IS	GZ 9:19; WA
Calidris subruficollis	NS	GZ 9:19
JACANIDAE		
Jacana jacana	32LM; 45LM; 47LM; 54LM; 58LM; 59LM; 62LM; 84LM; 86LM; 89LM; 91LM; 101LM; 104LM; 111LM; 146LM; 147LM; 148LM; 149LM; 151LM; 153LM; 161LM; 164LM; 1IS; 7IS; 8IS; 9IS; 10IS; 15IS; 17IS; 19IS; 20IS; 22IS; 25IS; 26IS; 31IS; 36IS; 39IS; 40IS; 41IS; 55IS; 58IS; 70IS; 71IS; 72IS; 74IS; 85IS; 91IS; 93IS; 101IS; 108IS; 120IS; 125IS; 127IS; 131IS; 132IS; 133IS; 139IS; 144IS; 153IS; 163IS; 165IS	AMNH 241367-241373, 241376; FMNH 64069, 404233; LACM 42157; MNRJ 7798; MPEG 2567, 5605, 50726, 76985; Pinto (1938):124; RBO 4(1):59; RBO 17(3-4):177; RBO 15(1):46; RBO 22(4):327; RBO^{+}11(1):169; UMMZ 241729; WA; XC

Taxa	Locality	Source
STERCORARIIDAE		
Stercorarius skua	106LM; 107LM	RBO 37
Stercorarius maccormicki	105LM; 26IS	RBO 38; WA
Stercorarius pomarinus	144IS	WA
Stercorarius parasiticus	134LM; 119IS	AO 180:14; WA
LARIDAE		
Xema sabini	119IS	WA
Chroicocephalus cirrocephalus	29LM; 134LM; 146LM; 146LM; 147LM; 148LM; 149LM; 161LM; 13IS; 15IS; 26IS; 106IS; 119IS; 131IS; 131IS; 143IS; 144IS; 160IS	AMNH 241232; AO 180:14; Pinto (1938):147; RBO 21(3):213-216; RBO 17(3-4):177; WA
Leucophaeus atricilla	29LM; 66LM; 69LM; 72LM; 74LM; 76LM; 130LM; 134LM; 3IS; 13IS; 119IS; 143IS; 144IS; 160IS	AO 180:14; RBO 15(2): 160; RBO 21(3): 213-216; WA
Leucophaeus pipixcan	134LM; 119IS	AO 180:14; WA
Larus dominicanus	119IS	WA
Larus fuscus	29LM; 144IS	RBO 21(3):213-216; WA
STERNIDAE		
Anous stolidus	83IS	WA
Onychoprion fuscatus	119IS	WA
Sternula antillarum	66LM; 68LM; 70LM; 161LM; 3IS; 26IS; 40IS; 92IS; 119IS; 143IS; 144IS	FMNH 64083; FMNH 64084; RBO 15(2):160; WA
Sternula superciliaris	91LM; 148LM; 149LM; 169LM; 169LM; 3IS; 13IS; 26IS; 40IS; 103IS; 119IS; 143IS;	AMNH 241228; LACM 42155; RBO 17(3-

Taxa	Locality	Source
	144IS	4):177; WA
Phaetusa simplex	59LM; 66LM; 68LM; 134LM; 147LM; 148LM; 149LM; 3IS; 13IS; 15IS; 26IS; 39IS; 40IS; 41IS; 55IS; 64IS; 70IS; 92IS; 119IS; 131IS; 143IS; 144IS; 153IS; 160IS	AO 180:14; RBO 17(3-4):177; RBO 15(2):160; RBO+ 11(1):165; WA
Gelochelidon nilotica	29LM; 72LM; 75LM; 146LM; 3IS; 13IS; 15IS; 26IS; 119IS; 143IS; 144IS; 160IS	Pinto (1938): 149; RBO 21(3):213-216; RBO 15(2): 160; WA
Chlidonias niger	134LM; 144IS; 119IS	AO 180:14; WA
Sterna hirundo	29LM; 3IS; 22IS; 26IS; 119IS; 143IS; 144IS	RBO 21(3):213-216; WA
Sterna dougallii	29LM; 119IS; 143IS	RBO 21(3):213-216; WA
Sterna paradisaea	92IS	WA
Thalasseus acuflavidus	54IS; 68LM; 76LM; 3IS; 15IS; 119IS; 143IS; 144IS	RBO 15(2): 160; WA
Thalasseus maximus	29LM; 3IS; 13IS; 119IS; 144IS	RBO 21(3):213-216; WA
RYNCHOPIDAE		
Rynchops niger	1IS; 26IS; 3IS; 40IS; 41IS; 70IS; 9IS; 103IS; 106IS; 119IS; 131IS; 13IS; 143IS; 147IS; 59LM; 66LM; 68LM; 70LM; 73LM; 75LM; 115LM; 146LM; 148LM; 149LM; 161LM	AMNH 241230; AMNH 241231; Pinto (1938):155; RBO 17(3-4):177; RBO 15(2):160; RBO+ 11(1):165; WA
COLUMBIFORMES		
COLUMBIDAE		
Columbina passerina	86LM; 160LM; 161LM; 162LM; 176LM; 1IS; 17IS; 3IS; 40IS; 41IS; 54IS; 92IS; 103IS; 119IS; 139IS; 143IS; 144IS; 153IS;	AMNH 241139-241143; FMNH 64024, 64025; RBO 22(4):327; WA; XC

Taxa	Locality	Source
	160IS	
Columbina minuta	9LM; 20LM; 22LM; 60LM; 86LM; 101LM; 127LM; 151LM; 17IS; 25IS; 34IS; 41IS; 58IS; 101IS; 133IS; 146IS; 153IS	AMNH 241144; FMNH 403242, 403256, 404253-404255; MNRJ 5259, 5268, 526944543, 44544; MPEG 49750-49761; 50728; 50857; RBO 22(4):327; WA
Columbina talpacoti	9LM; 14LM; 20LM; 22LM; 34LM; 38LM; 50LM; 58LM; 59LM; 60LM; 86LM; 91LM; 98LM; 100LM; 110LM; 111LM; 121LM; 127LM; 137LM; 138LM; 151LM; 152LM; 153LM; 154LM; 169LM; 7IS; 8IS; 1IS; 25IS; 26IS; 39IS; 40IS; 41IS; 48IS; 50IS; 55IS; 62IS; 70IS; 101IS; 108IS; 120IS; 127IS; 131IS; 132IS; 133IS; 135IS; 136IS; 144IS; 148IS; 153IS	AMNH 241117, 241120, 241121, 241126, 241129-241132; FMNH 64026-64028, 403235, 404248-404252, 418342, 418343; LACM 42177-42179, 42183- 42188; MNRJ 44557; MPEG 15562-15566, 20964, 40800, 42084-42085, 49762-49764; 50729, 50730, 76986, 76987, 77027; RBO 4(1):59; RBO 15(1): 46; RBO 22(4):327; RBO+ 11(1): 166; WA ; XC
Columbina squammata	15LM; 32LM; 59LM; 60LM; 62LM; 77LM; 83LM; 86LM; 91LM; 99LM; 100LM; 109LM; 121LM; 128LM; 137LM; 138LM; 139LM; 146LM; 151LM; 152LM; 154LM; 169LM; 1IS; 3IS; 8IS; 11IS; 15IS; 17IS; 22IS; 23IS; 25IS; 26IS; 34IS; 39IS; 41IS; 46IS; 48IS; 54IS; 67IS; 70IS; 72IS; 85IS; 99IS; 163IS; 160IS; 155IS; 153IS; 149IS; 147IS; 144IS; 143IS; 139IS; 137IS; 135IS; 133IS; 131IS; 127IS; 120IS; 119IS; 104IS; 101IS	AMNH 64053, 64054, 241052, 241053, 241056, 241057, 241059-241061, 241072-241077, FMNH 241078, 241079, 403226; FNJV 1496; LACM 42203-42209; MCZ 333264, 333265; MNRJ 5019; MPEG 15557-15561; 31534, 31535, 37663, 37819, 7820, 42081-42083, 43390-43392; Pinto (1938):161; RBO 4(1):59; RBO 15(1):46; RBO 22(4):327; RBO+ 11(1):166; USNM B41086.4167728; WA
Columbina picui	39LM; 59LM; 86LM; 101LM; 15IS; 26IS	AMNH 241094, 241096; RBO 22(4):327; RBO$^+$ 11(1):166; WA

Taxa	Locality	Source
Claravis pretiosa	34LM; 44LM; 59LM; 86LM; 91LM; 110LM; 111LM; 136LM; 137LM; 161LM; 167LM; 173LM; 25IS; 41IS; 86IS; 101IS; 120IS; 133IS; 153IS	AMNH241153; FMNH404263; LACM42189-42195; MPEG37327, 42086-42088, 42248, 50731, 67827; RBO4(1):59; RBO22(4):327; RBO^{+}11(1):166; WA
Uropelia campestris	60LM; 8IS; 49IS	FMNH 63974,403233, 403234; WA;
Columba livia	NS; 17IS; 26IS; 40IS; 41IS; 70IS; 119IS; 143IS; 144IS; 153IS	GZ 9:21; WA
Patagioenas speciosa	59LM; 86LM; 176LM; 3IS; 1IS; 34IS; 40IS; 41IS; 46IS; 127IS; 144IS; 147IS	MNRJ 5065; RBO 22(4):327; RBO^{+} 11(1):166; WA
Patagioenas picazuro	1IS; 17IS; 31IS; 39IS; 41IS; 57IS; 77IS; 87IS; 95IS; 112IS; 62LM; 100LM; 110LM	RBO 4(1):59; RBO 15(1):46; WA
Patagioenas cayennensis	32LM; 59LM; 81LM; 86LM; 133LM; 173LM; 8IS; 40IS; 41IS; 57IS; 139IS	AMNH 241029, 241030; FMNH 404260-404262; MNRJ 5202; MPEG 6833; Pinto (1938):157; RBO 22(4):327; RBO^{+} 11(1):166; WA
Patagioenas plumbea	58LM; 59LM; 86LM; 175LM	MPEG 77043; FNJV 718; RBO 22(4):327; RBO^{+} 11(1):166
Patagioenas subvinacea	4LM; 59LM; 86LM; 127LM; 136LM; 177LM; 1IS; 39IS; 48IS	MNRJ5011, 44527; MPEG38420, 42247; RBO22(4):327; RBO^{+}11(1):166; WA
Zenaida auriculata	25IS; 41IS; 101IS; 133IS; 152IS; 59LM; 86LM; 150LM; 164LM; 169LM; 173LM	AMNH 241034, 241038-241042, 241044, 241045; FMNH 404259; MPEG 49765; RBO 22(4):327; RBO+ 11(1): 166; WA

Taxa	Locality	Source
Leptotila verreauxi	9LM; 12LM; 14LM; 15LM; 39LM; 59LM; 62LM; 77LM; 81LM; 83LM; 86LM; 91LM; 98LM; 100LM; 109LM; 110LM; 111LM; 121LM; 122LM; 133LM; 137LM; 138LM; 154LM; 160LM; 161LM; 164LM; 169LM; 176LM; 1IS; 7IS; 15IS; 17IS; 20IS; 25IS; 39IS; 41IS; 67IS; 68IS; 95IS; 120IS; 139IS; 143IS; 144IS; 151IS	AMNH 241155-241158, 241161-241169; FMNH 64044, 64045, 403252, 404256-404258; LACM 42172-42176; MNRJ 5006, 5008, 5010, 5013; MPEG 15554, 17973, 37662, 37821, 37822, 40798, 40799, 42089, 43393, 43394; Pinto (1938): 168; RBO 4(1):59; RBO 15(1): 46; RBO 22(4):327; RBO+ 11(1):166; WA
Leptotila rufaxilla	1IS; 3IS; 41IS; 49IS; 6IS; 101IS; 125IS; 144IS; 160IS; 34LM; 59LM; 86LM; 91LM; 110LM; 121LM; 167LM; 176LM	FMNH 64023; MPEG 15555, 50732, 67828, 67829; RBO 4(1):59; RBO 22(4):327; RBO+ 11(1):166; WA
Geotrygon montana	4LM; 11LM; 44LM; 51LM; 59LM; 86LM; 178LM; 46IS	MPEG34767-34769, 37328, 37329, 38421; RBO+ 11(1):166; RBO 22(4):327; MPEG 34935, 38565, 38566; WA
OPISTHOCOMIFORMES		
OPISTHOCOMIDAE		
Opisthocomus hoazin	59LM; 93LM; 138LM; 142LM; 176LM; 1IS; 10IS; 31IS; 70IS; 106IS; 147IS; 164IS	AMNH 241178-241183, 64018; MPEG 40683; RBO+ 11(1):166; WA
CUCULIFORMES		
CUCULIDAE		
Coccycua minuta	11LM; 59LM; 64LM; 86LM; 91LM; 178LM; 20IS; 39IS; 71IS; 17IS	MPEG 34938, 38569; LACM 42303; LSUMZ 71584, 71585; 71586; RBO+ 11(1):166; RBO 22(4):327; WA

Taxa	Locality	Source
Piaya cayana	4LM; 12LM; 15LM; 42LM; 58LM; 59LM; 61LM; 62LM; 77LM; 83LM; 91LM; 100LM; 110LM; 111LM; 121LM; 127LM; 136LM; 140LM; 154LM; 162LM; 168LM; 169LM; 174LM; 176LM; 178LM; 184LM; 1IS; 11IS; 15IS; 20IS; 23IS; 25IS; 30IS; 39IS; 40IS; 41IS; 55IS; 71IS; 101IS; 120IS; 143IS; 144IS; 153IS	AMNH 242351-242363; 64061, 64062; LACM 42279; MNRJ 45754; MPEG 34937, 37559, 37560, 37675, 37676, 37824, 37825, 38428, 38429, 40796, 41950, 41951, 42090, 43412, 43413, 50738, 76890; RBO 4(1):59; RBO 15(1):47; RBO 22(4):327; RBO^+ 11(1):166; WA
Coccyzus melacoryphus	77LM; 86LM; 118LM; 137LM; 151LM; 1IS; 17IS; 25IS; 41IS; 58IS; 101IS; 139IS; 143IS; 144IS; 153IS	AMNH 241932; MNRJ 4011; MPEG 41949, 43409-43411; RBO 22(4):327; WA
Coccyzus americanus	17IS; 39IS; 41IS; 49IS; 8IS	WA
Coccyzus euleri	59LM; 86LM; 91LM; 138LM; 174LM; 15IS; 20IS; 39IS; 41IS; 101IS; 144IS; 153IS	FMNH 64059; LACM 42301, 42302; MPEG 37558; RBO 22(4):327; RBO^+ 11(1):166; WA
Coccyzus minor	3IS; 15IS	WA
Crotophaga major	59LM; 71LM; 84LM; 91LM; 142LM; 144LM; 146LM; 151LM; 176LM; 1IS; 10IS; 11IS; 15IS; 17IS; 20IS; 25IS; 26IS; 31IS; 39IS; 40IS; 41IS; 58IS; 92IS; 101IS; 119IS; 131IS; 139IS; 143IS; 144IS; 147IS; 153IS; 155IS; 160IS; 165IS	AMNH 242410-242414; FMNH 64076, 64077; LACM 42286; MNRJ 4265; MPEG 2549; Pinto (1938):180; RBO^+ 11(1):167; WA
Crotophaga ani	7LM; 39LM; 44LM; 45LM; 58LM; 59LM; 71LM; 86LM; 91LM; 100LM; 110LM; 121LM; 142LM; 151LM; 160LM; 161LM; 163LM; 1IS; 3IS; 7IS; 9IS; 15IS; 17IS; 25IS; 26IS; 31IS; 40IS; 41IS; 46IS; 48IS; 54IS; 55IS; 70IS; 76IS; 85IS; 101IS; 108IS;	AMNH 242398-242407; FMNH 64078, 64079; MNRJ 4101; MPEG 15895, 15898, 15899, 37335; 76864, 77006; Pinto (1938):179; RBO 4(1):59; RBO 15(1): 47; RBO 22(4):327; RBO^+ 11(1):166; WA; XC

Taxa	Locality	Source
	11IS; 131IS; 132IS; 133IS; 144IS; 153IS; 163IS; 165IS	
Guira guira	45LM; 59LM; 61LM; 62LM; 71LM; 86LM; 91LM; 95LM; 104LM; 109LM; 110LM; 111LM; 121LM; 128LM; 133LM; 154LM; 155LM; 160LM; 161LM; 163LM; 164LM; 168LM; 169LM; 176LM; 1IS; 3IS; 17IS; 25IS; 26IS; 31IS; 39IS; 40IS; 41IS; 48IS; 58IS; 70IS; 76IS; 85IS; 101IS; 110IS; 120IS; 125IS; 131IS; 132IS; 143IS; 144IS; 153IS	AMNH 242419-242428; FMNH 64063-64065; FNJV 1109; LACM 42296-42298; MNRJ 4222; MPEG 5604, 15901, 15902, 67809; Pinto (1938):181; RBO 4(1):60; RBO 15(1): 47; RBO22(4):327; RBO$^+$ 11(1): 167; WA
Tapera naevia	58LM; 59LM; 61LM; 62LM; 64LM; 86LM; 121LM; 127LM; 178LM; 1IS; 17IS; 25IS; 40IS; 41IS; 58IS; 95IS; 101IS; 103IS; 106IS; 147IS; 153IS;	LSUMZ 71587; MNRJ 45793, 45794; MPEG 77008, 34939; RBO 4(1):60; RBO 22(4):327; RBO$^+$ 11(1):167; WA
Dromococcyx phasianellus	53LM; 61LM; 86LM; 89LM; 98LM; 110LM; 111LM; 121LM; 168LM; 169LM; 7IS; 17IS; 30IS; 41IS; 47IS; 149IS; 144IS	AMNH 242387-242389, 476047; FNJV 1174; Pinto (1938):179; RBO 4(1):60; RBO 22(4):327; WA; XC
Dromococcyx pavoninus	12LM; 126LM; 136LM; 168LM; 41IS; 144IS	AMNH 242386; MPEG 40797, 42249; UMMZ 209207; WA
Neomorphus geoffroyi	11LM; 44LM; 125LM; 176LM; 41IS;	FMNH 64073-64075; MNRJ 427, 4272, 32348, 44336; MPEG 37332, 38570; WA
STRIGIFORMES		
TYTONIDAE		

Taxa	Locality	Source
Tyto furcata	27LM; 59LM; 86LM; 17IS; 25IS; 26IS; 135IS; 144IS	MPEG 50706, 50707; RBO 22(4):327; RBO+ 11(1):165; WA
STRIGIDAE		
Megascops choliba	58LM; 59LM; 62LM; 86LM; 91LM; 98LM; 100LM; 121LM; 161LM; 7IS; 17IS; 25IS; 26IS; 39IS; 41IS; 58IS; 92IS; 153IS; 144IS; 143IS; 135IS; 101IS	LACM 42310; MPEG 76957; FMNH 63987; RBO+ 11(1):165; RBO 4(1):60; RBO 15(1):47; RBO 22(4):327; WA; XC
Megascops usta	58LM; 37IS; 46IS	MPEG 76937; WA
Lophostrix cristata	86LM	RBO 22(4):327
Pulsatrix perspicillata	42LM; 58LM; 89LM; 100LM; 3IS; 1IS; 41IS; 101IS; 105IS; 153IS	MNRJ 4786; MPEG 8324, 76851; RBO 15(1):47; RBO 22(4):327; WA
Bubo virginianus	86LM	RBO 22(4):327
Strix virgata	44LM; 86LM	MPEG 37333; RBO 22(4):327
Strix huhula	58LM; 86LM; 89LM; 1IS; 27IS; 3IS; 41IS	MPEG 76949; Pinto (1938):226; RBO 22(4):327; WA
Glaucidium hardyi	86LM; 1IS; 59IS	RBO 22(4):327; WA; XC
Glaucidium brasilianum	3IS; 17IS; 22IS; 26IS; 34IS; 36IS; 39IS; 41IS; 54IS; 70IS; 153IS; 139IS; 135IS; 120IS; 103IS; 12LM; 32LM; 55LM; 59LM; 61LM; 62LM; 71LM; 84LM; 86LM; 89LM; 91LM; 98LM; 100LM; 121LM; 127LM; 133LM; 144LM; 146LM; 155LM; 167LM; 174LM	AMNH241607, 241608; 241612, 360748; FMNH63983; LACM42308, 42309; MNRJ4932, 45814; MPEG2508-2510, 7410, 37561, 40806, 50740, 67866-67868; Pinto (1938):229; RBO 4(1):60; RBO 15(1):47; RBO 22(4):327; RBO+ 11(1):165; WA
Athene cunicularia	60LM; 77LM; 86LM; 9LM; 101IS; 110LM; 121LM; 131IS; 152IS; 154LM; 20IS; 23IS; 25IS; 26IS; 34IS; 41IS; 46IS; 62IS; 70IS;	AMNH 241602; FMNH63984-63986; MPEG43414; RBO4(1):60; RBO22(4):327; WA

Taxa	Locality	Source
	80IS; 103IS; 112IS; 119IS; 120IS; 144IS	
Asio clamator	17IS; 41IS; 144IS	WA
NYCTIBIIFORMES		
NYCTIBIIDAE		
Nyctibius grandis	39IS; 48IS; 147IS; 44LM; 86LM	AMNH 242386; MPEG 40797; 42249; UMMZ 209207; WA
Nyctibius aethereus	58LM	MPEG 76936; 77028
Nyctibius griseus	59LM; 86LM; 89LM; 100LM; 121LM; 151LM; 155LM; 162LM; 164LM; 3IS; 4IS; 1IS; 15IS; 17IS; 20IS; 25IS; 31IS; 39IS; 41IS; 55IS; 70IS; 144IS; 151IS	AMNH 241898, 241899; MNRJ7159; MPEG 67869; Pinto (1938):230; RBO 4(1):60; RBO 15(1): 47; RBO 22(4):328; RBO+ 11(1): 167; WA
Nyctibius leucopterus	86LM	RBO 22(4):328
CAPRIMULGIFORMES		
CAPRIMULGIDAE		
Nyctiphrynus ocellatus	86LM	RBO 22(4):328
Antrostomus rufus	86LM; 25IS; 39IS; 3IS; 41IS; 48IS; 133IS; 144IS; 153IS	RBO 22(4):328; WA
Antrostomus sericocaudatus	58LM; 86LM; 1IS	MPEG 76871; RBO 22(4):328; WA
Lurocalis semitorquatus	89LM; 41IS	AMNH 476971; WA
Nyctiprogne leucopyga	86LM; 17IS; 46IS; 92IS	RBO 22(4):328; WA
Nyctidromus nigrescens	58LM; 176LM; 1IS; 138IS	FMNH 63304; RBO 22(4):328; WA

Taxa	Locality	Source
Nyctidromus albicollis	4LM; 11LM; 21LM; 38LM; 59LM; 60LM; 61LM; 62LM; 63LM; 64LM; 77LM; 86LM; 89LM; 91LM; 97LM; 98LM; 100LM; 109LM; 121LM; 127LM; 133LM; 137LM; 154LM; 155LM; 164LM; 168LM; 172LM; 176LM; 178LM; 1IS; 3IS; 4IS; 7IS; 15IS; 25IS; 27IS; 31IS; 39IS; 40IS; 41IS; 48IS; 68IS; 71IS; 103IS; 132IS; 133IS; 143IS; 153IS	AMNH 241927-241936, 477055; FMNH 63302, 63303; LACM 42311-42313; LSUMZ 71588-71590; MNRJ 4716, 45862; MPEG 7412, 8303, 8304, 15736-15739, 34934, 36857, 38441, 38581, 42080, 43415, 50741, 67870, 71445; Pinto (1938):237; RBO 4(1):60; RBO 15(1):47; RBO 22(4):328; RBO$^+$ 11(1): 167; WA; XC
Hydropsalis parvula	39LM; 59LM; 86LM; 89LM; 91LM; 155LM; 172LM; 17IS; 41IS; 57IS; 152IS; 153IS	AMNH 241962; FMNH 63305; MPEG 15745, 67878; Pinto (1938):241; RBO 22(4):328; RBO$^+$ 11(1):167; WA
Hydropsalis maculicaudus	16IS; 17IS; 153IS	WA
Hydropsalis torquata	89LM; 4IS; 25IS; 41IS; 152IS; 153IS	AMNH 477045; MPEG 8305; Pinto (1938):235; WA
Nannochordeiles pusillus	79LM; 100LM; 169LM; 41IS; 55IS	AMNH 241901-241907; FNJV 1385; RBO 15(1):47; WA
Podager nacunda	59LM; 91LM; 164LM; 1IS; 17IS; 120IS; 132IS; 147IS	AMNH 241911-241914; MPEG 15735; RBO$^+$ 11(1):167; WA
Chordeiles minor	103IS; 143IS	WA
Chordeiles rupestris	59LM; 61LM; 121LM	RBO$^+$ 11(1): 166; RBO 4(1):60
Chordeiles acutipennis	59LM; 86LM; 151LM; 40IS; 103IS	FMNH 63301; MNRJ 4702, 4703; RBO 22(4):328; RBO$^+$ 11(1):167; WA
APODIFORMES		
APODIDAE		
Cypseloides senex	39IS; 55IS; 120IS	WA

Taxa	Locality	Source
Streptoprocne zonaris	25IS; 62IS; 39IS; 120IS	WA
Chaetura spinicaudus	86LM; 100LM; 129LM	FNJV 1486; RBO 15(1):47; RBO 22(4):328
Chaetura chapmani	86LM	RBO 22(4):328
Chaetura meridionalis	100LM; 41IS; 144IS; 17IS	RBO 15(1): 47; WA
Chaetura brachyura	86LM; 1IS; 25IS; 39IS; 40IS; 41IS; 48IS; 49IS; 79IS; 153IS; 144IS	RBO 22(4):328; WA
Tachornis squamata	39LM; 61LM; 62LM; 86LM; 98LM; 100LM; 110LM; 25IS; 26IS; 39IS; 40IS; 41IS; 49IS; 94IS; 127IS; 144IS; 148IS; 153IS	AMNH 241972, 241973; RBO 4(1):60; RBO 15(1): 47; RBO 22(4):328; WA
Panyptila cayennensis	59LM; 86LM; 176LM; 41IS; 149IS	MNRJ 4631; RBO 22(4):328; RBO+ 11(1):166; WA
Panyptila cayennensis		
TROCHILIDAE		
Glaucis hirsutus	11LM; 12LM; 20IS; 28LM; 52LM; 58LM; 59LM; 64LM; 86LM; 91LM; 97LM; 151LM; 167LM; 174LM; 176LM; 177LM; 184LM; 41IS; 68IS; 144IS	FMNH 63241, 63242; LACM 42324; LSUMZ 71591-71598; MNRJ 18377; MPEG 15616; 36860, 36888, 3756, 38579; 40821, 50743-50745; 67884-67887, 77045, 77050, 77051; RBO 22(4):328; RBO+ 11(1): 171; WA
Threnetes leucurus	30IS	WA
Phaethornis maranhaoensis	38LM; 64LM; 98LM; 110LM; 136LM; 151LM; 100LM; 1IS; 17IS; 20IS; 25IS; 34IS; 41IS; 50IS; 62IS; 78IS; 90IS; 129IS; 133IS; 153IS	FMNH 63248; LSUMZ 71601, 71602; MNRJ 17987, 17988; MPEG 30470, 42250, 42251; RBO 4(1):60; RBO 15(1):47; WA; XC

Taxa	Locality	Source
Phaethornis ruber	11LM; 42LM; 51LM; 58LM; 59LM; 97LM; 163LM; 176LM; 1IS; 7IS; 17IS; 20IS; 39IS; 40IS; 143IS; 144IS; 165IS	MNRJ 17958, 17964; MPEG34771, 36859, 38571, 76819; RBO 22(4):328; RBO$^+$ 11(1):171; WA; XC
Phaethornis pretrei	14LM; 15LM; 34LM ; 62LM; 81LM; 83LM; 100LM; 110LM; 140LM; 39IS; 41IS; 55IS; 70IS	FMNH 63237; FMNH 63238; MPEG 37668, 37841, 40823, 40824, 41956, 50742; RBO4(1):60; RBO15(1): 47; WA
Phaethornis superciliosus	4LM; 11LM; 42LM; 44LM; 51LM; 58LM; 59LM; 178LM	MPEG 34946, 34947, 36883-36885, 37405, 37406, 38436-38440, 38572-38574, 76816, 76840, 76845; 76870, 76872, 77054; RBO 22(4):328; RBO$^+$ 11(1):171
Campylopterus largipennis	44LM; 52LM; 58LM; 59LM; 64LM; 86LM; 177LM; 178LM; 1IS; 147IS	LSUMZ 71603-71609; MNRJ 18196; MPEG 34948, 34949, 36887, 37407-37409, 77056; RBO 22(4):328; RBO$^+$ 11(1): 171; WA
Eupetomena macroura	37LM; 38LM; 60LM; 62LM; 86LM; 110LM; 121LM; 140LM; 17IS; 23IS; 39IS; 41IS; 15IS; 120IS; 153IS	AMNH 63206; FMNH 63207, 63208, 242025; MPEG 41957; RBO 4(1):60; RBO 22(4):328; WA
Florisuga mellivora	86LM; 138LM; 154LM; 176LM; 3IS; 17IS; 30IS; 37IS; 153IS	AMNH 242043; FMNH 63244, 63243; RBO 22(4):328; WA
Anthracothorax nigricollis	30IS; 59LM; 86LM; 91LM; 137LM; 172LM; 31IS; 41IS; 48IS; 58IS; 72IS; 116IS; 120IS; 133IS; 153IS	FMNH 63245-63247; LACM 42322, 42323; MPEG 42116; RBO 22(4):328; RBO$^+$ 11(1): 171; WA
Avocettula recurvirostris	58LM; 172LM; 176LM; 39IS; 153IS	FMNH 63233, 63234; MNRJ 18730; MPEG 76904; WA
Topaza pella	59LM; 86LM	RBO$^+$ 11(1):171; RBO 22(4):328

Taxa	Locality	Source
Chrysolampis mosquitus	59LM; 86LM; 89LM; 124LM; 133LM; 151LM; 155LM; 161LM; 163LM; 172LM; 176LM; 17IS; 20IS; 23IS; 25IS; 30IS; 39IS; 41IS; 49IS; 66IS; 131IS; 144IS; 149IS; 153IS; 155IS; 163IS	AMNH 482323; FMNH 63212-63218; MNRJ 6843-6846, 18427; MPEG 18429; 18431-18433, 67890, 67892, 67893; Pinto (1938):275; RBO 22(4):328; RBO+ 11(1):171; WA
Lophornis gouldii	58LM; 86LM; 89LM; 176LM	AMNH485144-485147; FMNH63235; MPEG76826; RBO22(4):328
Chlorestes notata	59LM; 64LM; 86LM; 89LM; 97LM; 124LM; 127LM; 160LM; 163LM; 176LM; 20IS; 31IS; 40IS; 48IS; 70IS; 101IS; 153IS	AMNH2 42133, 242134; 242139, 480774; FMNH 63283, 63284; LSUMZ 71611, 71612; MNRJ 18343, 18344, 18346, 18348, 18350, 18351, 18353-18355, 47305; MPEG 6842, 36858; RBO 22(4):328; RBO+11(1):171; WA
Chlorostilbon mellisugus	40IS	WA
Chlorostilbon lucidus	9LM; 38LM; 62LM; 77LM; 111LM; 155LM; 172LM; 41IS; 8IS; 143IS; 153IS	FMNH 63288-63291; MPEG 43418, 67901; RBO 4(1):60; WA
Thalurania furcata	9LM; 16LM; 44LM; 51LM; 52LM; 58LM; 59LM; 62LM; 64LM; 77LM; 83LM; 86LM; 89LM; 98LM; 100LM; 11LM; 121LM; 136LM; 137LM; 140LM; 161LM; 163LM; 172LM; 176LM; 178LM; 3IS; 39IS; 40IS; 88IS; 120IS; 133IS; 144IS; 147IS; 163IS	FMNH 63221-63232, 63252-63254; LSUMZ 71613-71619; MNRJ 18298-18303, 18309, 18310; MPEG 34774, 34775, 34950, 34951, 36886, 37403, 37404, 37669, 38577, 38578, 41958-41960, 42117, 42118, 42252, 42253, 43416, 43417, 76940, 76967; Pinto (1938): 270; RBO 4(1):60; RBO 15(1):47; RBO 22(4):328; RBO+ 11(1):171; WA
Hylocharis cyanus	11LM; 58LM; 59LM; 176LM; 177LM	FMNH 63281, 63282; MNRJ 18113, 18114; MPEG 38580, 76815, 76828, 76900, 76981; RBO+11(1):171

Taxa	Locality	Source
Polytmus guainumbi	17IS; 40IS; 66IS; 103IS; 116IS; 151LM; 173LM	FMNH 63286, 63287; MNRJ 18744, 18746; WA
Polytmus theresiae	58LM	MPEG 76982, 76983
Amazilia leucogaster	89LM; 95LM; 146LM; 161LM; 176LM; 3IS; 26IS; 54IS; 119IS; 143IS; 144IS; 15IS; 160IS	AMNH242119, 479672, 479673; Pinto (1938):258; FMNH 63255-63260; WA;
Amazilia versicolor	9LM; 58LM; 59LM; 86LM; 172LM; 147IS; 153IS	FMNH 63266-63273; MPEG 76827; RBO 22(4):328; RBO^{+} 11(1):171; WA
Amazilia fimbriata	12LM; 61LM; 62LM; 64LM; 81LM; 86LM; 91LM; 98LM; 100LM; 109LM; 111LM; 137LM; 151LM; 172LM; 176LM; 15IS; 17IS; 20IS; 25IS; 26IS; 39IS; 40IS; 41IS; 66IS; 68IS; 106IS; 120IS; 126IS; 127IS; 133IS; 144IS; 153IS	FMNH 63274-63277; LACM 42314, 42315; LSUMZ 71620-71624; MNRJ 18235, 18236, 18239, 18244, 18245; MPEG15604; 40822; 42119, 42120-42123; RBO 4(1):60; RBO 15(1):47; RBO 22(4):328; WA
Heliothryx auritus	59LM; 86LM; 91LM; 176LM	FMNH 63307; LACM 42329; RBO 22(4):328; RBO^{+} 11(1): 171
Heliactin bilophus	37LM; 154LM; 172LM; 8IS; 23IS; 57IS	AMNH242270; 242271; FMNH63311; WA
Heliomaster longirostris	58LM; 59LM; 81LM; 86LM; 136LM; 172LM; 23IS; 39IS; 62IS; 70IS	MPEG 77033; FMNH63312-63315; MPEG42254; RBO 22(4):328; RBO^{+}11(1):171; WA
Calliphlox amethystina	9LM; 58LM; 86LM; 160LM; 172LM; 176LM; 20IS; 39IS; 40IS; 120IS	AMNH 242284; FMNH 63308-63310; MPEG 76984; RBO 22(4):328; WA
TROGONIFORMES		
TROGONIDAE		
Trogon melanurus	4LM; 38LM; 91LM; 86LM; 175LM; 39IS	FNJV 1717; LACM 42388; MPEG 38430, 38431, 6848, 15799; RBO 22(4):328; WA

Taxa	Locality	Source
Trogon viridis	1IS; 3IS; 7IS; 30IS; 31IS; 40IS; 59IS; 124IS; 158IS; 15LM; 58LM; 59LM; 60LM; 86LM; 91LM; 142LM	AMNH 242295; LACM 42376; MPEG 6847, 37806, 76953, 76989; RBO 22(4):328; RBO+ 11(1):170; WA; XC
Trogon ramonianus		
Trogon curucui	15IS; 23IS; 25IS; 27IS; 39IS; 40IS; 41IS; 93IS; 101IS; 120IS; 131IS; 133IS; 139IS; 153IS; 36LM; 38LM; 60LM; 61LM; 62LM; 64LM; 77LM; 84LM; 86LM; 89LM; 91LM; 98LM; 100LM; 110LM; 121LM; 122LM; 133LM; 136LM; 137LM; 140LM; 154LM; 158LM; 169LM; 172LM	AMNH 242322-242334; FMNH 63528, 63529, 63532; LACM 42379; LSUMZ 71625; MPEG 2470, 8301, 8302, 15801, 41952, 41953, 42104-42106, 42255, 43419-43421, 67912, 67913; Pinto (1938):290; RBO4(1):60; RBO15(1):47; RBO22(4):328; WA
Trogon rufus	86LM; 1IS	RBO22(4):328; WA
CORACIIFORMES		
ALCEDINIDAE		
Megaceryle torquata	38LM; 59LM; 62LM; 77LM; 86LM; 91LM; 133LM; 147LM; 148LM; 1IS; 3IS; 7IS; 15IS; 22IS; 26IS; 31IS; 35IS; 38IS; 39IS; 40IS; 41IS; 55IS; 58IS; 66IS; 70IS; 92IS; 116IS; 119IS; 131IS; 13IS; 143IS; 144IS; 153IS	AMNH 241856; LACM 44100-44104; MPEG 6841; Pinto (1938):293; RBO 4(1):60; RBO 17(3-4):177; RBO 22(4):329; RBO+ 11(1): 165; WA
Chloroceryle amazona	22LM; 45LM; 54LM; 59LM; 62LM; 86LM; 91LM; 147LM; 148LM; 149LM; 7IS; 17IS; 31IS; 34IS; 36IS; 39IS; 40IS; 41IS; 53IS; 58IS; 60IS; 71IS; 103IS; 120IS; 125IS; 127IS; 133IS; 134IS; 139IS; 143IS; 153IS; 15IS	LACM 44113-44120; MPEG 15938, 17904, 49766, 50746; RBO 4(1):60; RBO 17(3-4):177; RBO 15(1): 48; RBO 22(4):329; RBO+ 11(1):165; WA; XC
Chloroceryle aenea	59LM; 91LM; 181LM; 41IS; 105IS; 144IS;	LACM 44121; MPEG 70176; RBO+

Taxa	Locality	Source
	153IS	11(1):167; WA
Chloroceryle americana	14LM; 58LM; 59LM; 62LM; 65LM; 86LM; 91LM; 138LM; 172LM; 15IS; 40IS; 41IS; 46IS; 48IS; 55IS; 58IS; 94IS; 101IS; 103IS; 105IS; 119IS; 129IS; 139IS; 143IS; 153IS; 159IS	FMNH 63957-63960; LACM 44122, 44123, 44125; MPEG 40808, 76988; RBO 4(1):60; RBO 22(4):329; RBO+ 11(1): 167; WA
Chloroceryle inda	14LM; 59LM; 86LM; 91LM; 137LM; 17IS; 26IS; 105IS	LACM 44128, 44129; MPEG 40807, 42107; RBO 22(4):329; RBO+ 11(1):167; WA
MOMOTIDAE		
Momotus momota	4LM; 9LM; 11LM; 12LM; 15LM; 44LM; 52LM; 58LM; 59LM; 84LM; 86LM; 89LM; 91LM; 92LM; 119LM; 136LM; 137LM; 138LM; 140LM; 144LM; 146LM; 161LM; 167LM; 172LM; 174LM; 176LM; 1IS; 3IS; 23IS; 39IS; 41IS; 46IS; 55IS; 59IS; 101IS; 102IS; 120IS; 120IS; 133IS; 139IS; 153IS	AMNH 2531, 2532, 15815, 36881, 36882; FMNH 37336, 37337, 37566-37568, 37826-37830; LACM 37831, 38434; MPEG 38435, 38584, 38585, 40809, 40810, 41954, 41955, 42101-42103, 42256-42259, 44111, 44112, 63325-63333; 67914; 76906, 241885, 241886, 295609, 477920-477922; Pinto (1938):293; RBO 11(1):170; RBO+ 22(4):329; WA
GALBULIFORMES		
GALBULIDAE		
Brachygalba lugubris	9LM; 11LM; 58LM; 59LM; 86LM; 91LM; 124LM; 138LM; 144LM; 176LM; 30IS; 34IS; 39IS; 46IS; 71IS; 120IS; 147IS	AMNH 242509-242514; FMNH 63930-63935; LACM 42401-42403, 42423, MPEG6856, 38582, 76832, 76866, 76867; RBO 22(4):329; RBO+ 11(1):169; WA
Galbula cyanicollis	11LM; 44LM; 52LM; 59LM; 86LM; 1IS; 46IS	MPEG 36889-36891, 37339-37341, 38583; RBO 22(4):329; RBO+ 11(1): 169; WA

Taxa	Locality	Source
Galbula ruficauda	12LM; 15LM; 34LM; 36LM; 38LM; 44LM; 57LM; 58LM; 59LM; 60LM; 61LM; 62LM; 77LM; 83LM; 91LM; 93LM; 100LM; 109LM; 110LM; 124LM; 128LM; 136LM; 137LM; 138LM; 140LM; 152LM; 167LM; 1IS; 6IS; 8IS; 17IS; 22IS; 23IS; 25IS; 31IS; 34IS; 39IS; 41IS; 48IS; 59IS; 67IS; 70IS; 71IS; 89IS; 92IS; 101IS; 106IS; 117IS; 120IS; 133IS; 139IS; 153IS	FMNH 1837, 64035-64038; FNJV 64039; LACM 42413- 42422; MPEG 6850-6855, 15816-15826, 17907, 17908; 37342, 37343, 37677-37680, 37834-37838, 40825-40829, 41973, 41974, 42113-42115, 42260, 43422-43426, 50747-50750, 67915, 76998, 77015; RBO 4(1):61; RBO15(1):48; RBO 22(4):329; RBO[+] 11(1): 169; WA
Galbula dea	86LM	RBO 22(4):329
Jacamerops aureus	86LM; 91LM; 46IS	LACM 44130-44132; RBO 22(4):329; WA
BUCCONIDAE		
Notharchus hyperrhynchus	58LM; 59LM; 91LM; 124LM; 167LM; 1IS; 25IS; 41IS; 46IS	LACM 42424-42425; MPEG 67932, 6857; RBO[+] 11(1):169; RBO 22(4):329; WA
Notharchus tectus	11LM; 15LM; 42LM; 58LM; 59LM; 61LM; 71LM; 84LM; 89LM; 91LM; 92LM; 124LM; 133LM; 140LM; 1IS; 23IS; 33IS; 39IS; 41IS; 101IS; 119IS; 120IS; 144IS	AMNH 486017; FMNH 63929; LACM 42438-42443; LSUMZ 67138; MPEG 2547, 6858, 8291, 8292, 17910, 37840, 38587, 41964-41967; 70196, 70197, 76863, 76865; Pinto (1938):309; RBO 22(4):329; RBO[+] 11(1): 169; WA
Bucco tamatia	59LM; 86LM; 1IS; 39IS	RBO[+]11(1):169; RBO 22(4):329; WA
Bucco capensis	4LM; 11LM; 86LM; 46IS	MPEG 38443, 38586; RBO 22(4):329; WA
Nystalus torridus	58LM; 91LM; 1IS; 39IS; 46IS; 147IS	MPEG 15804; RBO 22(4):329; RBO[+] 11(1):169; XC; WA
Nystalus chacuru	59LM; 60LM; 77LM; 131LM; 8IS; 39IS; 41IS; 49IS	FMNH 63938-63940; MPEG 43427, 43428; RBO+11(1):169; WA

Taxa	Locality	Source
Nystalus maculatus	15LM; 38LM; 60LM; 86LM; 89LM; 91LM; 98LM; 100LM; 109LM; 110LM; 137LM; 154LM; 168LM; 1IS; 2IS; 15IS; 23IS; 25IS; 26IS; 31IS; 34IS; 39IS; 41IS; 48IS; 49IS; 59IS; 62IS; 67IS; 70IS; 72IS; 93IS; 101IS; 120IS; 127IS; 131IS; 133IS; 137IS; 147IS; 153IS; 164IS	AMNH 242533-242536; 486132-486136; FMNH 63949-63953; LACM 42433-42437; LSUMZ 67147, 67148; MPEG 8290; 15806-15811, 18003, 37839, 42108-42111; RBO4(1):61; RBO15(1):48; RBO22(4):329; WA
Malacoptila striata	14LM; 38LM; 56LM; 61LM; 64LM; 89LM; 124LM; 144LM; 15IS; 17IS; 41IS; 153IS	AMNH 242544, 242545; FMNH 63928; LSUMZ 71626, 71627; MPEG 40830, 6859, 8293, 70054, 70055, 75535, 75536 ; Pinto (1938):314; WA; XC
Malacoptila rufa	52LM; 59LM	MPEG 36894; RBO+ 11(1):169
Nonnula rubecula	140LM; 39IS	MPEG 41968-41970; WA
Monasa nigrifrons	7LM; 12LM; 15LM; 30LM; 34LM; 36LM; 50LM; 60LM; 61LM; 62LM; 83LM; 85LM; 86LM; 89LM; 91LM; 93LM; 98LM; 100LM; 124LM; 136LM; 137LM; 138LM; 140LM; 142LM; 146LM; 151LM; 155LM; 167LM; 168LM; 169LM; 172LM; 174LM; 176LM; 184LM; 10IS; 17IS; 93IS; 8IS; 20IS; 23IS; 25IS; 31IS; 34IS; 39IS; 40IS; 41IS; 49IS; 55IS; 62IS; 70IS; 71IS; 89IS; 101IS; 117IS; 120IS; 121IS; 139IS; 141IS; 149IS; 153IS; 163IS; 164IS	AMNH 242560-242570, 486326, 486327; FMNH 1873, 1874; 63997-64000; LACM 42455, 42456; MCZ 333409; MPEG 2548, 6860, 6861, 8294-8296, 15917-15926, 37563-37565, 37673, 37674, 37832, 37833, 40832-40835, 41961-41963, 42112, 42261-42263, 43429, 50751, 50758, 67933, 67935-67937; UMMZ 87756; RBO 4(1):61; RBO 15(1): 48; RBO 22(4):329; WA; XC
Monasa morphoeus	4LM; 11LM; 40LM; 58LM; 178LM; 1IS; 30IS; 46IS; 147IS; 164IS	FNJV 1879; MPEG 34940, 38432, 38433, 38588, 38589, 76794, 76891, 76935, 77034, 77046; RBO 22(4):329; WA

Taxa	Locality	Source
Chelidoptera tenebrosa	14LM; 59LM; 86LM; 89LM; 91LM; 95LM; 144LM; 138LM; 128LM; 124LM; 176LM; 169LM; 1IS; 23IS; 25IS; 31IS; 34IS; 35IS; 37IS; 39IS; 40IS; 41IS; 49IS; 101IS; 123IS; 133IS; 147IS; 153IS; 158IS	AMNH 242587-242594; FMNH 63961-63964; FNJV 1883; LACM 42444-42454; MPEG 6862, 8297, 8298, 15812, 15813, 18004, 40831; Pinto (1938):319; RBO22(4):329; RBO+11(1):169; WA
PICIFORMES		
RAMPHASTIDAE		
Ramphastos toco	9LM; 77LM; 100LM; 8IS; 15IS; 23IS; 41IS; 102IS; 120IS; 153IS	FMNH 62842, 62843; MPEG 43430; RBO 15(1):48; WA
Ramphastos tucanus	4LM; 11LM; 40LM; 57LM; 59LM; 89LM; 1IS; 3IS; 39IS; 40IS; 46IS; 48IS; 58IS	FNJV 1934-1936; MPEG 38407, 38590; Pinto (1938): 325; RBO 22(4):329; RBO+ 11(1):170; WA
Ramphastos vitellinus	4LM; 9LM; 42LM; 59LM; 89LM; 91LM; 176LM; 178LM; 23IS; 35IS; 39IS; 40IS; 120IS	FMNH 62840, 62841; LACM 42479; MPEG 34941, 34942, 38408; Pinto (1938):327; RBO+ 11(1):170; RBO 22(4):329; WA
Selenidera gouldii	15LM; 57LM; 58LM; 89LM; 136LM; 25IS; 39IS; 46IS	AMNH 486958; MPEG 37842, 42265-42268, 76980; RBO 22(4):329; WA
Pteroglossus inscriptus	12LM; 14LM; 15LM; 57LM; 59LM; 62LM; 89LM; 91LM; 93LM ; 100LM; 136LM; 140LM; 151LM; 155LM; 176LM; 178LM; 184LM; 1IS; 17IS; 20IS; 25IS; 30IS; 31IS; 34IS; 39IS; 41IS; 48IS; 76IS; 91IS; 101IS; 127IS; 129IS; 133IS; 139IS; 143IS; 153IS; 163IS	AMNH 486912, 486913; FMNH 62838, 62839; LACM 42487-42495; MPEG 8299, 8300, 15943, 17918, 34943, 37843, 37844, 40812-40814, 41971, 41972, 42264, 50754, 67989; Pinto (1938):332; RBO 4(1):61; RBO 15(1):48; RBO 22(4):329; RBO +11(1):170; WA

Taxa	Locality	Source
Pteroglossus bitorquatus	4LM; 51LM; 57LM; 59LM; 89LM; 178LM; 1IS; 17IS; 34IS; 106IS; 147IS; 165IS	AMNH 486879, 486880; MPEG 34772, 34944, 38409, 38410; Pinto (1938):331; RBO 22(4):329; RBO+ 11(1):170; WA
Pteroglossus aracari	12LM; 42LM; 58LM; 59LM; 82LM; 84LM; 85LM; 98LM; 121LM; 136LM; 146LM; 167LM; 173LM; 176LM; 1IS; 3IS; 10IS; 110IS; 17IS; 20IS; 30IS; 31IS; 34IS; 39IS; 40IS; 41IS; 48IS; 49IS; 54IS; 58IS; 71IS; 90IS; 101IS; 120IS; 127IS; 133IS; 139IS; 147IS; 153IS	FMNH 62836, 62837; MPEG 2543-2546, 40811, 42130, 50752, 50753, 67988, 76979, 77062; Pinto (1938):329; RBO 22(4):329; RBO 4(1):61; RBO+ 11(1): 170; WA
PICIDAE		
Picumnus buffonii	42LM; 44LM; 59LM; 91LM; 176LM; 1IS	MNH 63941-63948; LACM 42506, 42507; MPEG 37401, 37402; RBO 22(4):329; RBO+ 11(1):168; WA
Picumnus pygmaeus	11LM; 58LM; 60LM; 64LM; 77LM; 100LM; 110LM ; 111LM; 121LM; 142LM; 143LM; 168LM; 174LM; 1IS; 7IS; 17IS; 20IS; 25IS; 34IS; 40IS; 41IS; 46IS; 86IS; 101IS; 153IS; 155IS; 127IS	AMNH 242761-242763; FMNH 63965; FNJV 1989; LSUMZ 71633, 71634-71637; MPEG 30471, 30472, 37569, 38591, 70302, 70303, 76969, 77021; RBO 4(1):61; RBO 15(1):48; WA; XC
Picumnus cirratus	59LM; 136LM; 81IS	RBO+ 11(1):168; MPEG 42269; WA
Picumnus albosquamatus	91LM; 173LM; 39IS; 70IS; 93IS; 120IS	LACM 42508-42515, 46028; MPEG 17932, 18005; FMNH 63966, 63967; WA
Melanerpes candidus	30LM; 38LM; 59LM; 79LM; 86LM; 89LM; 8LM; 91LM; 122LM; 124LM; 152LM; 164LM; 169LM; 3IS; 6IS; 8IS; 11IS; 19IS; 22IS; 25IS; 26IS; 34IS; 39IS; 41IS; 70IS; 71IS; 72IS; 101IS; 116IS; 120IS; 125IS;	AMNH 242654-242659; FMNH 63979, 63980; FNJV2075, 2076; LACM 42562, 42563; MPEG 6866, 6867, 7414, 8284, 8285; Pinto (1938):338; RBO 22(4):329; RBO+ 11(1):168; WA

Taxa	Locality	Source
	153IS	
Melanerpes cruentatus	4LM; 15LM; 42LM; 59LM; 83LM; 91LM; 136LM; 140LM; 178LM; 1IS; 10IS; 30IS; 46IS; 48IS; 120IS	FMNH 295654; LACM 42519- 42521, 44137; MPEG 15946, 15947, 17926, 34953, 34954, 34955, 37667, 37849, 38427, 41982, 42275; RBO 22(4):329; RBO+ 11(1): 168; WA
Veniliornis affinis	4LM; 15LM; 38LM; 40LM; 64LM; 84LM; 86LM; 89LM; 91LM; 100LM; 138LM; 174LM; 176LM; 181LM; 1IS; 17IS; 20IS; 23IS; 39IS; 40IS; 41IS; 48IS; 66IS; 71IS; 133IS; 144IS; 153IS	AMNH 488102, 488103; FMNH 62956-62960; FNJV 2091; LACM 42538-42542; LSUMZ 71641-71643; MPEG 2533, 15944, 15945, 37574, 37576, 37577, 37850-37852, 38426, 70175; Pinto (1938):357; RBO 15(1):48; RBO 22(4):329; WA; XC
Veniliornis passerinus	1IS; 25IS; 34IS; 41IS; 59IS; 101IS; 120IS; 125IS; 137IS; 139IS; 153IS; 9LM; 34LM; 38LM; 59LM; 60LM; 62LM; 64LM; 91LM; 100LM; 109LM; 111LM; 121LM; 137LM; 168LM; 169LM; 174LM	AMNH242681-242684; FMNH 62953-62955; LACM 42543-42548; LSUMZ71639, 71640; MPEG 17929, 37575, 42129, 50757; RBO 4(1):61; RBO15(1):48; RBO+ 11(1):168; WA
Veniliornis mixtus	120IS	WA
Piculus flavigula	4LM; 11LM; 12LM; 42LM; 58LM; 59LM; 136LM; 1IS; 55IS	MPE G38425, 38593, 40819, 42272, 42273, 76868, 76938, 76939; RBO22(4):329; RBO+ 11(1):168; WA
Piculus paraensis	42LM; 89LM; 62IS; 25IS; 46IS	MPEG7413, 8282, 8283; RBO22(4):329; WA
Piculus chrysochloros	12LM; 61LM; 62LM; 140LM; 25IS; 153IS; 96IS	MPEG 40818, 41983; RBO 4(1):61; WA

Taxa	Locality	Source
Colaptes melanochloros	11LM; 12LM; 14LM; 15LM; 21LM; 38LM; 52LM; 59LM; 60LM; 71LM; 77LM; 86LM; 89LM; 91LM; 93LM; 98LM; 100LM; 124LM; 133LM; 136LM; 137LM; 140LM; 146LM; 152LM; 1IS; 8IS; 17IS; 20IS; 22IS; 25IS; 31IS; 37IS; 39IS; 40IS; 41IS; 70IS; 92IS; 97IS; 101IS; 103IS; 116IS; 120IS; 125IS; 131IS; 133IS; 144IS; 153IS; 160IS; 163IS	AMNH 487429-487432; FMNH 63922-63925; LACM 42516-42518, 78878; MPEG 6864, 6865, 8279-8281, 15939, 17925, 36892, 37848, 38592, 40816, 40817, 41975, 41976, 42124, 42125, 42270, 42271, 43437, 50756; Pinto (1938):343; RBO 4(1):61; RBO 15(1):48; RBO 22(4):329; RBO[+] 11(1):168; WA
Colaptes campestris	36LM; 60LM; 77LM; 122LM; 23IS; 39IS; 41IS; 49IS; 120IS; 133IS	FMNH 63921; MPEG 6863, 43431-43436; WA
Celeus torquatus	4LM; 86LM	MPEG 38424; RBO 22(4):329
Celeus ochraceus	9LM; 15LM; 61LM; 62LM; 64LM; 77LM; 81LM; 84LM; 85LM; 86LM; 89LM; 91LM; 97LM; 98LM; 100LM; 109LM; 111LM; 121LM; 122LM; 137LM; 138LM; 140LM; 146LM; 151LM; 155LM; 174LM; 184LM; 17IS; 20IS; 23IS; 25IS; 26IS; 34IS; 39IS; 41IS; 71IS; 101IS; 120IS; 127IS; 129IS; 133IS; 139IS; 149IS; 150IS; 153IS; 160IS; 163IS	AMNH 488255-488257, 488260; FMNH 51082, 63975-63977, 63992; LACM 42528-42530; LSUMZ 71638; MPEG 2534-2536, 6868, 8286-8288, 15951, 36861-36862, 37572, 37573, 37845-37847, 41979-41981, 42126-42128, 43438, 50755, 67977, 67978; RBO 4(1):61; RBO 15(1):48; RBO 22(4):329; WA; XC
Celeus elegans	59LM; 86LM; 176LM	FMNH 64002; RBO[+] 11(1): 168; RBO 22(4):329
Celeus undatus	51LM	MPEG 34773
Celeus flavus	12LM; 40LM; 84LM; 86LM; 89LM; 91LM; 93LM; 136LM; 146LM; 160LM; 164LM; 176LM; 3IS; 17IS; 20IS; 33IS; 34IS; 39IS; 41IS; 48IS; 98IS; 133IS; 143IS; 144IS;	AMNH 242711-242713; FMNH 64001; FNJV 2031; LACM 42522, 42523; MPEG 2537-2539, 8289, 15952, 15953, 40820, 42274; Pinto (1938):350; RBO 22(4):329;

Taxa	Locality	Source
	153IS	WA
Celeus obrieni	110LM; 121LM; 155LM; 1IS; 41IS; 44IS; 62IS; 63IS; 139IS; 140IS; 156IS; 158IS	MPEG 61549, 69978, 69979; WA; XC
Dryocopus lineatus	40LM; 42LM; 4LM; 59LM; 77LM; 83LM; 84LM; 91LM; 98LM; 100LM; 140LM; 155LM; 171LM; 174LM; 3IS; 31IS; 39IS; 40IS; 41IS; 48IS; 58IS; 72IS; 77IS; 120IS; 133IS; 144IS; 153IS; 163IS	FNJV 2047; LACM 42564-42566; MCZ 135011; MPEG 2542, 37570, 37664, 38423, 41978, 43439, 67982-67984; RBO 4(1):61; RBO 15(1): 48; RBO 22(4):329; RBO$^+$ 11(1):168; WA
Campephilus rubricollis	14LM; 26LM; 40LM; 55LM; 58LM; 59LM; 83LM; 86LM; 89LM; 91LM; 136LM; 140LM; 174LM; 1IS; 37IS; 40IS; 41IS; 71IS; 72IS; 101IS; 153IS	FNJV 2100; LACM 42549, 42561; MPEG 37571, 37665, 37666, 40815, 41977, 42277, 46324, 50759, 76958; Pinto (1938):352; RBO 22(4):330; RBO$^+$ 11(1):168; WA
Campephilus melanoleucos	26LM;36LM;62LM;77LM;84LM;86LM;89LM;91LM;98LM;100LM;133LM;136LM;146LM;155LM;160LM;3IS;6IS;15IS;17IS;20IS;23IS;25IS;26IS;36IS;39IS;40IS;41IS;47IS;62IS;68IS;90IS;101IS;118IS;120IS;131IS;133IS;139IS;143IS;144IS;147IS;153IS;160IS	AMNH 242734; MPEG 2540, 2541, 7415, 15954, 42276, 43440-43442, 46323, 67985; UMMZ 89390; Pinto (1938):353; RBO 4(1):61; RBO 15(1): 48; RBO 22(4):330; WA
CARIAMIFORMES		
CARIAMIDAE		
Cariama cristata	15LM;61LM;62LM;98LM;100LM;154LM; 8IS;39IS;41IS;151IS;120IS	AMNH 241388, 37823; RBO 4(1):59; RBO 15(1):46; WA
FALCONIFORMES		

Taxa	Locality	Source
FALCONIDAE		
Daptrius ater	59LM; 91LM; 119LM; 176LM; 1IS; 46IS; 48IS; 106IS	AMNH 471236; FMNH 64082; LACM 42142, 42141; RBO⁺ 11(1):165; WA
Ibycter americanus	1IS; 37IS; 46IS; 9LM; 37LM; 58LM; 59LM; 77LM; 81LM; 160LM	AMNH 241505-241507; FMNH 63990, 63991; RBO 22(4):330; RBO⁺11(1):166; WA
Caracara plancus	47LM; 59LM; 86LM; 89LM; 146LM; 168LM; 184LM; 1IS; 8IS; 22LM; 23IS; 25IS; 26IS; 27IS; 31IS; 34IS; 39IS; 41IS; 48IS; 68IS; 69IS; 70IS; 85IS; 101IS; 103IS; 119IS; 120IS; 131IS; 133IS; 143IS; 144IS; 147IS; 149IS; 153IS; 15IS; 165IS; 166IS	AMNH241503, 241504; FMNH 100401; MCZ 92682; MPEG 50709, 50710; RBO⁺ 11(1):165; RBO 22(4):330; WA
Milvago chimachima	9LM; 15LM; 32LM; 38LM; 45LM; 50LM; 59LM; 62LM; 85LM; 86LM; 89LM; 91LM; 100LM; 109LM; 110LM; 121LM; 133LM; 137LM; 146LM; 172LM; NS; 1IS; 3IS; 13IS; 15IS; 17IS; 20IS; 23IS; 25IS; 26IS; 31IS; 34IS; 39IS; 40IS; 41IS; 45IS; 51IS; 58IS; 61IS; 67IS; 71IS; 81IS; 101IS; 108IS; 119IS; 120IS; 132IS; 133IS; 139IS; 143IS; 144IS; 163IS; 165IS	AMNH 241514, 241515; FMNH 63993-63996; FNJV 395; LACM 42139, 42140; MCZ 92638, 143097, 143098; MPEG 2504, 2505, 8322; 37804, 42091; Pinto (1938):87; USNM 273954.4051; RBO 4(1):58; RBO 15(1):46; RBO 22(4):330; RBO⁺ 11(1):165; WA
Herpetotheres cachinnans	42LM; 59LM; 62LM; 89LM; 100LM; 121LM; 123LM; 146LM; 1IS; 3IS; 17IS; 25IS; 26IS; 28IS; 34IS; 39IS; 40IS; 41IS; 46IS; 48IS; 70IS; 72IS; 76IS; 79IS; 90IS; 101IS; 132IS; 139IS; 147IS; 153IS	MNRJ 45314; MPEG 8318; Pinto (1938):84; RBO 4(1):58; RBO 15(1):46; RBO 22(4):330; RBO⁺ 11(1):165; WA
Micrastur ruficollis	58LM; 61LM; 62LM; 86LM; 100LM; 111LM; 123LM; 140LM; 1IS; 41IS; 90IS;	MNRJ 44318; MPEG 76802, 41946; RBO 4(1):59; RBO 15(1):46; RBO 22(4):330;

Taxa	Locality	Source
	120IS; 133IS	WA
Micrastur mintoni	4LM; 58LM; 86LM; 178LM; 46IS	MPEG 34932, 34933, 38406, 76895; RBO 22(4):330; WA
Micrastur semitorquatus	86LM; 89LM; 7IS; 41IS	Helmmayr (1929):453; RBO 22(4):330; XC; WA
Falco sparverius	9LM; 45LM; 77LM; 86LM; 93LM; 109LM	FMNH 64011; MPEG 15707, 43384, 43385; RBO 15(1):46; RBO 22(4):330
Falco rufigularis	58LM; 59LM; 89LM; 164LM; 168LM; 1IS; 8IS; 17IS; 25IS; 31IS; 34IS; 37IS; 39IS; 40IS; 41IS; 46IS; 48IS; 57IS; 68IS; 70IS; 92IS; 101IS; 120IS; 124IS; 153IS; 164IS; 165IS	AMNH 241566, 241567; MNRJ 6200; MPEG 7409; RBO 22(4):330; RBO+ 11(1):165; WA
Falco deiroleucus	86LM	RBO 22(4):330
Falco femoralis	89LM; 1IS; 23IS; 25IS; 39IS; 41IS; 70IS; 77IS; 90IS; 101IS; 120IS; 164IS	Pinto (1938):91; WA
Falco peregrinus	3IS; 13IS; 15IS; 17IS; 92IS; 110IS; 119IS; 125IS; 144IS	WA
PSITTACIFORMES		
PSITTACIDAE		
Anodorhynchus hyacinthinus	119LM; 8IS; 23IS; 120IS; 144IS	AMNH 474103; WA
Ara ararauna	NS; 8IS; 39IS; 70IS; 152IS	GZ 9:21; WA
Ara macao	1IS; 46IS; 57LM; 143IS; 147IS	RBO 22(4):330; WA
Ara chloropterus	57LM; 1IS; 31IS; 39IS; 46IS; 120IS; 138IS	RBO 22(4):330; WA
Ara severus	1IS; 31IS; 86LM; 147IS	RBO 22(4):330; WA

Taxa	Locality	Source
Orthopsittaca manilatus	86LM; 23IS; 39IS; 41IS; 120IS; 132IS; 153IS	RBO 22(4):330; WA
Primolius maracana	22LM ; 61LM; 89LM; 104LM; 110LM; 164LM; 11IS; 25IS; 3IS; 40IS; 41IS; 58IS; 66IS; 71IS; 90IS; 119IS; 133IS; 143IS; 144IS	AMNH 241629; MNRJ 3335, 3344-3347; MPEG 6837, 8306, 8307, 49741; Pinto (1938):184; RBO 4(1):59; WA
Diopsittaca nobilis	7LM; 39LM; 48LM; 60LM; 61LM; 79LM; 85LM; 86LM; 89LM; 91LM; 100LM; 109LM; 121LM; 122LM; 133LM; 138LM; 146LM; 154LM; 161LM ; 176LM; 3IS; 4IS; 13IS; 17IS; 26IS; 40IS; 41IS; 54IS; 71IS; 75IS; 95IS; 101IS; 120IS; 131IS; 133IS; 139IS; 144IS; 153IS; 163IS	AMNH 241635-241645, 322103, 474115-474118; FMNH 48995, 62875-62879; FNJV 844; LACM 42226-42228; MNRJ 3403-3405, 3407, 3408; MPEG 2550, 50733; Pinto (1938):186; RBO 4(1):59; RBO 15(1):46; RBO 22(4):330; XC ; WA
Guaruba guarouba	57LM; 59LM; 86LM; 103LM; 1IS; 17IS; 30IS; 46IS; 72IS; 138IS	MPEG 6838-6840; RBO 22(4):330; RBO+ 11(1):166; WA
Thectocercus acuticaudatus	15IS; 39IS; 120IS	WA
Psittacara leucophthalmus	15LM; 22LM ; 30LM; 57LM; 59LM; 91LM; 173LM; 176LM; 182LM; 1IS; 8IS; 17IS; 21IS; 31IS; 39IS; 40IS; 41IS; 48IS; 59IS; 71IS; 98IS; 116IS; 120IS; 138IS; 144IS; 147IS; 153IS	AMNH 241676, 241677; FMNH 62859, 62860; FNJV 853, 854; MNRJ 3442; MPEG 15585, 37807, 37808, 49742-49746; RBO 22(4):330; RBO+ 11(1): 166; WA
Aratinga jandaya	12LM; 14LM; 39LM; 50LM; 58LM; 59LM; 62LM; 77LM; 81LM; 83LM; 86LM; 89LM; 91LM; 98LM; 99LM; 122LM; 127LM; 133LM; 143LM; 168LM; 172LM; 176LM; 184LM; 1IS; 3IS; 7IS; 10IS; 14IS; 15IS; 17IS; 25IS; 26IS; 28IS; 30IS; 31IS; 34IS; 37IS; 39IS; 40IS; 41IS; 46IS; 48IS; 55IS;	AMNH 241678-241680, 241687, 474256-474258; FMNH 50104, 62867-62872; FNJV 859, 860; LACM 42210, 42211-42216; MNRJ 3494, 3495, 3515, 3516, 3518, 45408-45411; MPEG 7411, 8308, 8309, 17933, 31532, 31533, 37671, 37672, 40802, 40803, 43395, 43396, 50734, 76820,

Taxa	Locality	Source
	60IS; 62IS; 68IS; 70IS; 72IS; 76IS; 101IS; 103IS; 116IS; 120IS; 125IS; 132IS; 133IS; 139IS; 143IS; 144IS; 158IS; 164IS; 165IS	76956; Pinto (1938): 6642; RBO 4(1):59; RBO 22(4):330; RBO+ 11(1): 166; WA ; XC
Eupsittula aurea	9LM; 12LM; 15LM; 36LM; 59LM; 60LM; 61LM; 62LM; 77LM; 81LM; 89LM; 86LM; 91LM; 93LM; 98LM; 100LM; 111LM; 121LM; 128LM; 133LM; 161LM; 169LM; 172LM; 23IS; 26IS; 39IS; 41IS; 59IS; 8IS; 93IS; 101IS; 120IS; 131IS; 133IS; 139IS; 144IS; 146IS; 152IS; 153IS	AMNH 241707-241710, 241717-241719, 474557; FMNH 62924-62929; FNJV 871; LACM 42272-42274; MPEG 8310, 15587, 37809-37812, 40804, 43397-43402; Pinto (1938):191; RBO 4(1):59; RBO 15(1): 46; RBO 22(4):330; RBO+ 11(1):166; WA
Eupsittula cactorum	NS; 15IS	GZ 9:22; WA
Pyrrhura coerulescens	4LM; 14LM; 15LM; 57LM; 58LM; 59LM; 84LM; 89LM; 127LM; 174LM; 1IS; 25IS; 30IS; 46IS; 48IS; 62IS; 147IS	AMNH 174594, 474732-474737; MNRJ 3672, 3673, 45434; MPEG 2551-2555, 8311, 8312, 37556, 37557, 37813-38419, 40801, 76976, 76977, 77035; Pinto (1938):197; RBO 22(4):330; RBO+ 11(1):166; WA
Pyrrhura amazonum	42LM; 57LM; 78LM*; 91LM; 93LM	LACM 42239-42247; MPEG 15584, 69750; RBO 22(4):330
Forpus xanthopterygius	22LM; 34LM; 59LM; 60LM; 81LM; 86LM; 91LM; 137LM; 144LM; 151LM; 168LM; 176LM; 17IS; 23IS; 30IS; 31IS; 34IS; 39IS; 40IS; 41IS; 48IS; 68IS; 90IS; 106IS; 116IS; 120IS; 124IS; 127IS; 139IS; 153IS	AMNH 241768-241778; FMNH 62909-62917; LACM 42217-42225; MNRJ 3812, 3814; MPEG 42098, 42099, 42100, 49747, 49748, 50735, 50736; RBO 22(4):330; RBO+ 11(1): 166; WA

Taxa	Locality	Source
Brotogeris chiriri	12LM; 15LM; 36LM; 38LM; 50LM; 59LM; 60LM; 62LM; 77LM; 79LM; 81LM; 83LM; 86LM; 89LM; 91LM; 100LM; 110LM; 137LM; 142LM; 151LM; 161LM; 168LM; 169LM; 176LM; 20IS; 24IS; 25IS; 39IS; 41IS; 48IS; 53IS; 62IS; 70IS; 71IS; 97IS; 101IS; 112IS; 120IS; 144IS; 153IS	AMNH 475098, 241800-241814; FMNH 62930-62934, 62936; FNJV 914-916; LACM 42249-42256, 42263-42271; MNRJ 3765; MPEG 15022, 15574, 15575, 15577-15583, 17936-17942, 37670, 37817, 37818, 40805, 42094-42097, 43403-43408; RBO 4 (1):59, 11 (1):166, 15 (1):46, 22 (4):330; WA
Brotogeris chrysoptera	40LM; 44LM; 86LM; 89LM; 91LM; 138LM; 144LM; 147IS; 1IS; 30IS; 34IS; 40IS	AMNH 241791, 475026-475031; FMNH 62937-62940; FNJV 923; LACM 42262; MPEG 37330, 37331; Pinto (1938) 203; RBO 22(4):330; WA
Touit huetii	86LM	RBO 22(4):330
Pionites leucogaster	42LM; 175LM; 46IS	FNJV 930; RBO 22(4):330; WA
Pyrilia vulturina	7LM; 1IS; 46IS	5RBO 22(4):330; WA
Alipiopsitta xanthops	93LM; 100LM; 153IS; 166LM; 172LM; 8IS; 41IS	CM P136526; FMNH 63694; MNRJ 43617; MPEG 15589; RBO 15(1):46; WA
Pionus menstruus	11LM; 57LM; 59LM; 117LM; 140LM; 140LM; 176LM; 1IS; 20IS; 30IS; 37IS; 46IS; 70IS; 144IS	FMNH 62873; MNRJ 3969; MPEG 38568, 41947, 41948; RBO 22(4):330; RBO^{+} 11(1):166; WA
Pionus maximiliani	59LM; 62LM; 98LM; 100LM; 109LM; 111LM; 154LM; 168LM; 169LM; 8IS; 41IS; 101IS	AMNH 241850-241853; RBO 4(1):59, 15(1):47; RBO^{+} 11(1):166; WA
Pionus fuscus	57LM; 176LM; 1IS; 46IS	FMNH 62874; RBO 22(4):330; WA
Amazona farinosa	59LM; 86LM; 178LM; 46IS; 147IS	MPEG 34936; RBO 22(4):330; RBO+ 11(1):166; WA

Taxa	Locality	Source
Amazona amazonica	26IS; 33IS; 34IS; 37IS; 39IS; 40IS; 41IS; 48IS; 75IS; 8IS; 98IS; 101IS; 116IS; 120IS; 127IS; 133IS; 143IS; 144IS; 22LM; 59LM; 65LM; 79LM; 89LM; 91LM; 100LM; 109LM; 110LM; 121LM; 127LM; 133LM; 137LM	FMNH 62858; FNJV 1000; LACM 42238; MNRJ 3889, 3891, 3897, 45737; MPEG 42092, 42093, 50737; Pinto (1938) 206; RBO 4(1):59, 15(1):47; RBO+ 11(1):166; WA
Amazona ochrocephala	57LM; 1IS; 46IS	RBO 22(4):330; WA
Amazona aestiva	109LM; 39IS; 41IS; 77IS; 120IS; 133IS	FNJV 982; RBO 15(1):47; WA
Deroptyus accipitrinus	11LM; 57LM; 46IS	MPEG 38567; RBO 22(4):330; WA
PASSERIFORMES		
THAMNOPHILIDAE		
Myrmornis torquata	52LM; 58LM; 178LM	MPEG 34978, 34979, 36923, 76911
Pygiptila stellaris	42LM; 51LM	MPEG 34783; RBO 22(4):330
Myrmorchilus strigilatus	NS	GZ 9:35
Myrmotherula multostriata	51LM; 86LM; 91LM; 1IS	LACM 42895, 44140; MPEG 15786, 15787, 15788, 34787; RBO 22(4):330; WA
Myrmotherula axillaris	11LM; 44LM; 4LM; 51LM; 52LM; 58LM; 59LM; 86LM; 91LM; 176LM; 178LM; 1IS; 40IS; 124IS; 147IS	FMNH 63457-63459; LACM 42853; MPEG 15784, 15795, 34791, 34792, 34969, 34970, 36949, 37382-37385, 38525, 38526, 38649, 38650, 76836, 76877, 76880, 77040; RBO 22(4):330; RBO+ 11(1):168; WA
Myrmotherula longipennis	11LM; 44LM; 4LM; 52LM; 58LM; 86LM; 178LM; 1IS; 37IS	MPEG 34971, 36955-36958, 37389-38527, 38645-38648, 76855, 76858, 76919, 76920; RBO 22(4):330; WA

Taxa	Locality	Source
Myrmotherula menetriesii	11LM; 44LM; 4LM; 51LM; 58LM; 59LM; 86LM; 176LM; 1IS; 46IS	FMNH 63443, 63444, 63445, MPEG 34793, 37386, 37388, 38528, 38651, 76825, 76884, 76971, 76997; RBO 22(4):330; RBO^{+} 11(1):168; WA
Formicivora melanogaster	111LM; 155LM; 57IS	MPEG 68078; RBO 4(1):61; WA
Formicivora rufa	9LM; 59LM; 77LM; 91LM; 131LM; 172LM; 23IS; 26IS; 39IS; 41IS; 57IS; 77IS; 8IS; 95IS; 120IS; 152IS	FMNH 63471-63478; LACM 42879; MPEG 43487-43492; RBO^{+} 11(1):168; WA
Isleria hauxwelli	4LM; 11LM; 44LM; 51LM; 52LM; 58LM; 59LM; 86LM; 176LM; 178LM	FMNH 63514-63516; MPEG 34788-34790, 34968, 36950-36954, 36959, 37387, 38519-38524, 38640-38644, 76818, 76896, 76914, 76916, 76917; RBO 22(4):331; RBO^{+} 11(1):168
Thamnomanes caesius	4LM; 44LM; 52LM; 51LM; 1IS; 46IS	MPEG 34784, 36934-36938, 37413-37415, 38478-38483; WA
Dysithamnus mentalis	4LM; 11LM; 15LM; 44LM; 52LM; 58LM; 59LM; 83LM; 86LM; 91LM; 136LM; 140LM; 167LM; 174LM; 176LM; 178LM; 185LM; 41IS; 46IS; 101IS; 153IS	FMNH 63421-63423; MPEG 15777, 34966, 34967, 36939-36944, 37395-37400, 37603-37606, 37695-37700, 37868-37872, 37914, 38530-38534, 38638, 38639, 42014, 42302-42317, 68049-68053, 76809, 76810, 76839; RBO 22(4):331; RBO^{+} 11(1):167; WA
Herpsilochmus sellowi	110LM; 111LM; 121LM; 41IS; 160IS	RBO 4(1):61; WA
Herpsilochmus atricapillus	12LM; 38LM; 62LM; 77LM; 81LM; 83LM; 91LM; 100LM; 109LM; 110LM; 121LM; 137LM; 140LM; 155LM; 172LM; 174LM; 17IS; 25IS; 27IS; 39IS; 41IS; 95IS; 133IS; 142IS; 153IS	FMNH 63526, 63527, 63533-63536; LACM 42881-42891, MPEG 37600, 37701, 37702, 40866, 40867, 42015, 42016, 42170, 42171, 43483, 68063-68066, 70341-70343; RBO 4(1):58, 4(1):61, 15(1):49; WA; XC

Taxa	Locality	Source
Herpsilochmus pectoralis	56LM; 60LM; 64LM; 128LM; 138LM; 146LM; 6IS; 11IS; 15IS; 17IS; 26IS; 41IS; 62IS; 66IS; 71IS; 101IS; 132IS; 133IS; 153IS; 155IS	AMNH 243019; FMNH 63479, 63480; FNJV 2768; LSUMZ 71675-71677; MPEG 30473, 30474, 75534; Pinto (1938) 482; WA
Herpsilochmus longirostris	8IS	WA
Herpsilochmus rufimarginatus	86LM; 172LM; 175LM; 176LM	FMNH 63523-63525; FNJV 2776; RBO 22(4):331
Sakesphorus luctuosus	50LM; 59LM; 86LM; 91LM; 1IS; 17IS; 30IS; 31IS; 34IS; 39IS; 92IS; 120IS	FNJV 2590; LACM 42810, 42811; MPEG 15775; RBO 22(4):331; RBO^+ 11(1):167; WA
Thamnophilus doliatus	20LM; 54LM; 59LM; 64LM; 81LM; 86LM; 91LM; 100LM; 126LM; 137LM; 1IS; 17IS; 25IS; 36IS; 39IS; 41IS; 62IS; 101IS; 120IS; 153IS; 165IS	FMNH 63905-63908; LSUMZ 71669; MPEG 15756, 42164, 50773, 50774; RBO 15(1):48, 22(4):331; RBO^+ 11(1):167; WA
Thamnophilus capistratus	110LM; 121LM	RBO 4(1):61
Thamnophilus torquatus	77LM; 91LM; 136LM; 8IS; 23IS; 26IS; 39IS; 41IS; 95IS; 152IS	LACM 42931; MPEG 42301, 43479-43482; WA
Thamnophilus palliatus	58LM; 59LM; 64LM; 89LM; 91LM; 86LM; 92LM; 138LM; 143LM; 167LM; 176LM; 178LM; 1IS; 7IS; 17IS; 20IS; 34IS; 41IS; 46IS; 48IS; 59IS; 71IS; 137IS; 147IS	AMNH 489783; FMNH 63902-63904; FNJV 2608; LACM 42900-42909; LSUMZ 67252, 71670-71674; MPEG 18129, 34965, 68003, 76849; RBO 22(4):331; RBO^+ 11(1):67; WA; XC
Thamnophilus pelzelni	38LM; 59LM; 61LM; 62LM; 77LM; 81LM; 86LM; 98LM; 9LM; 100LM; 109LM; 110LM; 111LM; 121LM; 136LM; 137LM; 140LM; 155LM; 156LM; 172LM; 6IS; 15IS; 23IS; 25IS; 27IS; 32IS; 39IS; 41IS;	FMNH 63401-63407, 63413, 63414; MPEG 42011-42013, 42165-42169, 42300, 43470-43478, 68033-68037, 68203; RBO+ 11(1):167; RBO 4(1):61, 15(1):48, 22(4):331; WA

Taxa	Locality	Source
	62IS; 101IS; 120IS; 132IS; 133IS; 139IS; 152IS; 153IS	
Thamnophilus aethiops	4LM; 11LM; 44LM; 51LM; 52LM; 58LM; 59LM; 86LM; 176LM; 1IS; 147IS	FMNH 63446; MPEG 34782, 36928-36933, 37365, 37366, 37376, 37377, 38473-38477, 38626-38630, 76803, 76844, 76847, 76852, 76869; RBO 22(4):331; RBO+ 11(1):167; WA
Thamnophilus amazonicus	15LM; 44LM; 58LM; 59LM; 83LM; 86LM; 89LM; 138LM; 176LM; 133IS; 143IS; 144IS; 159IS; 1IS; 3IS; 6IS; 20IS; 40IS; 41IS; 58IS; 62IS; 71IS	AMNH 489437, 489438; FMNH 63424-63428; MPEG 37364, 37372-37375, 37693, 37694, 37864, 76806; RBO 22(4):331; RBO+ 11(1):167; WA
Taraba major	11LM; 12LM; 34LM; 38LM; 44LM; 50LM; 57LM; 59LM; 60LM; 61LM; 64LM; 83LM; 84LM; 89LM; 91LM; 92LM; 100LM; 110LM; 111LM; 121LM; 122LM; 133LM; 136LM; 137LM; 140LM; 142LM; 143LM; 144LM; 146LM; 151LM; 152LM; 154LM; 160LM; 167LM; 168LM; 169LM; 174LM; 176LM; 1IS; 20IS; 25IS; 31IS; 34IS; 40IS; 41IS; 58IS; 70IS; 71IS; 72IS; 93IS; 101IS; 103IS; 123IS; 126IS; 136IS; 137IS; 139IS; 147IS; 149IS; 151IS	AMNH 242856-242869; FMNH 63866-63877, 65628; FNJV 2576; LACM 42812-42825; LSUMZ 67238, 67239, 71664-71668; MPEG 2530, 8277, 8278, 15761, 15762, 18076, 18077, 37355, 37595-37690, 37691, 37692, 38621, 40868-40871, 42010, 42162, 42163, 42299, 50771, 50772, 67992-67994; Pinto (1938) 447; RBO 4(1):61, 15(1):48, 22(4):331; RBO+ 11(1):167; WA; XC
Hypocnemoides maculicauda	14LM; 51LM; 86LM; 91LM; 1IS; 17IS; 34IS; 41IS; 72IS; 112IS	LACM 42847-42849, 42852; MPEG 18105, 34801, 40860, 40861; RBO 22(4):331; WA
Sclateria naevia	40LM; 51LM; 58LM; 59LM; 89LM; 1IS; 17IS; 34IS	AMNH 491408; FNJV 2976; MPEG 34802, 34803, 77005, 77037; RBO+ 11(1):168; WA

Taxa	Locality	Source
Pyriglena leuconota	4LM; 10LM; 11LM; 12LM; 14LM; 15LM; 42LM; 44LM; 51LM; 58LM; 59LM; 64LM; 83LM; 89LM; 91LM; 100LM; 110LM; 121LM; 136LM; 138LM; 144LM; 155LM; 167LM; 174LM; 176LM; 178LM; 1IS; 3IS; 37IS; 39IS; 40IS; 41IS; 62IS; 71IS; 101IS; 141IS; 153IS	AMNH 243134, 491211-491213; FMNH 63509-63513; FNJV 2889, 2890; LACM 42800; LSUMZ 71693-71704; MPEG 34796-34800, 34973, 34974, 36925, 36926, 37358, 37359, 37362, 37363, 37607, 37608, 37709-37717, 37865, 38486-38497, 38624, 38625, 40858, 40859, 42322, 42323, 68100-68111, 70198, 70199, 76813, 76817, 76842, 76846, 76888; Pinto (1938) 497; RBO 4(1):62, 15(1):49, 22(4):331; RBO+ 11(1):168; WA; XC
Cercomacra manu	82IS	WA
Cercomacra cinerascens	58LM; 59LM; 86LM; 91LM; 176LM; 1IS	FMNH 63497; LACM 42932, 42933, 42938; MPEG 15755, 76902; RBO 22(4):331; RBO+ 11(1):168; WA
Cercomacra ferdinandi	96LM; 102LM	Cotinga 25(2006):21-23
Cercomacroides laeta	4LM; 40LM; 44LM; 51LM; 59LM; 64LM; 86LM; 167LM; 176LM; 181LM; 1IS; 30IS; 34IS; 46IS; 147IS	FMNH 63493-63496; FNJV 2876, 2877; LSUMZ 71692; MPEG 34794, 34795, 37378-37380, 37416, 37417, 38484, 38485, 68099, 70181, 70182; RBO 22(4):331; RBO+ 11(1):168; WA
Willisornis vidua	4LM; 11LM; 44LM; 51LM; 52LM; 58LM; 59LM; 86LM; 176LM; 178LM; 1IS; 37IS	FMNH 63521, 63522; MPEG 34804-34807, 34976, 34977, 36945-36948, 37367, 37368-37371, 38509-38518, 38634-38637, 76848, 76856, 76874, 76878, 76887; RBO+ 11(1):168; RBO 22(4):331; WA
Phlegopsis nigromaculata	4LM; 42LM; 51LM; 58LM; 176LM; 178LM; 46IS; 48IS	FMNH 63501-63505; MPEG 34808, 34809, 34975, 38498-38503, 76885, 76894, 76898;

Taxa	Locality	Source
		RBO 22(4):331; WA
MELANOPAREIIDAE		
Melanopareia torquata	NS; 8IS; 23IS; 39IS; 152IS	GZ 9:36; WA
CONOPOPHAGIDAE		
Conopophaga roberti	4LM; 9LM; 11LM; 15LM; 44LM; 51LM; 52LM; 58LM; 59LM; 62LM; 64LM; 86LM; 89LM; 97LM; 100LM; 110LM; 121LM; 136LM; 138LM; 142LM; 155LM; 167LM; 176LM; 178LM; 181LM; 23IS; 41IS; 46IS; 101IS; 102IS; 141IS; 153IS	AMNH 242769, 488909-488911; FMNH 63881-63890; LSUMZ 71706-71709; MPEG 34812, 34980, 36866, 36924, 36927, 37360, 37361, 37873-37878, 38529, 38652-38654, 42324, 42325, 68129, 68130-68133, 70183, 70201, 76963, Pinto (1938) 528; RBO 4(1):62, 15(1):49, 22(4):331; RBO+ 11(1):168; WA; XC
GRALLARIIDAE		
Hylopezus paraensis	52LM; 86LM	MPEG 36922; RBO 22(4):331
FORMICARIIDAE		
Formicarius colma	11LM; 52LM; 61LM; 62LM; 64LM; 86LM; 110LM; 121LM; 144LM; 176LM; 25IS; 37IS; 41IS; 46IS; 62IS; 101IS; 133IS	AMNH 243142-243144; FMNH 63508; LSUMZ 71705; MPEG 36917, 36918, 38623, 70200; RBO 4(1):62, 22(4):331; WA
Formicarius analis	4LM; 11LM; 40LM; 44LM; 51LM; 52LM; 59LM; 86LM; 176LM; 1IS; 37IS; 46IS; 71IS	FMNH 63506, 63507; FNJV 3043, 3044; MPEG 34810, 34811, 36919-36921, 37356, 37357, 38504-38508, 38622; RBO 22(4):331; RBO^{+} 11(1):168; WA; XC
SCLERURIDAE		
Sclerurus macconnelli	44LM; 59LM; 86LM; 138LM	FMNH 63861; MPEG 37418; RBO 22(4):331; RBO^{+} 11(1):168

Taxa	Locality	Source
Sclerurus rufigularis	11LM; 58LM; 86LM; 178LM	MPEG 34964, 38614, 38615, 76918, 76946; RBO 22(4):331
Sclerurus caudacutus	44LM; 58LM; 86LM	MPEG 37419, 76964; RBO 22(4):331
DENDROCOLAPTIDAE		
Dendrocincla fuliginosa	4LM; 11LM; 44LM; 51LM; 52LM; 58LM; 59LM; 86LM; 91LM; 136LM; 176LM; 178LM; 1IS; 144IS	FMNH 63894, 63895; LACM 42615; MPEG 34776, 34956, 34957, 36897-36900, 37344-37348, 38454-38458, 38599-38601, 42278-42282, 74390, 76853, 76897; RBO 22(4):331; RBO+ 11(1):169; WA
Dendrocincla merula	4LM; 52LM; 59LM; 86LM; 178LM	MPEG 34958, 36901-36904, 38459-38462; RBO 22(4):331; RBO+ 11(1):169
Deconychura longicauda	4LM; 11LM; 44LM; 58LM; 86LM; 46IS	MPEG 37353, 38453, 38602, 76899; RBO 22(4):331; WA
Sittasomus griseicapillus	9LM; 12LM; 14LM; 15LM; 36LM; 38LM; 39LM; 59LM; 61LM; 62LM; 77LM; 81LM; 83LM; 91LM; 98LM; 100LM; 136LM; 137LM; 140LM; 154LM; 155LM; 158LM; 169LM; 172LM; 174LM; 17IS; 39IS; 41IS; 49IS; 101IS; 102IS; 153IS	AMNH 243367-243374; FMNH 63826-63832; LACM 42642, 42643; MPEG 15789, 15790, 37589-37593, 37686-37688, 37857-37860, 40849-40853, 40966, 41997-42004, 42131-42136, 42283-42285, 43443-43449, 68156-68159; RBO 4(1):62, 15(1):49; RBO+ 11(1):169; WA
Certhiasomus stictolaemus	11LM; 52LM; 86LM; 178LM	MPEG 34959, 36905, 36906, 38603-38605; RBO 22(4):331
Glyphorynchus spirurus	4LM; 11LM; 51LM; 52LM; 58LM; 59LM; 86LM; 176LM; 178LM; 1IS; 37IS; 46IS	FMNH 63901; MPEG 34777, 34960, 36911, 38463-38468, 38606-38608, 76811, 76814, 76838, 76841; RBO 22(4):331; RBO+ 11(1):169; WA

Taxa	Locality	Source
Xiphorhynchus spixii	4LM; 11LM; 44LM; 51LM; 52LM; 58LM; 59LM; 85LM; 86LM; 178LM	MPEG 2529, 34778-34780, 34961, 34962, 36909, 36910, 37350-37352, 38452, 38595-38597, 74391, 76886; RBO 22(4):331; RBO+ 11(1):169
Xiphorhynchus obsoletus	86LM	RBO 22(4):331
Xiphorhynchus guttatoides	4LM; 11LM; 12LM; 15LM; 44LM; 58LM; 59LM; 62LM; 64LM; 81LM; 83LM; 86LM; 91LM; 92LM; 97LM; 100LM; 136LM; 137LM; 140LM; 155LM; 158LM; 167LM; 168LM; 169LM; 174LM; 176LM; 184LM; 1IS; 25IS; 39IS; 41IS; 46IS; 101IS; 120IS; 133IS; 139IS; 153IS	AMNH 243381-243384; FMNH 63777-63780, 311029; LACM 42599, 42600; LSUMZ 71645, 71646; MPEG 15747, 36865, 37349, 37583-37587, 37681-37683, 37855, 38447-38450, 38594, 40844, 42005-42008, 42140, 42292, 42293, 42296, 42297, 50761, 68181-68187, 76943; RBO 4(1):62, 15(1):49, 22(4):331; RBO+ 11(1):169; WA
Campylorhamphus trochilirostris	55LM; 111LM; 121LM; 41IS; 153IS	MPEG 50760; RBO 4(1):62; WA
Dendroplex picus	3LM; 12LM; 14LM; 33LM; 58LM; 59LM; 60LM; 61LM; 62LM; 64LM; 71LM; 86LM; 89LM; 91LM; 97LM; 98LM; 100LM; 110LM; 111LM; 121LM; 127LM; 133LM; 136LM; 137LM; 138LM; 142LM; 151LM; 157LM; 160LM; 161LM; 164LM; 169LM; 174LM; 1IS; 6IS; 11IS; 15IS; 17IS; 20IS; 25IS; 30IS; 34IS; 39IS; 40IS; 41IS; 58IS; 62IS; 67IS; 70IS; 71IS; 92IS; 101IS; 133IS; 139IS; 144IS; 153IS; 155IS; 160IS	AMNH 243396-243404; CM P138487; FMNH 63772-63776; LACM 42649-42654; LSUMZ 71647-71654; MNRJ 47390; MPEG 8273-8276, 15749, 18046, 36863, 36864, 37588, 40845-40847, 42137, 42138, 42294, 42295, 50762, 68175, 70317, 70318, 72265, 77022; Pinto (1938) 374; RBO 4(1):62, 15(1):49, 22(4):330; RBO+ 11(1):168; WA
Lepidocolaptes angustirostris	9LM; 14LM; 32LM; 53LM; 60LM; 61LM; 62LM; 77LM; 79LM; 83LM; 91LM; 98LM; 100LM; 121LM; 128LM; 137LM; 155LM; 169LM; 172LM; 180LM; 23IS; 39IS; 41IS; 62IS; 71IS; 77IS; 101IS; 120IS; 133IS;	AMNH 243454-243458; FMNH 63841-63845, 63858-63860; FNJV 2176-2179; LACM 42644-42646; MPEG 15765, 37684, 37685, 40848, 42139, 43455-43460, 68212-

Taxa	Locality	Source
	139IS; 153IS	68214; RBO 4(1):62, 15(1):49; WA
Lepidocolaptes layardi	4LM; 15LM; 58LM; 59LM;86LM; 176LM; 1IS; 30IS; 34IS; 58IS	FMNH 63856, 63857; MPEG 37856, 38451, 76991; RBO+ 11(1):169; RBO 22(4):331; WA
Nasica longirostris	91LM; 17IS	LACM 42567, 42568; WA
Dendrexetastes rufigula	58LM	MPEG 76873
Dendrocolaptes medius	4LM; 11LM; 52LM; 58LM; 86LM; 136LM; 176LM; 30IS; 37IS; 46IS	FMNH 63781-63784; MPEG 36895, 36896, 38444-38446, 38598, 42286, 76805; RBO 22(4):331; WA
Dendrocolaptes platyrostris	9LM; 12LM; 15LM; 36LM; 59LM; 77LM; 91LM; 100LM; 113LM; 136LM; 137LM; 140LM; 154LM; 155LM; 169LM; 171LM; 174LM; 39IS; 41IS; 55IS; 104IS; 120IS; 133IS; 152IS; 153IS	AMNH 243507-243509; FMNH 63786; LACM 42569-42571; MPEG 18056, 37579-37582, 37853, 37854, 40836-40843, 41984-41995, 42141-42145, 42287-42291, 43450-43454, 66150, 66151, 68141-68146, 70057, 70321; RBO 15(1):49; RBO+ 11(1):169; WA
Xiphocolaptes promeropirhynchus	59LM	RBO+ 11(1):169
Xiphocolaptes falcirostris	60LM; 62LM; 98LM; 100LM; 140LM; 152LM; 155LM; 169LM; 174LM; 33IS; 41IS; 101IS; 122IS; 153IS	AMNH 243416-243419; FMNH 63792, 63793; MPEG 37578, 41996, 68147; RBO 4(1):62, 15(1):49; WA; XC
XENOPIDAE		
Xenops minutus	44LM; 52LM; 58LM; 59LM; 89LM; 86LM; 11LM; 161LM; 176LM; 41IS	FMNH 63795-63797; MPEG 36914, 37354, 38619, 38620, 76812, 76850; Pinto (1938) 436; RBO 22(4):331; RBO+ 11(1):169; WA

Taxa	Locality	Source
Xenops rutilans	36LM; 38LM; 61LM; 77LM; 91LM; 100LM; 109LM; 136LM; 137LM; 155LM; 169LM; 33IS; 39IS; 120IS; 141IS; 153IS	AMNH 243310, 63805, 63806; LACM 42694, 42695; MPEG 15748, 42161, 42298, 43467-43469, 68255; RBO 4(1):62, 15(1):49, 22(4):332; WA; XC
FURNARIIDAE		
Berlepschia rikeri	61LM; 86LM; 26IS; 26IS; 41IS; 48IS; 101IS; 133IS; 133IS; 143IS; 153IS	RBO 4(1):62, 22(4):332; WA
Furnarius figulus	61LM; 110LM; 152LM; 6IS; 7IS; 17IS; 19IS; 20IS; 25IS; 34IS; 41IS; 55IS; 96IS; 101IS; 132IS; 139IS; 153IS; 165IS	FMNH 63787; RBO 4(1):62, 15(1):49; WA; XC
Furnarius leucopus	55LM; 59LM; 60LM; 142LM; 169LM; 15IS; 25IS; 41IS; 101IS; 133IS; 135IS; 153IS	AMNH 243155-243160; FMNH 63745-63747; MPEG 50763; RBO^{+} 11(1):167; WA
Furnarius rufus	8IS; 55IS	WA
Automolus rufipileatus	4LM; 51LM; 58LM; 59LM; 86LM; 91LM; 181LM; 46IS	MPEG 15754, 34781, 38470, 38471, 70177, 76823, 77061; RBO 22(4):332; RBO^{+} 11(1):168; WA
Automolus paraensis	4LM; 11LM; 11LM; 52LM; 52LM; 58LM; 86LM; 178LM; 46IS	MPEG 34963, 36907, 36908, 38469, 38609, 38610, 76915; RBO 22(4):332; WA
Anabacerthia ruficaudata	58LM; 59LM; 86LM; 176LM	FMNH 63854; MPEG 76909; RBO 22(4):330; RBO+ 11(1):168
Philydor erythrocercum	11LM; 12LM; 42LM; 44LM; 51LM; 58LM; 171LM; 176LM; 1IS	FMNH 63855; MCZ 135081; MPEG 36912, 36913, 37420, 37421, 38611, 38612, 40857, 76972; RBO 22(4):332; WA
Philydor pyrrhodes	11LM; 42LM	MPEG 38613; RBO 22(4):332
Pseudoseisura cristata	101LM	AMNH 243292

Taxa	Locality	Source
Phacellodomus rufifrons	77LM; 8IS; 100IS; 120IS	MPEG 43463-43466; WA
Certhiaxis cinnamomeus	22LM; 24LM; 32LM; 39LM; 45LM; 59LM; 62LM; 86LM; 89LM; 110LM; 122LM; 146LM; 176LM; 15IS; 16IS; 17IS; 20IS; 22IS; 39IS; 41IS; 52IS; 58IS; 101IS; 103IS; 153IS	AMNH 243201-243204, 523631, 523632; FMNH 63853; MPEG 45076, 49768, 49769; Pinto (1938) 415; RBO 4(1):62, 15(1):49, 22(4):332; RBO$^+$ 11(1):167; WA
Synallaxis sp. novum	19LM; 64LM	LSUMZ 71655-71659; MPEG 76694
Synallaxis frontalis	20LM; 34LM; 38LM; 59LM; 81LM; 89LM; 91LM; 98LM; 100LM; 110LM; 111LM; 152LM; 172LM; 1IS; 8IS; 25IS; 26IS; 41IS; 101IS	AMNH 523337; FMNH 63807-63815; LACM 42638; MPEG 15751, 15752, 50764, 50765, 50767; Pinto (1938) 407; RBO 15(1):49; RBO$^+$ 11(1):167; WA
Synallaxis albescens	20LM; 59LM; 60LM; 86LM; 176LM; 40IS; 17IS; 103IS; 112IS; 126IS; 137IS; 152IS	FMNH 63838-63840; MPEG 50766; RBO 22(4):332; RBO$^+$ 11(1):167; WA
Synallaxis rutilans	4LM; 11LM; 44LM; 52LM; 58LM; 64LM; 86LM; 176LM; 46IS; 90IS	FMNH 63798-63800; LSUMZ 71660, 71661; MPEG 36915, 36916, 37422, 38472, 38616-38618, 76837, 76901, 76905; RBO 22(4):332; WA
Synallaxis gujanensis	58LM; 59LM; 86LM; 91LM; 144LM; 151LM; 176LM; 17IS; 40IS; 126IS	AMNH 243211; FMNH 63802-63804; LACM 42639-42641; MPEG 76945, 76955, 77026; RBO 22(4):332; RBO$^+$ 11(1):167; WA
Cranioleuca vulpina	20LM; 59LM; 77LM; 11IS; 17IS; 41IS; 58IS; 71IS; 101IS; 153IS	AMNH 243250; MPEG 50768; RBO$^+$ 11(1):167; WA
PIPRIDAE		

Taxa	Locality	Source
Neopelma pallescens	15LM; 56LM; 61LM; 62LM; 64LM; 77LM; 83LM; 89LM; 100LM; 110LM; 136LM; 137LM; 138LM; 140LM; 158LM; 167LM; 169LM; 172LM; 17IS; 25IS; 39IS; 41IS; 101IS; 120IS; 133IS; 153IS; 155IS	AMNH 244290, 493612-493614; FMNH 62977-62980; LSUMZ 71728-71732; MPEG 8270, 37719, 37910-37913, 42023-42025, 42180, 42181, 42353-42355, 42356-42363, 43499, 43500, 68560-68562, 68571-68574, 75533; Pinto (1944) 2:102; RBO 4(1):63, 15(1):50; WA
Tyranneutes stolzmanni	11LM; 58LM; 59LM; 86LM; 175LM; 1IS	FNJV 3426; MPEG 38667, 77010; RBO 22(4):332; RBO+ 11(1):170; WA
Pipra fasciicauda	12LM; 14LM; 15LM; 59LM; 91LM; 136LM; 140LM; 39IS; 48IS; 56IS	LACM 43096-43100; MPEG 18001, 37896-37902, 40903-40910, 42017-42021, 42176-42179, 42331-42341; RBO+ 11(1):170; WA
Ceratopipra rubrocapilla	4LM; 11LM; 44LM; 51LM; 58LM; 59LM; 86LM; 178LM; 37IS; 48IS	MPEG 34814, 34815, 34929, 37434-37437, 38535, 38658-38660, 76859; RBO 22(4):332; RBO+ 11(1):170; WA
Lepidothrix iris	11LM; 86LM	MPEG 38665; RBO 22(4):332
Manacus manacus	11LM; 14LM; 15LM; 34LM; 43LM; 58LM; 59LM; 61LM; 64LM; 83LM; 86LM; 89LM; 91LM; 92LM; 97LM; 136LM; 138LM; 140LM; 144LM; 167LM; 176LM; 178LM; 3IS; 20IS; 34IS; 39IS; 40IS; 41IS; 71IS; 86IS; 101IS; 109IS; 120IS; 124IS; 133IS; 158IS	AMNH 244274, 244275; FMNH 62981-62987; LACM 43103-43116; LSUMZ 67487, 67488, 71721-71727; MPEG 8268, 8269, 17999, 18000, 27150, 34925, 36867-36870, 37720, 37903-37909, 38666, 40915, 40916, 42022, 42342-42352, 50776, 50777, 68575-68581, 74007, 76881, 76999, 77017; RBO 4(1):63, 22(4):332; RBO+ 11(1):170; WA
Machaeropterus pyrocephalus	36LM	MPEG 43498
Dixiphia pipra	11LM; 51LM; 52LM; 58LM; 86LM; 178LM	MPEG 34816, 34926-34928, 36960-38664, 76824, 76834, 76854, 76860; RBO

Taxa	Locality	Source
		22(4):332
Chiroxiphia pareola	44LM; 51LM; 59LM; 64LM; 77LM; 84LM; 85LM; 86LM; 89LM; 138LM; 144LM; 155LM; 160LM; 164LM; 167LM; 176LM; 25IS; 3IS; 40IS; 41IS; 58IS; 89IS; 101IS; 133IS; 143IS; 144IS; 153IS; 161IS	AMNH 128730, 244260-244270; FMNH 62970-62976; LSUMZ 71716-71720; MPEG 2526, 2527, 8265-8267, 34817, 34818, 37438-37441, 68582-68585; RBO 22(4):332; RBO^+ 11(1):170; WA
Antilophia galeata	36LM; 8IS; 39IS; 120IS	MPEG 43495-43497; WA
ONYCHORHYNCHIDAE		
Onychorhynchus coronatus	44LM; 52LM; 59LM; 86LM; 167LM; 176LM; 178LM; 1IS; 40IS; 46IS; 48IS	MNRJ 10170, 10171; MPEG 34918, 36962, 36963, 37425, 68394-68398; RBO 22(4):332; RBO^+ 11(1):168; WA; XC
Terenotriccus erythrurus	1LM; 44LM; 44LM; 52LM; 58LM; 59LM; 86LM; 167LM; 176LM; 177LM	FMNH 63101; LSUMZ 50249; MNRJ 10174; MPEG 36975, 37432, 37433, 68279, 76861; RBO 22(4):332; RBO^+ 11(1):168
Myiobius barbatus	61LM; 62LM; 64LM; 110LM; 111LM	LSUMZ 71752-71754; RBO 4(1):63
Myiobius atricaudus	4LM; 9LM; 11LM; 15LM; 34LM; 38LM; 44LM; 51LM; 52LM; 58LM; 59LM; 60LM; 77LM; 81LM; 83LM; 86LM; 109LM; 136LM; 137LM; 140LM; 144LM; 155LM; 167LM; 168LM; 169LM; 172LM; 174LM; 176LM; 177LM; 178LM; 23IS; 41IS; 101IS; 133IS; 153IS	AMNH 244036-244039; FMNH 63148-63153; MNRJ 12990, 12991; MPEG 34820-34822, 34919, 36969, 36970, 36971, 37423, 37424, 37613-37615, 37730, 37731, 37879, 38550, 38674-38677, 42045, 42046, 42218-42222, 42372, 42373, 43513, 54469, 68387-76875; RBO 15(1):50, 22(4):332; RBO^+ 11(1):168; WA
TITYRIDAE		
Schiffornis turdina	4LM; 11LM; 44LM; 51LM; 52LM; 59LM; 86LM; 178LM	MPEG 34819, 34923, 34924, 36961, 37442-37444, 38536, 38668-38670; RBO

Taxa	Locality	Source
		22(4):332; RBO+ 11(1):170
Laniocera hypopyrra	1LM; 11LM; 58LM; 1IS	LSUMZ 50248; MPEG 38671, 77042; WA
Iodopleura isabellae	86LM; 91LM; 92LM; 1IS	LACM 43023-43025; LSUMZ 67376; MPEG 17960; RBO 22(4):332; WA
Tityra inquisitor	4LM; 36LM; 59LM; 71LM; 86LM; 91LM; 1IS; 3IS; 37IS; 39IS; 40IS; 41IS; 120IS; 153IS	FMNH 63720; LACM 43064, 43065; MPEG 38414, 43493, 43494; RBO 22(4):332; RBO+ 11(1):170; WA
Tityra cayana	57LM; 59LM; 61LM; 62LM; 81LM; 83LM; 98LM; 100LM; 137LM; 140LM; 155LM; 169LM; 30IS; 37IS; 39IS; 40IS; 41IS; 77IS; 89IS; 153IS	AMNH 244309-244314; MPEG 6887, 6888, 37718, 42026, 42027, 42146, 68541; RBO 15(1):50, 22(4):332, 4(1):64; RBO+ 11(1):170;
Tityra semifasciata	38LM; 59LM; 60LM; 86LM; 91LM; 136LM; 1IS; 17IS; 25IS; 39IS; 41IS; 48IS; 55IS; 120IS; 153IS	LACM 43055-43060; MPEG 6889, 6890, 42326-42330; RBO 22(4):332; RBO+ 11(1):170; WA
Pachyramphus viridis	59LM; 64LM; 25IS; 39IS; 41IS; 153IS	LSUMZ 71713, 71714; RBO+ 11(1):170; WA
Pachyramphus rufus	23LM; 58LM; 59LM; 1IS; 17IS; 31IS; 40IS; 41IS; 46IS	MPEG 50775, 76798, 76950, 77025, 77047; RBO+ 11(1):170; WA
Pachyramphus castaneus	4LM; 86LM; 1IS	MPEG 38415; RBO 22(4):332; WA
Pachyramphus polychopterus	14LM; 38LM; 59LM; 62LM; 86LM; 89LM; 91LM; 100LM; 109LM; 110LM; 137LM; 138LM; 155LM; 161LM; 178LM; 3IS; 25IS; 33IS; 41IS; 144IS; 153IS	AMNH 494050; FMNH 63766-63768; LACM 43045; LSUMZ 67402; MPEG 8271, 8272, 15722, 15730, 15732, 34922, 40901, 42147, 42148, 68542, 68543; RBO 4(1):64, 15(1):51, 22(4):332; RBO+ 11(1):170; WA
Pachyramphus marginatus	86LM; 176LM; 20IS	FMNH 63765; RBO 22(4):332; WA

Taxa	Locality	Source
Pachyramphus minor	58LM; 86LM; 1IS	MPEG 76923, 77007; RBO 22(4):332; WA
Pachyramphus validus	14LM; 86LM; 25IS; 40IS; 41IS	MPEG 40902; RBO 22(4):332; WA
Xenopsaris albinucha	62LM; 91LM; 110LM; 27IS; 41IS; 101IS; 144IS; 153IS	LACM 43413, 43414; RBO 4(1):64; WA
COTINGIDAE		
Phoenicircus carnifex	58LM	MPEG 76959, 77029
Haematoderus militaris	58LM; 37IS; 46IS	RBO 22(4):332; WA
Querula purpurata	42LM; 59LM; 93LM; 178LM; 1IS; 30IS; 39IS; 40IS; 48IS; 147IS	MPEG 15742-15744, 34930; RBO 22(4):332; RBO+ 11(1):170; WA
Lipaugus vociferans	1LM; 4LM; 40LM; 59LM; 85LM; 86LM; 176LM; 1IS; 46IS	FMNH 63762; FNJV 3187-3190; KU 52644; MPEG 2528, 38416; RBO 22(4):330; RBO+ 11(1):170; WA
Procnias averano	NS; 14LM; 61LM; 62LM; 81LM; 98LM; 100LM; 111LM; 121LM; 173LM; 17IS; 30IS; 39IS; 41IS; 89IS; 101IS; 120IS; 133IS; 141IS; 143IS; 144IS; 153IS	FMNH 63736-63740; FNJV 3307-3309; MPEG 40911-40913; RBO 4(1):63, 15(1):50; WA; XC
Cotinga cayana	4LM; 86LM	MPEG 38412, 38413; RBO 22(4):332
Cotinga cotinga	4LM; 58LM; 91LM	LACM 43026-43028; MPEG 17951, 17952, 38411; RBO 22(4):330
Gymnoderus foetidus	14LM; 86LM; 30IS; 164IS	MPEG 40914; RBO 22(4):332; WA
Xipholena lamellipennis	1LM; 58LM; 89LM; 1IS; 46IS	AMNH 494652, 494653; KU 52657; MPEG 77032; RBO 22(4):332; WA
PIPRITIDAE		
Piprites chloris	42LM; 58LM; 59LM; 176LM; 177LM;	FMNH 62883; MNRJ 11144; MPEG 76795, 76821, 76829, 76882, 76883; RBO

Taxa	Locality	Source
	46IS; 48IS	22(4):330; RBO+ 11(1):170; WA
PLATYRINCHIDAE		
Platyrinchus saturatus	11LM; 42LM; 51LM; 58LM; 59LM; 176LM; 177LM; 178LM	FMNH 63161; MNRJ 9982, 9983; MPEG 34913, 34914, 36979-36981, 38678, 38680, 76913; RBO 22(4):333; RBO+ 11(1) 168
Platyrinchus mystaceus	12LM; 13LM; 14LM; 15LM; 59LM; 64LM; 81LM; 83LM; 91LM; 124LM; 136LM; 138LM; 140LM; 151LM; 155LM; 41IS; 133IS; 153IS	AMNH 243631; FMNH 63121-63127; LACM 43312, 43313; LSUMZ 71758-71760; MNRJ 10445, 10461; MPEG 6886, 37723, 37724, 37880-37884, 40895-40897, 42040-42044, 42374-42377, 68441, 68442, 70184; RBO+ 11(1):168; WA
Platyrinchus platyrhynchos	4LM; 11LM; 42LM; 51LM; 178LM; 164IS	MPEG 34915-34917, 36976-36978, 38551, 38679; RBO 22(4):333; WA
RHYNCHOCYCLIDAE		
Taeniotriccus andrei	51LM; 58LM; 86LM; 1IS; 17IS; 30IS; 46IS	MPEG 34823, 76833; RBO 22(4):333; WA
Mionectes amazonus	11LM; 52LM; 58LM; 178LM	MPEG 34909, 36973, 38685-38687, 74392
Mionectes oleagineus	4LM; 11LM; 44LM; 52LM; 58LM; 59LM; 64LM; 86LM; 161LM; 20IS; 133IS; 144IS	FMNH 63203; LSUMZ 71796-71799; MPEG 36974, 37429-37431, 38546-38548, 38549, 38688, 76822, 76835, 76862, 77014; RBO 22(4):333; RBO+ 11(1):168; WA
Mionectes macconnelli	86LM	RBO 22(4):333
Leptopogon amaurocephalus	12LM; 14LM; 15LM; 59LM; 64LM; 83LM; 91LM; 97LM; 109LM; 111LM; 121LM; 136LM; 137LM; 155LM; 169LM; 172LM; 174LM; 25IS; 41IS; 71IS; 101IS; 153IS	AMNH 243797; FMNH 63322; LACM 43411; LSUMZ 71791-71795; MPEG 36871-36873, 37609-37611, 37728, 37729, 37893-37895, 40887-40890, 40893, 42227, 42381-42387, 68314, 68315; RBO 4(1):62,

Taxa	Locality	Source
		15(1):50; RBO+ 11(1):168; WA
Corythopis torquatus	11LM; 51LM; 52LM; 177LM; 178LM	MNRJ 16462; MPEG 34813, 34981, 36968, 38655-38657
Corythopis delalandi	36LM; 172LM	FMNH 63891-63893; MPEG 43529
Phylloscartes virescens	58LM	MPEG 76807-76978
Rhynchocyclus olivaceus	11LM; 44LM; 52LM; 58LM; 59LM; 176LM; 177LM	FMNH 63136; MNRJ 12688-12692; MPEG 36964-36967, 37427, 38672, 76973; RBO+ 11(1):168
Tolmomyias sulphurescens	15LM; 59LM; 81LM; 86LM; 91LM; 100LM; 109LM; 136LM; 140LM; 167LM; 176LM; 1IS; 17IS; 41IS; 62IS	FMNH 63099, 63100, 63162, 63163; LACM 43368, 43369, 43371-43376; MNRJ 23153; MPEG 15665, 15731, 37890, 42035-42038, 42378, 42379, 68392, 68393; RBO 15(1):50, 22(4):333; RBO+ 11(1):168; WA; XC
Tolmomyias assimilis	176LM; 177LM	FMNH 63164, 63165; MNRJ 23154
Tolmomyias poliocephalus	91LM; 163LM; 176LM; 177LM; 1IS; 17IS; 25IS; 39IS; 41IS; 144IS	FMNH 63097, 63098; LACM 43370; MNRJ 13314, 13320; MPEG 15658; WA
Tolmomyias flaviventris	17IS; 20IS; 23IS; 25IS; 31IS; 34IS; 39IS; 40IS; 41IS; 68IS; 101IS; 120IS; 133IS; 139IS; 141IS; 143IS; 144IS; 153IS	XC; WA
Todirostrum maculatum	59LM; 86LM; 91LM; 143LM; 161LM; 163LM; 164LM; 176LM; 15IS; 17IS; 20IS; 31IS; 39IS; 119IS; 143IS; 144IS; 155IS;	AMNH 243725; FMNH 63079, 63080; FNJV 3863; MNRJ 12766, 12767, 12769; MPEG 15687, 15688; RBO 22(4):333;

Taxa	Locality	Source
	160IS	RBO+ 11(1):167; WA
Todirostrum cinereum	22LM; 38LM; 59LM; 60LM; 77LM; 86LM; 100LM; 110LM; 111LM; 121LM; 138LM; 151LM; 176LM; 184LM; 1IS; 19IS; 20IS; 25IS; 26IS; 34IS; 39IS; 40IS; 41IS; 46IS; 70IS; 92IS; 101IS; 120IS; 133IS; 153IS; 160IS	FMNH 63112-63117; MNRJ 12770, 12772, 12773; MPEG 43515, 43516, 49777, 50797; RBO 4(1):62, 15(1):49, 22(4):333; RBO+ 11(1):167; WA
Todirostrum chrysocrotaphum	86LM; 176LM; 1IS; 40IS; 30IS	FMNH 63143, 63144; MNRJ 13584; RBO 22(4):333; WA
Poecilotriccus fumifrons	9LM; 11LM; 38LM; 42LM; 59LM; 64LM; 81LM; 100LM; 167LM; 173LM; 1IS; 7IS; 8IS; 23IS; 30IS; 34IS; 39IS; 41IS; 62IS; 101IS; 139IS	FMNH 63102-63106; LSUMZ 71770-71772; MPEG 30231, 38683, 38684, 68317; RBO 15(1):49, 22(4):333; RBO+ 11(1):167; WA; XC
Poecilotriccus sylvia	42LM; 64LM; 91LM; 138LM; 151LM; 161LM; 163LM; 17IS; 20IS; 126IS; 144IS; 147IS	FMNH 63107-63111; LACM 43279; LSUMZ 71773-71775; MNRJ 13546-13550; MPEG 30230; RBO 22(4):333; WA
Myiornis ecaudatus	86LM	RBO 22(4):333
Hemitriccus striaticollis	9LM; 20LM; 38LM; 58LM; 59LM; 60LM; 61LM; 62LM; 64LM; 86LM; 91LM; 98LM; 137LM; 138LM; 146LM; 151LM; 167LM; 176LM; 1IS; 7IS; 15IS; 17IS; 20IS; 23IS; 34IS; 36IS; 39IS; 41IS; 71IS; 77IS; 90IS; 101IS; 126IS; 131IS; 133IS; 149IS; 153IS	FMNH 63082-63096; LACM 43274-43278; LSUMZ 32293, 71776-71780; MNRJ 13528-13531; 13534, 13536, 13537; MPEG 15646-15650, 42226, 50796, 68280, 76800, 77048; Pinto (1944) 2:232; RBO 4(1):62, 22(4):333; RBO+ 11(1):167; WA; XC
Hemitriccus margaritaceiventer	5LM; 9LM; 38LM; 59LM; 61LM; 62LM; 77LM; 81LM; 89LM; 91LM; 98LM; 109LM; 110LM; 111LM; 8IS; 23IS; 26IS;	AMNH 498709; BMPEG 9(1):138; FMNH 63072-63078; LACM 43272, 43273; MPEG 43517, 43518; RBO 4(1):62, 15(1):49;

Taxa	Locality	Source
	32IS; 39IS; 41IS; 57IS; 62IS; 95IS; 101IS; 133IS; 152IS; 153IS	RBO+ 11(1):167; WA
Lophotriccus galeatus	44LM; 51LM; 52LM; 58LM; 59LM; 77LM; 86LM; 91LM; 161LM; 163LM; 176LM; 177LM; 178LM; 1IS; 17IS; 41IS; 90IS; 144IS; 147IS; 153IS	AMNH 243774; FMNH 63359, 63360; LACM 43293, 43294; MNRJ 12899, 12900, 13401-13406, 13408, 13409; MPEG 34824-34826, 34910, 36972, 37428, 76968, 76990; RBO 22(4):333; RBO+ 11(1):168; WA
TYRANNIDAE		
Hirundinea ferruginea	9LM; 172LM; 26IS; 39IS; 120IS	FMNH 63145-63147; WA
Zimmerius acer	60LM; 64LM; 86LM; 89LM; 91LM; 163LM; 176LM; 1IS; 3IS; 17IS; 20IS; 40IS; 41IS; 129IS; 144IS; 153IS	FMNH 63319, 63320; LACM 43410; LSUMZ 71783-71789; MNRJ 12633, 12640, 12647; Pinto (1944) 2:296; RBO 22(4):333; WA; XC
Inezia subflava	91LM	MPEG 15641
Euscarthmus meloryphus	20LM; 22LM; 59LM; 64LM; 89LM; 151LM; 172LM; 26IS; 27IS; 41IS; 66IS; 86IS; 101IS; 133IS	AMNH 498920; FMNH 63171-63173; MNRJ 12391-12393; MPEG 30475, 49776, 54463-54465; RBO+ 11(1):167; WA
Euscarthmus rufomarginatus	8IS; 152IS; 131LM	FMNH 63441; WA
Ornithion inerme	86LM; 179LM; 1IS; 34IS; 41IS	MNRJ 12650; RBO 22(4):333; WA
Camptostoma obsoletum	9LM; 58LM; 59LM; 61LM; 62LM; 64LM; 81LM; 86LM; 89LM; 91LM; 98LM; 164LM; 176LM; 169LM; 160LM; 111LM; 110LM; 100LM; 1IS; 17IS; 25IS; 26IS; 39IS; 41IS; 48IS; 55IS; 58IS; 101IS; 103IS; 132IS; 133IS; 144IS; 153IS; 154IS	AMNH 243849-243851, 243853, 499868; FMNH 63182, 63183; LSUMZ 71790; MNRJ 12671, 12678; MPEG 15654, 77036, 77058; RBO 4(1):63, 15(1):50, 22(4):333; RBO+ 11(1):167; WA

Taxa	Locality	Source
Elaenia flavogaster	20LM; 22LM; 34LM; 58LM; 59LM; 77LM; 86LM; 91LM; 135LM; 137LM; 151LM; 161LM; 163LM; 164LM; 169LM; 17IS; 40IS; 41IS; 120IS; 137IS	AMNH 243869, 243891, 243892, 243894, 243897, 243902, 243903; FMNH 63436-63440; MNRJ 13153, 13154, 13157, 13159, 13161, 13163, 13164, 13496; MPEG 15672, 15673, 15701, 15703, 15704, 42158, 42159, 43520, 43521, 50791-50793, 76942; RBO 22(4):333; RBO^{+} 11(1):169; WA
Elaenia spectabilis	91LM; 40IS; 41IS	MPEG 15634, 15635, 15638; WA
Elaenia parvirostris	61LM; 62LM; 110LM; 137LM; 180LM	MPEG 42160, 68352, 68353; RBO 4(1):62
Elaenia cristata	9LM; 22LM; 53LM; 60LM; 91LM; 98LM; 110LM; 111LM; 86LM; 1IS; 11IS; 26IS; 31IS; 39IS; 40IS; 41IS; 49IS; 66IS; 96IS; 117IS; 120IS; 144IS; 153IS	FMNH 63418-63420; FNJV 5009-5011; MPEG 15671; 49774; RBO 4(1):63, 22(4):333; WA
Elaenia chiriquensis	9LM; 38LM; 53LM; 81LM; 172LM; 144IS; 41IS; 49IS	FMNH 63166-63170; FNJV 5015; WA
Suiriri suiriri	31LM; 60LM; 61LM; 77LM; 121LM; 172LM; 41IS; 49IS; 71IS; 120IS	AMNH 243913; FMNH 63431-63435; MPEG 43526-43528; RBO 4(1):63; WA
Suiriri affinis	8IS; 120IS	WA
Myiopagis gaimardii	58LM; 59LM; 64LM; 86LM; 91LM; 138LM; 161LM; 176LM; 1IS; 20IS; 41IS; 49IS; 71IS; 144IS; 153IS	FMNH 63192, 63193; LACM 43386-43388; LSUMZ 71781, 71782; MNRJ 12853, 12860; MPEG 15656, 15657, 15667, 77044; RBO 22(4):333; RBO^{+} 11(1):168; WA
Myiopagis caniceps	58LM; 60LM; 83LM; 91LM; 100LM; 155LM; 169LM; 1IS; 41IS; 120IS; 137IS; 153IS	AMNH 243901; FMNH 63318; LACM 43412; MPEG 37732, 37733, 68292, 76799, 76830, 76910; RBO 15(1):49; WA

Taxa	Locality	Source
Myiopagis viridicata	12LM; 77LM; 86LM; 98LM; 100LM; 109LM; 110LM; 137LM; 155LM; 174LM; 178LM; 17IS; 39IS; 41IS; 89IS; 153IS	MPEG 34908, 37612, 40886, 42210-42217, 43522-43525, 68289-68291; RBO 4(1):62, 15(1):49, 22(4):333; WA
Tyrannulus elatus	86LM; 138LM; 40IS	FMNH 63317; RBO 22(4):333; WA
Capsiempis flaveola	15LM; 22LM; 91LM; 174LM; 184LM; 17IS; 41IS; 153IS	LACM 43365, 43366; MPEG 15663, 37616, 37887-37889, 50709, 50710; WA
Phaeomyias murina	9LM; 20LM; 42LM; 59LM; 60LM; 61LM; 62LM; 81LM; 91LM; 98LM; 101LM; 110LM; 111LM; 142LM; 151LM; 163LM; 169LM; 26IS; 39IS; 40IS; 41IS; 109IS; 143IS; 144IS; 152IS; 153IS	AMNH 243822-243824; FMNH 63184-63188; LACM 43389-43392; MNRJ 13439, 13441, 13445, 13446, 13453; MPEG 15652, 15664, 50794, 54462; RBO 4(1):63, 22(4):333; RBO+ 11(1):167; WA
Phyllomyias fasciatus	9LM; 60LM; 91LM; 100LM; 136LM; 1IS; 39IS; 41IS	FMNH 63201, 63202; LACM 43393-43396; MPEG 15643, 15645, 15653, 15655, 42186, 42380; RBO 15(1):49; WA
Culicivora caudacuta	77LM	MPEG 43519
Pseudocolopteryx sclateri	15IS; 17IS; 103IS	WA
Serpophaga subcristata	NS; 39IS; 41IS	GZ 9:42; WA
Attila cinnamomeus	58LM; 64LM; 91LM; 128LM; 176LM; 7IS; 17IS; 20IS; 40IS; 41IS; 58IS; 72IS; 101IS; 124IS; 133IS; 144IS; 147IS; 153IS	FMNH 63741; FNJV 3655; LACM 43380, 43381; LSUMZ 67381, 71712; MNRJ 5721; MPEG 15723, 77041, 77060; WA; XC
Attila spadiceus	4LM; 40LM; 58LM; 59LM; 86LM; 167LM; 70IS; 41IS; 124IS; 133IS; 153IS	FNJV 3631; MPEG 38540-38544, 68453, 76804; RBO 22(4):333; RBO+ 11(1):168; WA
Legatus leucophaius	40LM; 50LM; 57LM; 59LM; 164LM; 1IS; 39IS; 41IS; 48IS; 144IS; 153IS	AMNH 243919; FMNH 63019; FNJV 3528, 3529; RBO 22(4):333; RBO+ 11(1):170; WA

Taxa	Locality	Source
Ramphotrigon megacephalum	1IS	WA
Ramphotrigon ruficauda	58LM; 86LM; 178LM; 46IS	MPEG 34911, 34912, 76907, 76921, 76924; RBO 22(4):333; WA
Myiarchus tuberculifer	64LM; 86LM; 155LM; 176LM; 1IS; 46IS	FMNH 63061; MPEG 30224, 68502; RBO 22(4):333; WA
Myiarchus swainsoni	9LM; 53LM; 59LM; 86LM; 91LM; 151LM; 15IS; 39IS; 41IS; 46IS; 66IS; 133IS; 153IS	FMNH 63041, 63042; FNJV 3688; LACM 43342, 43345, 43347, 43349, 43351, 43352; MPEG 15632; RBO 22(4):333; RBO+ 11(1):169; WA
Myiarchus ferox	4LM; 11LM; 12LM; 58LM; 59LM; 62LM; 64LM; 71LM; 86LM; 91LM; 163LM; 111LM; 161LM; 160LM; 151LM; 137LM; 3IS; 30IS; 34IS; 35IS; 36IS; 39IS; 40IS; 41IS; 68IS; 71IS; 101IS; 133IS; 143IS; 144IS; 153IS	AMNH 244114; FMNH 63043-63046; LACM 43343, 43344, 43346, 43348, 43350, 43353; LSUMZ 71738-71743; MNRJ 12576-12578, 12580-12582; MPEG 15630, 18018-18020, 38539, 38673, 40881, 42155, 76926, 76951, 76952; RBO 4(1):63, 22(4):333; RBO+ 11(1):169; WA
Myiarchus tyrannulus	98LM; 93LM; 91LM; 86LM; 77LM; 71LM; 62LM; 61LM; 59LM; 34IS; 34LM; 22LM; 15IS; 100LM; 101IS; 109LM; 110LM; 111LM; 121LM; 133IS; 137LM; 153IS; 161LM; 176LM; 8IS; 25IS; 39IS; 41IS; 119IS; 142IS; 144IS	AMNH 244111; FMNH 63036-63039; LACM 43336-43339; MPEG 15626-15629, 15631, 15633, 18013-18017, 42156, 43506, 43507, 49770, 50786; RBO 4(1):63, 15(1):50, 22(4):333; RBO+ 11(1):169; WA; XC
Sirystes sibilator	77LM; 91LM; 100LM; 136LM; 137LM; 140LM; 155LM; 1IS; 27IS; 39IS; 41IS; 46IS; 120IS; 141IS	LACM 43356-43360; MPEG 42031-42034, 42157, 42366, 43503, 68472, 68540; RBO 15(1):50; WA; XC
Rhytipterna simplex	4LM; 58LM; 91LM; 176LM; 176LM; 177LM	FMNH 63761; LACM 43089; MNRJ 6058, 6062; MPEG 38417, 76843

Taxa	Locality	Source
Casiornis rufus	14LM; 15LM; 38LM; 91LM; 174LM; 41IS; 89IS; 101IS; 112IS; 153IS	FMNH 63742-63744; LACM 43382; MPEG 37617, 37618, 37886, 40900; WA
Casiornis fuscus	9LM; 12LM; 23LM; 86LM; 91LM; 110LM; 121LM; 133LM; 136LM; 151LM; 158LM; 168LM; 25IS; 34IS; 39IS; 41IS; 64IS; 101IS; 133IS; 144IS; 153IS	AMNH 244361; FMNH 63759, 63760; LACM 43383-43385; MNRJ 6006-6008; MPEG 40898, 40899, 42368, 50782, 68471; Pinto (1944) 2:23; RBO 4(1):63, 22(4):333; WA
Pitangus sulphuratus	12LM; 20LM; 23LM; 42LM; 45LM; 55LM; 58LM; 59LM; 61LM; 62LM; 64LM; 71LM; 77LM; 91LM; 93LM; 98LM; 100LM; 101LM; 110LM; 121LM; 133LM; 136LM; 138LM; 151LM; 162LM; 164LM; 169LM; 182LM; 1IS; 8IS; 15IS; 17IS; 25IS; 26IS; 39IS; 40IS; 41IS; 46IS; 61IS; 66IS; 70IS; 72IS; 79IS; 94IS; 95IS; 101IS; 103IS; 108IS; 131IS; 133IS; 137IS; 139IS; 143IS; 144IS; 153IS; 160IS; 165IS	AMNH 243953, 243954, 243962-243972; FMNH 63063, 63064; LACM 43214, 43217, 43219, 43220, 43222-43224, 43226; LSUMZ 67503, 67504, 71737; MNRJ 7951; MPEG 15681-15685, 40874, 40875, 42149-42152, 42367, 43505, 50778-50781, 76975; Pinto (1944) 2:164; RBO 4(1):63, 15(1):50, 22(4):333; RBO+ 11(1):169; WA
Philohydor lictor	16LM; 50LM; 59LM; 91LM; 140LM; 146LM; 161LM; 182LM; 7IS; 17IS; 31IS; 34IS; 40IS; 41IS; 50IS; 101IS; 123IS; 153IS	AMNH 243952; FMNH 63062; FNJV 3627; LACM 43238, 43239; MNRJ 10628; MPEG 42030; Pinto (1944) 2:166; RBO+ 11(1):169; WA; XC
Machetornis rixosa	20LM; 22LM; 37LM; 60LM; 86LM; 98LM; 100LM; 121LM; 128LM; 146LM; 152LM; 6IS; 9IS; 17IS; 20IS; 25IS; 32IS; 40IS; 41IS; 49IS; 61IS; 68IS; 71IS; 74IS; 84IS; 90IS; 101IS; 110IS; 125IS; 127IS; 131IS; 136IS; 139IS; 149IS; 153IS; 163IS	AMNH 243619; FMNH 63005, 63008, 63009; FNJV 3483; MPEG 49772, 50784; Pinto (1944) 2:130; RBO 15(1):50, 22(4):333; WA

Taxa	Locality	Source
Myiodynastes maculatus	1IS; 10IS; 15IS; 17IS; 23IS; 25IS; 27IS; 40IS; 41IS; 59IS; 71IS; 101IS; 120IS; 133IS; 137IS; 144IS; 149IS; 153IS; 4LM; 12LM; 14LM; 38LM; 44LM; 50LM; 55LM; 57LM; 59LM; 61LM; 62LM; 83LM; 84LM; 89LM; 91LM; 95LM; 98LM; 100LM; 110LM; 137LM; 151LM; 155LM; 164LM; 169LM; 178LM	AMNH 243984-243987; FMNH 62996-62999; FNJV 3576; LACM 43241-43243; MPEG 2525; 34921; 37426; 37721; 38545; 40876-40880; 42153; 50789; 68538; 68539; Pinto (1944) 2:148; RBO 4(1):63, 15(1):50, 22(4):333; RBO+ 11(1):169; WA
Tyrannopsis sulphurea	86LM; 91LM; 160LM; 164LM; 3IS; 8IS; 17IS; 26IS; 40IS; 41IS; 48IS; 133IS; 143IS; 144IS; 153IS	AMNH 244014; LACM 46346; MPEG 15702; RBO 22(4):333; WA; XC
Megarynchus pitangua	9LM; 12LM; 14LM; 15LM; 31LM; 59LM; 61LM; 62LM; 86LM; 91LM; 98LM; 100LM; 109LM; 110LM; 111LM; 121LM; 133LM; 138LM; 140LM; 154LM; 155LM; 169LM; 174LM; 176LM; 1IS; 3IS; 23IS; 25IS; 34IS; 39IS; 40IS; 41IS; 59IS; 70IS; 77IS; 120IS; 133IS; 149IS; 153IS	AMNH 244005-244008; FMNH 63029-63031; LACM 43206-43216, 43218, 43221, 43225; MNRJ 7864; MPEG 15674, 15676-15679, 37625, 37885, 40872, 40873, 42028, 42029, 68503; Pinto (1944) 2:152; RBO 4(1):63, 15(1):50, 22(4):333; RBO+ 11(1):169; WA
Myiozetetes cayanensis	93LM; 91LM; 89LM; 86LM; 83LM; 64LM; 61LM; 59LM; 58LM; 53LM; 45LM; 34LM; 163LM; 128LM; 100LM; 151LM; 160LM; 169LM; 176LM; 1IS; 17IS; 23IS; 25IS; 26IS; 31IS; 34IS; 39IS; 40IS; 41IS; 46IS; 48IS; 59IS; 68IS; 94IS; 98IS; 101IS; 126IS; 135IS; 144IS; 149IS; 153IS	AMNH 243949-243951; FMNH 63028; FNJV 3594-3596; LACM 43227-43237; LSUMZ 71734; MNRJ 10734, 10746, 10747; MPEG 15690, 15691, 15695-15698, 18021, 30489, 37722, 50785, 76947, 76966; Pinto (1944) 2:22; RBO 4(1):63, 15(1):50, 22(4):333; RBO+ 11(1):169; WA
Myiozetetes similis	58LM; 59LM; 60LM; 61LM; 62LM; 64LM; 64LM; 86LM; 91LM; 91LM; 91LM; 93LM; 98LM; 111LM; 121LM; 137LM; 138LM; 17IS; 26IS; 34IS; 39IS; 41IS; 101IS; 144IS	FMNH 63025, 63027; LSUMZ 71735, 71736; MPEG 15689, 15692-15694, 42154, 77039; RBO 4(1):63, 22(4):333; RBO+ 11(1):169; WA

Taxa	Locality	Source
Tyrannus albogularis	39IS; 17IS	WA
Tyrannus melancholicus	7LM; 20LM; 45LM; 59LM; 61LM; 64LM; 71LM; 77LM; 86LM; 91LM; 93LM; 98LM; 100LM; 109LM; 110LM; 121LM; 146LM; 151LM; 160LM; 161LM; 168LM; 169LM; 1IS; 15IS; 17IS; 23IS; 25IS; 26IS; 31IS; 39IS; 40IS; 41IS; 46IS; 48IS; 55IS; 66IS; 70IS; 74IS; 80IS; 94IS; 114IS; 120IS; 131IS; 133IS; 134IS; 139IS; 143IS; 144IS; 160IS	AMNH 244227-244231, 244233-244238; FMNH 63010, 63011, 63012, 295796, 295797; LACM 43328-43335; LSUMZ 71733; MPEG 15617, 15618, 15620-15625, 43504, 50783; Pinto (1944) 2:138; RBO 4(1):63, 15(1):50, 22(4):333; RBO+ 11(1):169; WA
Tyrannus savana	61LM; 86LM; 98LM; 151LM; 3IS; 15IS; 15IS; 23IS; 25IS; 39IS; 41IS; 120IS; 139IS; 144IS	FMNH 63000; RBO 22(4):334, 4(1):63; WA
Griseotyrannus aurantioatrocristatus	1IS; 3IS; 17IS; 25IS; 39IS; 41IS; 49IS; 62IS; 101IS; 133IS; 143IS; 144IS; 153IS; 33LM; 60LM; 61LM; 62LM; 91LM; 98LM; 111LM; 121LM; 152LM; 161LM; 163LM	AMNH 244168; FMNH 56654, 63014-63018; LACM 43252-43271; MNRJ 12968; MPEG 15636, 15637, 50790; RBO 4(1):63; WA
Empidonomus varius	50LM; 59LM; 62LM; 81LM; 86LM; 89LM; 91LM; 100LM; 110LM; 111LM; 121LM; 161LM; 163LM; 176LM; 1IS; 3IS; 25IS; 31IS; 39IS; 40IS; 41IS; 46IS; 58IS; 59IS; 133IS; 137IS; 143IS; 144IS; 153IS	AMNH 496368, 496369; FMNH 62988-62990; FNJV 3521; LACM 43251; MNRJ 12424, 12426, 12427; MPEG 8264; RBO 15(1):50, 22(4):334, 4(1):63; RBO+ 11(1):169; WA
Conopias trivirgatus	NS	GZ 9:39
Colonia colonus	4LM; 59LM; 86LM; 135LM; 136LM; 154LM; 1IS; 8IS; 30IS; 48IS	AMNH 243608-243612; MPEG 38537, 38538, 42364, 42365; RBO 22(4):334; RBO+ 11(1):169; WA

Taxa	Locality	Source
Myiophobus fasciatus	9LM; 20LM; 22LM; 58LM; 59LM; 64LM; 86LM; 151LM; 163LM; 172LM; 1IS; 17IS; 25IS; 41IS; 71IS; 101IS; 153IS	FMNH 63154-63159; LSUMZ 71755-71757; MNRJ 9992, 13621-13623; MPEG 49775, 54468, 76994, 77018; RBO 22(4):334; RBO^{+} 11(1):167; WA
Sublegatus modestus	9LM; 91LM; 111LM; 172LM; 41IS; 49IS	FMNH 63323, 63324, 63442; LACM 43400-43407; RBO 4(1):63; WA
Pyrocephalus rubinus	91LM	LACM 43323-43327
Fluvicola albiventer	91LM; 146LM; 8IS; 17IS; 23IS; 25IS; 41IS; 55IS; 64IS; 101IS; 143IS; 153IS	LACM 43303-43306; Pinto (1944) 2:122; WA
Fluvicola nengeta	38LM; 45LM; 58LM; 59LM; 60LM; 62LM; 77LM; 86LM; 122LM; 142LM; 144LM; 154LM; 168LM; 169LM; 1IS; 6IS; 15IS; 20IS; 32IS; 34IS; 39IS; 41IS; 48IS; 61IS; 72IS; 92IS; 98IS; 101IS; 103IS; 127IS; 153IS; 159IS	AMNH 243552-243554, 243562-243570, 244323; FMNH 63022-63024; MPEG 76796, 76801, 76995; RBO 15(1):50, 22(4):334, 4(1):63; RBO^{+} 11(1):167; WA
Arundinicola leucocephala	45LM; 47LM; 77LM; 86LM; 91LM; 146LM; 168LM; 176LM; 3IS; 15IS; 17IS; 22IS; 31IS; 41IS; 58IS; 101IS; 103IS; 106IS; 120IS; 123IS; 127IS; 132IS; 153IS	AMNH 243589-243593; FMNH 62968; LACM 43302; UMMZ 87457; Pinto (1944) 2:124; RBO 15(1):50, 22(4):334; WA
Cnemotriccus fuscatus	12LM; 34LM; 38LM; 60LM; 64LM; 77LM; 81LM; 86LM; 89LM; 100LM; 136LM; 137LM; 151LM; 155LM; 169LM; 172LM; 174LM; 25IS; 39IS; 41IS; 86IS; 101IS; 102IS; 106IS; 133IS; 144IS; 153IS	AMNH 244084, 497815, 497816; FMNH 63047-63056; LSUMZ 71744-71751; MNRJ 10000, 12996, 13601, 13604, MPEG 37619, 37620, 40882-40885, 42223-42225, 42371, 43512, 50787, 50788, 68440; Pinto (1944) 2:186; RBO 15(1):50; 22(4):334; WA

Taxa	Locality	Source
Lathrotriccus euleri	14LM; 36LM; 59LM; 83LM; 86LM; 136LM; 167LM; 169LM; 178LM; 1IS; 6IS; 7IS; 8IS; 28IS; 41IS; 46IS; 89IS; 101IS; 153IS	AMNH 244092; MPEG 34920, 37727, 40891, 40892, 42369, 42370, 43511, 68447-68452; RBO 22(4):334; RBO^+ 11(1):168; WA; XC
Contopus cinereus	9LM; 39LM; 77LM; 100LM; 131LM; 154LM; 168LM; 169LM; 39IS; 46IS; 48IS	AMNH 244097-244100, 244110; FMNH 63059, 63060; MPEG 43508-43510; RBO 15(1):50; WA
Contopus nigrescens	57LM; 1IS; 46IS	RBO 22(4):334; WA
Knipolegus lophotes	NS	GZ 9:37
Satrapa icterophrys	41IS; 91LM	MPEG 15890; WA
Xolmis cinereus	36LM; 60LM; 133LM; 146LM; 8IS; 41IS; 57IS; 95IS	AMNH 495103; FMNH 63003, 63004; MPEG 43501; Pinto (1944):104; WA
Xolmis velatus	60LM; 77LM; 41IS; 120IS	FMNH 63001; 63002; MPEG 43502; WA
VIREONIDAE		
Cyclarhis gujanensis	9LM; 12LM; 15LM; 38LM; 59LM; 60LM; 61LM; 62LM; 64LM; 83LM; 86LM; 91LM; 98LM; 100LM; 101LM; 110LM; 111LM; 136LM; 137LM; 140LM; 146LM; 151LM; 160LM; 161LM; 163LM; 167LM; 169LM; 172LM; 176LM; 1IS; 3IS; 20IS; 22IS; 25IS; 27IS; 39IS; 40IS; 41IS; 120IS; 131IS; 133IS; 144IS; 153IS	AMNH 244705-244716; FMNH 62793-62801; LACM 43516; LSUMZ 71828-71830; MNRJ 15889, 15890; MPEG 37734, 37940, 37941, 40935, 42054, 42182, 42397, 68599; Pinto (1944) 2:392; RBO 4(1):64, 15(1):51, 22(4):334; RBO+ 11(1):167; WA
Hylophilus pectoralis	16LM; 22LM; 59LM; 60LM; 64LM; 86LM; 91LM; 121LM; 138LM; 163LM; 176LM; 1IS; 7IS; 17IS; 20IS; 26IS; 34IS; 39IS; 40IS; 41IS; 58IS; 84IS; 101IS; 103IS; 119IS; 131IS; 137IS; 139IS; 143IS; 144IS; 147IS;	FMNH 62774-62780; LSUMZ 71837-71840; MNRJ 16071, 16073-16075, 16077-16079; MPEG 15662, 15893, 49778, 50804; RBO 22(4):334, 4(1):64; RBO^+ 11(1):167; WA; XC

Taxa	Locality	Source
	153IS	
Hylophilus semicinereus	86LM; 128LM; 176LM; 177LM; 1IS; 34IS; 46IS	FMNH 62758; FNJV 6309; MNRJ 16068-16070; RBO 22(4):334; WA
Tunchiornis ochraceiceps	52LM; 58LM; 178LM	MPEG 34990, 36984-36986, 76960
Vireo olivaceus	38LM; 53LM; 59LM; 60LM; 61LM; 62LM; 64LM; 89LM; 91LM; 98LM; 100LM; 110LM; 111LM; 138LM; 160LM; 161LM; 163LM; 164LM; 169LM; 172LM; 174LM; 176LM; 178LM	AMNH 244657-244668; FMNH 62749-62756; FNJV 6248; LACM 43598-43606; LSUMZ 67660-67664, 71831-71836; MNRJ 16056, 16057, 16062, 16063, 16065; MPEG 8236-8238, 34989, 37627; RBO 4(1):64, 15(1):51; RBO+ 11(1):167
Vireo chivi	77LM; 91LM; 86LM; 137LM; 140LM; 155LM; 3IS; 20IS; 23IS; 25IS; 31IS; 39IS; 41IS; 48IS; 66IS; 71IS; 120IS; 132IS; 133IS; 143IS; 144IS; 153IS	MPEG 15873-15879, 42055, 42056, 42183, 43548, 43549, 68596-68598; RBO 22(4):334; WA
CORVIDAE		
Cyanocorax cristatellus	9LM; 30LM; 77LM; 110LM; 112LM; 121LM; 8IS; 23IS; 39IS; 41IS; 77IS; 151IS; 153IS	FMNH 62844-62847; FNJV 5486; MPEG 6877, 43530, 43531; RBO 4(1):64; WA
Cyanocorax cyanopogon	7LM; 15LM; 34LM; 53LM; 60LM; 61LM; 62LM; 83LM; 86LM; 89LM; 91LM; 92LM; 93LM; 98LM; 100LM; 109LM; 121LM; 133LM; 138LM; 144LM; 154LM; 155LM; 168LM; 23IS; 25IS; 39IS; 41IS; 59IS; 62IS; 101IS; 120IS; 124IS; 131IS; 139IS; 144IS; 153IS	AMNH 245894-245900; FMNH 53662, 62848-62854; FNJV 5525; LACM 43433-43435; LSUMZ 67585-67587; MPEG 15931, 15932, 17965, 37744, 37925, 37926, 54490, 68607; Pinto (1944) 2:327; RBO 4(1):64, 15(1):51, 22(4):334; WA

Taxa	Locality	Source
HIRUNDINIDAE		
Pygochelidon cyanoleuca	100LM; 41IS; 90IS; 160IS	RBO 15(1):51; WA
Pygochelidon melanoleuca	93LM	MPEG 15570, 15571
Stelgidopteryx ruficollis	12LM; 34LM; 53LM; 58LM; 59LM; 64LM; 86LM; 91LM; 100LM; 110LM; 121LM; 154LM; 164LM; 169LM; 172LM; 1IS; 6IS; 17IS; 31IS; 35IS; 39IS; 40IS; 41IS; 49IS; 70IS; 71IS; 125IS; 133IS; 136IS; 144IS; 147IS; 153IS	AMNH 244455-244460; FMNH 62821; FNJV 5352; LACM 43426-43430; LSUMZ 71801, 71802; MPEG 8239, 40936, 40937, 50803, 76993; RBO 4(1):64, 15(1):51, 22(4):334; RBO+ 11(1):166; WA
Progne tapera	42LM; 59LM; 91LM; 93LM; 151LM; 7IS; 17IS; 40IS; 41IS; 49IS; 153IS	FMNH 62803; LACM 43431, 43432; MNRJ 4500, 4501; MPEG 15572; RBO 22(4):334; RBO$^+$ 11(1):166; WA; XC
Progne subis	91LM; 1IS	LACM 43420; WA
Progne chalybea	42LM; 59LM; 62LM; 91LM; 109LM; 110LM; 121LM; 143LM; 174LM; 184LM; 1IS; 3IS; 17IS; 20IS; 21IS; 25IS; 26IS; 39IS; 40IS; 41IS; 46IS; 58IS; 70IS; 84IS; 94IS; 166IS; 160IS; 153IS; 144IS; 143IS; 133IS; 132IS; 123IS; 119IS; 118IS; 116IS; 101IS	FNJV 5279; LACM 43418, 43419; MPEG 15573, 18006, 37626, 50798, 50799; RBO 4(1):64, 15(1):51, 22(4):334; RBO+ 11(1):166; WA
Tachycineta albiventer	45LM; 47LM; 59LM; 77LM; 89LM; 133LM; 144LM; 176LM; 1IS; 3IS; 6IS; 15IS; 18IS; 23IS; 25IS; 26IS; 34IS; 35IS; 40IS; 41IS; 55IS; 70IS; 72IS; 79IS; 90IS; 153IS; 144IS; 143IS; 139IS; 131IS; 119IS; 110IS; 160IS	AMNH 244386-244390, 500742, 500743; FMNH 62802; Pinto (1944) 2:324; RBO 15(1):51; RBO$^+$ 11(1):166; WA
Hirundo rustica	77LM; 15IS; 17IS; 25IS; 41IS; 76IS; 103IS; 119IS; 123IS; 144IS	AMNH 244394-244402; WA

Taxa	Locality	Source
TROGLODYTIDAE		
Microcerculus marginatus	4LM; 11LM; 52LM; 59LM; 46IS	MPEG 36987, 38555, 38689; RBO+ 11(1):168; WA
Troglodytes musculus	58LM; 59LM; 60LM; 62LM; 64LM; 89LM; 91LM; 98LM; 100LM; 101LM; 110LM; 111LM; 121LM; 128LM; 146LM; 160LM; 161LM; 163LM; 164LM; 175LM; 178LM; 1IS; 23IS; 25IS; 26IS; 39IS; 40IS; 41IS; 46IS; 47IS; 48IS; 54IS; 55IS; 62IS; 70IS; 72IS; 93IS; 95IS; 101IS; 119IS; 120IS; 133IS; 137IS; 139IS; 143IS; 144IS; 153IS; 154IS; 155IS	AMNH 244536-244546, 502204; FMNH 62714-62718; FNJV 4485, 4486, 5722, 5723; LACM 43505-43509; LSUMZ 71812-71815; MNRJ 16382, 16389; MPEG 8235, 15767, 15768, 18036, 34983, 76930; Pinto (1944) 2:348; RBO 4(1):64, 15(1):51; RBO+ 11(1):167; WA
Campylorhynchus turdinus	4LM; 12LM; 38LM; 52LM; 59LM; 83LM; 91LM; 92LM; 1IS; 17IS; 31IS; 34IS; 59IS; 72IS; 124IS	FMNH 62683, 62684; LACM 43471-43485; LSUMZ 67592, 67593; MPEG 15796-15798, 18037-18039, 36982, 36983, 37740, 37741, 38557, 40928-40930; RBO+ 11(1):167; WA
Pheugopedius genibarbis	9LM; 11LM; 14LM; 15LM; 40LM; 44LM; 51LM; 53LM; 58LM; 59LM; 60LM; 64LM; 83LM; 89LM; 91LM; 100LM; 128LM; 136LM; 138LM; 142LM; 143LM; 144LM; 146LM; 151LM; 161LM; 162LM; 163LM; 164LM; 167LM; 173LM; 176LM; 177LM; 178LM; 1IS; 7IS; 17IS; 20IS; 25IS; 41IS; 101IS; 120IS; 132IS; 137IS; 143IS; 144IS; 147IS; 149IS; 153IS	AMNH 244516-244523, 502730, 502731; FMNH 62706-62713; FNJV 4967, 4969, 4970, 4975, 5594, 5596, 5597, 5602; LACM 43495-43501; LSUMZ 71803-71810; MNRJ 16575-16578, 16580-16582, 16584, 16589; MPEG 30488, 34828, 34982, 37410-37412; 37737-37739, 37931, 38690, 38691, 40932, 40933, 42388-42391, 68619-68621, 76934, 76944, 76965; Pinto (1944) 2:341; RBO 15(1):51; RBO+ 11(1):168; WA; XC

Taxa	Locality	Source
Cantorchilus leucotis	9LM; 34LM; 59LM; 62LM; 64LM; 81LM; 110LM; 152LM; 176LM; 7IS; 3IS; 17IS; 20IS; 34IS; 39IS; 41IS; 70IS; 71IS; 95IS; 124IS; 132IS; 153IS	FMNH 62695-62699, 62701-62705; LSUMZ 71811; MNRJ 16619, 16621-16623; MPEG 50801, 50802; RBO 4(1):64; RBO+11(1):167; WA; XC
Cantorchilus longirostris	61LM; 62LM; 110LM; 111LM; 121LM	RBO 4(1):64
DONACOBIIDAE		
Donacobius atricapilla	14LM; 15LM; 20LM; 23LM; 58LM; 59LM; 91LM; 122LM; 131LM; 133LM; 138LM; 140LM; 176LM; 1IS; 17IS; 25IS; 30IS; 31IS; 34IS; 41IS; 46IS; 50IS; 68IS; 75IS; 101IS; 103IS; 104IS; 106IS; 120IS; 127IS; 130IS; 153IS; 165IS	AMNH 244598-244601; FMNH 62668-62670; LACM 43436, 43437; MPEG 6869, 15933, 37930, 40934, 42053, 50829, 50830, 77052; Pinto (1944) 2:360; RBO+ 11(1):167; WA
POLIOPTILIDAE		
Ramphocaenus melanurus	4LM; 59LM; 64LM; 83LM; 89LM; 176LM; 177LM; 1IS; 34IS; 41IS; 86IS; 101IS; 133IS; 147IS	AMNH 490948; LSUMZ 71824-71827; MNRJ 16755, 16758; MPEG 37742, 38556; RBO+ 11(1):168; WA
Polioptila plumbea	38LM; 59LM; 60LM; 61LM; 62LM; 81LM; 89LM; 91LM; 98LM; 100LM; 109LM; 110LM; 111LM; 121LM; 168LM; 176LM; 1IS; 8IS; 15IS; 23IS; 25IS; 26IS; 31IS; 39IS; 40IS; 41IS; 89IS; 101IS; 133IS; 139IS; 141IS; 152IS; 153IS	AMNH 244480, 503036; FMNH 62727-62735; LACM 43607; RBO 4(1):64, 15(1):51; RBO+ 11(1):167; WA; XC
Polioptila paraensis	58LM	MPEG 76962
Polioptila dumicola	77LM; 91LM; 39IS	MPEG 15856, 43546, 43547; WA
TURDIDAE		

Taxa	Locality	Source
Turdus leucomelas	9LM; 12LM; 15LM; 28LM; 30LM; 36LM; 59LM; 60LM; 61LM; 62LM; 64LM; 77LM; 81LM; 83LM; 89LM; 91LM; 92LM; 97LM; 98LM; 100LM; 109LM; 110LM; 111LM; 121LM; 136LM; 137LM; 140LM; 151LM; 155LM; 158LM; 161LM; 163LM; 174LM; 1IS; 8IS; 15IS; 25IS; 39IS; 40IS; 41IS; 48IS; 59IS; 62IS; 70IS; 120IS; 133IS; 144IS; 153IS	FMNH 62663-62667, 295844; FNJV 4535, 5996; LACM 43447-43458; LSUMZ 67640-67642, 71816-71820; MNRJ 16723, 16724, 16726, 16728, 16731, 16736; MPEG 8233, 8234, 15934-15936, 17986-17995, 30480, 36875, 36876, 37633-37736, 37915-37924, 40920-40922, 42047-42052, 42187-42194, 42392-42395, 43537-43544, 45077, 50825, 68640-68645; Pinto (1944) 2:374; RBO 4(1):64, 15(1):51; RBO+ 11(1):170; WA
Turdus fumigatus	12LM; 51LM; 58LM; 59LM; 64LM; 91LM; 174LM; 176LM; 178LM; 17IS; 25IS; 103IS; 144IS	FMNH 62656, 62657; LACM 43465-43470; LSUMZ 71821; MNRJ 16256, 16713;, MPEG 34830-34832, 34984, 34985, 37628-37632, 40923-40927, 76996; RBO+ (1):170; WA
Turdus rufiventris	60LM; 62LM; 110LM; 153IS	FMNH 62658; RBO 4(1):64; WA
Turdus nudigenis	12LM; 59LM; 64LM; 91LM; 97LM; 163LM; 171LM; 176LM; 177LM; 17IS; 25IS; 34IS; 70IS; 101IS; 144IS	LACM 43438-43444; LSUMZ 71822, 71823; MNRJ 16714-16716; MPEG 36874, 40917-40919; 66153; RBO+ 11(1):170; WA
Turdus amaurochalinus	44LM; 59LM; 77LM; 91LM; 133LM; 136LM; 161LM; 25IS; 41IS; 101IS; 112IS; 143IS; 153IS; 160IS	FMNH 62662; LACM 43445; MPEG 37458, 42396, 43545; Pinto (1944) 2:371; RBO+ 11(1):169; WA
Turdus albicollis	51LM; 40LM; 91LM; 171LM; 176LM; 178LM	FNJV 6080; LACM 43446; MNRJ 16662; MPEG 34829, 34986-34988, 66152
MIMIDAE		
Mimus gilvus	65LM; 89LM; 128LM; 146LM; 3IS; 26IS; 40IS; 66IS; 119IS; 144IS	FMNH 62681, 62682; FNJV 5810; Pinto (1944) 2:354; WA

Taxa	Locality	Source
Mimus saturninus	14LM; 15LM; 22LM; 33LM; 34LM; 50LM; 59LM; 60LM; 77LM; 79LM; 81LM; 146LM; 152LM; 1IS; 26IS; 39IS; 41IS; 48IS; 59IS; 70IS; 77IS; 120IS; 139IS; 153IS; 160IS	FMNH 62672-62680; FNJV 5821; MPEG 37927, 37928, 40931-43536; 50834-50836; Pinto (1944) 2:355; RBO+ 11(1):169; WA
MOTACILLIDAE		
Anthus lutescens	47LM; 65LM; 146LM; 151LM; 164LM; 17IS; 20IS; 22IS; 25IS; 26IS; 31IS; 41IS; 58IS; 92IS; 103IS; 119IS; 131IS; 144IS	AMNH 244765-244771, 500416; FMNH 62804-62806; MNRJ 14168-14170; WA
PASSERELLIDAE		
Zonotrichia capensis	60LM; 77LM; 79LM; 81LM; 101LM; 128LM; 168LM; 8IS; 23IS; 39IS; 41IS; 101IS; 120IS; 133IS	AMNH 245055, 245056; FMNH 63685-63688; FNJV 7507, 7515; MPEG 43632, 43633; WA
Ammodramus humeralis	60LM; 91LM; 146LM; 151LM; 172LM; 17IS; 26IS; 37IS; 39IS; 40IS; 41IS; 102IS; 112IS; 116IS; 117IS; 123IS; 127IS; 133IS; 152IS; 163IS	FMNH 63695-63700; LACM 43797; MNRJ 15124, 15130, 15138; Pinto (1944) 2:656; WA
Ammodramus aurifrons	NS; 34IS; 40IS; 46IS; 59IS	GZ 9:51; WA
Arremon taciturnus	4LM; 9LM; 11LM; 12LM; 14LM; 15LM; 16LM; 33LM; 36LM; 44LM; 51LM; 52LM; 58LM; 59LM; 62LM; 64LM; 81LM; 83LM; 91LM; 97LM; 100LM; 109LM; 110LM; 111LM; 133LM; 136LM; 140LM; 151LM; 167LM; 174LM; 176LM; 1IS; 71IS; 37IS; 41IS; 39IS; 20IS; 17IS; 56IS; 153IS; 149IS; 147IS; 144IS; 141IS; 133IS; 101IS	FMNH 63593-63596; LACM 43814-43820; LSUMZ 71895; MNRJ 10802, 10804, 10806, 10807, 10811; MPEG 34843-34846, 36878-36880, 36989-36991, 37447-37450, 37654-37657, 37755-37759, 37958-37963, 38558, 38559, 38700, 38701, 40957-40961, 42077-42079, 42436-42439, 43631, 50809, 50810, 68840, 76903, 76908; Pinto (1944) 2:652; RBO 4(1):65, 15(1):51, RBO+

Taxa	Locality	Source
		11(1):171; WA; XC
Arremon flavirostris	6LM; 7LM; 89LM; 144LM; 154LM; 168LM	AMNH 245165-245173, 520250, 520251; MNRJ 245171
PARULIDAE		
Setophaga pitiayumi	77LM; 100LM; 140LM; 172LM; 8IS; 144IS	FMNH 62757; MPEG 42059, 42060, 43551; RBO 15(1):51; WA
Geothlypis aequinoctialis	2LM; 59LM; 39IS	MPEG 22071; RBO+ 11(1):167; WA
Basileuterus culicivorus	9LM; 12LM; 14LM; 15LM; 36LM; 77LM; 81LM; 83LM; 91LM; 136LM; 140LM; 152LM; 172LM; 23IS; 39IS; 41IS; 56IS; 102IS; 120IS	CM P136670, P136671; FMNH 62762-62764, 62766-62773; LACM 43584-43589, 43591, 43592; MPEG 15852, 37749-37753, 37946-37957, 40938-40940, 42057, 42058, 42209, 42409-42416, 43564-43572; WA
Myiothlypis flaveola	9LM; 15LM; 36LM; 38LM; 59LM; 61LM; 64LM; 77LM; 83LM; 89LM; 98LM; 100LM; 109LM; 110LM; 111LM; 137LM; 136LM; 154LM; 155LM; 169LM; 172LM; 120IS; 25IS; 41IS; 133IS; 153IS; 101IS; 27IS; 152IS	AMNH 244750, 244751, 244753, 244754, 505610; FMNH 62736-62742; LSUMZ 71844, 71845; MPEG 37745-37748, 37942-37945, 42205-42208, 42399-42408, 43552-43563, 68683, 68684; RBO 4(1):65, 15(1):51; RBO+ 11(1):168; WA
Myiothlypis mesoleuca	NS; 177LM	GZ 9:47; MNRJ 14434
ICTERIDAE		
Psarocolius viridis	40LM; 30IS	FNJV 6364, 6365; WA

Taxa	Locality	Source
Psarocolius decumanus	15LM; 59LM; 61LM; 62LM; 83LM; 84LM; 89LM; 91LM; 98LM; 100LM; 111LM; 121LM; 124LM; 133LM; 146LM; 174LM; 1IS; 3IS; 15IS; 20IS; 25IS; 39IS; 40IS; 41IS; 62IS; 106IS; 112IS; 120IS; 132IS; 133IS; 139IS; 151IS; 153IS; 161IS	LACM 43612; MPEG 2521-2523, 6878, 6879, 8258, 23444, 37636-37639, 37754, 37929; Pinto (1944) 2:548; RBO 4(1):65, 15(1):51; RBO+ 11(1):171; WA
Psarocolius bifasciatus	11LM; 58LM; 1IS	MPEG 38707, 38708, 76892, 76954; WA
Procacicus solitarius	NS; 151LM; 15IS; 17IS; 84IS	GZ 9:46; MNRJ 11198, 11403; WA
Cacicus haemorrhous	121LM; 1IS	RBO 4(1):65; WA
Cacicus cela	12LM; 39LM; 40LM; 59LM; 61LM; 62LM; 64LM; 89LM; 91LM; 111LM; 121LM; 122LM; 133LM; 137LM; 142LM; 144LM; 151LM; 174LM; 176LM; 15IS; 17IS; 25IS; 26IS; 30IS; 39IS; 40IS; 41IS; 43IS; 48IS; 58IS; 66IS; 70IS; 101IS; 103IS; 120IS; 126IS; 147IS; 153IS; 160IS	AMNH 245734-245744; FMNH 63380; FNJV 4460, 6379; LACM 43619-43628; MNRJ 15943, 15946; MPEG 8259-8261, 15717-15719, 17963, 37644-37647, 40965, 42195; UMMZ 88601; ZUEC 715; RBO 4(1):65; RBO^{+} 11(1):171; WA
Icterus cayanensis	9LM; 34LM; 59LM; 64LM; 89LM; 91LM; 121LM; 133LM; 136LM; 138LM; 140LM; 146LM; 39IS; 77IS	AMNH 521599; FMNH 63373, 63374; LACM 43634-43640; LSUMZ 71841-71843; MPEG 8262, 8263, 42061, 42062, 42398, 50842; Pinto (1944) 2:568; RBO 4(1):65; RBO^{+} 11(1):171; WA
Icterus jamacaii	11LM; 12LM; 38LM; 44LM; 59LM; 60LM; 62LM; 91LM; 111LM; 124LM; 174LM; 1IS; 25IS; 31IS; 34IS; 41IS; 48IS; 62IS; 72IS; 93IS; 101IS; 116IS; 120IS; 124IS; 136IS; 151IS; 164IS	FMNH 63388-63390; LACM 43613-43618; MPEG 6880-6885, 17964, 37455, 37640-37643, 38705, 40963, 40964; RBO 4(1):65; RBO^{+} 11(1):170; WA
Gnorimopsar chopi	36LM; 59LM; 60LM; 60LM; 100LM; 23IS;	FMNH 63375, 63376; MPEG 43550; RBO

Taxa	Locality	Source
	39IS; 41IS; 49IS; 77IS; 153IS; 120IS	15(1):51; RBO+ 11(1):171; WA
Agelasticus cyanopus	NS; 151LM	GZ 9:47; MNRJ 15792
Chrysomus ruficapillus	54LM; 62LM; 151LM; 17IS; 29IS; 41IS; 50IS; 58IS; 75IS; 101IS; 120IS; 123IS; 160IS; 163IS	FMNH 63395; MNRJ 15786, 15787, 15791; MPEG 54853-54864; RBO 4(1):65; WA
Molothrus oryzivorus	59LM; 174LM; 1IS; 17IS; 25IS; 34IS; 39IS; 41IS; 58IS; 70IS; 72IS; 101IS; 103IS; 139IS; 144IS; 153IS	MPEG 37635; RBO+ 11(1):171; WA
Molothrus bonariensis	37LM; 77LM; 89LM; 91LM; 133LM; 151LM; 1IS; 6IS; 7IS; 17IS; 25IS; 31IS; 39IS; 41IS; 46IS; 55IS; 58IS; 70IS; 94IS; 116IS; 119IS; 127IS; 133IS; 139IS; 144IS; 153IS	AMNH 245768-245772; FMNH 63400; LACM 43629-43633; MVZ 108818; Pinto (1944) 2:562; WA
Sturnella militaris	71LM; 77LM; 85LM; 114LM; 132LM; 133LM; 151LM; 176LM; 1IS; 9IS; 10IS; 17IS; 20IS; 22IS; 31IS; 34IS; 46IS; 48IS; 55IS; 58IS; 62IS; 70IS; 71IS; 72IS; 90IS; 106IS; 108IS; 116IS; 119IS; 123IS; 125IS; 126IS; 127IS; 131IS; 137IS; 144IS; 146IS; 147IS; 164IS	AMNH 245808-245818; FMNH 63381-63387; MNRJ 11453, 11456, 11463, 11464; MPEG 2524; UMMZ 89497; RBO 15(3):449; WA
Sturnella superciliaris	91LM; 17IS; 17IS; 25IS; 25IS; 25IS; 41IS; 41IS; 70IS; 120IS; 128IS	AO 179:25; WA
MITROSPINGIDAE		
Lamprospiza melanoleuca	NS; 1IS; 46IS	GZ 9:50; WA
THRAUPIDAE		

Taxa	Locality	Source
Porphyrospiza caerulescens	169LM; 173LM; 39IS; 41IS; 120IS	AMNH 245058-245060; FMNH 63689-63693; WA
Parkerthraustes humeralis	1IS	WA
Neothraupis fasciata	9LM; 38LM; 77LM; 8IS; 39IS; 77IS; 120IS	FMNH 63606-63611; MPEG 43617; MPEG 43618; WA
Cissopis leverianus	4LM; 12LM; 15LM; 44LM; 59LM; 91LM; 124LM; 136LM; 167LM; 178LM; 1IS; 10IS; 25IS; 30IS; 39IS; 59IS; 101IS	LACM 43644-43650; LSUMZ 67871, 67872; MPEG 6875, 6876, 15827-15829, 18035, 34993, 37445, 37937, 38561, 40954, 42426, 42427, 68714; RBO[+] 11(1):170; WA
Schistochlamys melanopis	59LM; 89LM; 91LM; 136LM; 1IS; 25IS; 26IS; 39IS; 40IS; 41IS; 66IS; 67IS; 101IS; 127IS; 131IS; 133IS; 139IS; 147IS; 155IS; 160IS	LACM 43651-43653; MPEG 8255, 42428; RBO[+] 11(1):170; WA
Schistochlamys ruficapillus	59LM; 89LM; 91LM; 136LM; 1IS; 25IS; 26IS; 39IS; 40IS; 41IS; 66IS; 67IS; 101IS; 127IS; 131IS; 133IS; 139IS; 147IS; 155IS; 160IS	LACM 43651-43653; MPEG 8255, 42428; RBO[+] 11(1):170; WA
Paroaria dominicana	45LM; 62LM; 77LM; 101LM; 110LM; 152LM; 168LM; 1IS; 7IS; 8IS; 17IS; 25IS; 31IS; 34IS; 41IS; 48IS; 49IS; 53IS; 57IS; 61IS; 62IS; 70IS; 93IS; 101IS; 136IS; 139IS; 143IS; 144IS; 146IS	AMNH 245162-245164; FMNH 63648, 63649; RBO 4(1):65, 15(1):51; WA
Paroaria gularis	NS; 70IS; 55IS; 147IS	GZ 9:50; WA
Tangara mexicana	NS; 40IS; 81IS	GZ 9:48; WA
Tangara punctata	NS	GZ 9:48

Taxa	Locality	Source
Tangara episcopus	28LM; 38LM; 50LM; 58LM; 59LM; 60LM; 89LM; 91LM; 93LM; 133LM; 151LM; 161LM; 163LM; 176LM; 184LM; 1IS; 17IS; 25IS; 30IS; 31IS; 39IS; 40IS; 41IS; 46IS; 55IS; 70IS; 72IS; 79IS; 84IS; 116IS; 119IS; 126IS; 131IS; 133IS; 140IS; 143IS; 144IS; 153IS	FMNH 63568-63573; FNJV 6852; LACM 43663-43669; MCZ 151827; MNRJ 12457-12463; MPEG 8252, 15859, 15861, 50823, 50824, 77057; RBO+ 11(1):170; WA
Tangara sayaca	38LM; 61LM; 98LM; 100LM; 110LM; 111LM; 152LM; 25IS; 39IS; 41IS; 55IS; 62IS; 77IS; 120IS; 139IS	FMNH 63625; 63626; RBO 4(1):65, 15(1):51; WA
Tangara palmarum	1IS; 7IS; 8IS; 11IS; 19IS; 23IS; 26IS; 39IS; 40IS; 41IS; 46IS; 70IS; 71IS; 72IS; 84IS; 94IS; 101IS; 103IS; 110IS; 116IS; 119IS; 131IS; 133IS; 135IS; 139IS; 143IS; 144IS; 153IS; 163IS; 12LM; 16LM; 20LM; 22LM; 28LM; 38LM; 59LM; 60LM; 61LM; 62LM; 64LM; 77LM; 89LM; 91LM; 98LM; 111LM; 121LM; 128LM; 133LM; 137LM; 140LM; 143LM; 151LM; 161LM; 163LM; 174LM; 184LM	FMNH 63541-63547; FNJV 6887, 6888; LACM 43670-43684; LSUMZ 71854; MNRJ 6745, 6747, 6749; MPEG 8251, 15863, 18031-18034, 30487, 37648, 40941, 40942, 42066, 42198, 42199, 42200, 43583-43591, 49782, 49783, 50817-50822; Pinto (1944) 2:494; RBO 4(1):65; RBO+ 11(1):170; WA; XC
Tangara cayana	9LM; 38LM; 59LM; 60LM; 77LM; 81LM; 91LM; 98LM; 111LM; 137LM; 152LM; 172LM; 8IS; 25IS; 39IS; 41IS; 101IS; 112IS; 120IS; 152IS; 153IS	FMNH 63347-63358; LACM 45445-45447; MPEG 42196, 43576-43582; RBO 4(1):65; RBO+ 11(1):170; WA
Nemosia pileata	37LM; 38LM; 59LM; 60LM; 61LM; 62LM; 64LM; 71LM; 77LM; 79LM; 91LM; 98LM; 100LM; 110LM; 111LM; 121LM; 124LM; 135LM; 140LM; 158LM; 169LM; 17IS; 23IS; 25IS; 27IS; 31IS; 32IS; 39IS; 41IS;	AMNH 245612-245615; FMNH 63582-63589; FNJV 6987; LACM 43708-43720; LSUMZ 71864, 71865; MPEG 6872-6874, 15858, 15889, 42065, 43610, 43611, 68700; RBO 4(1):65, 15(1):51; RBO+ 11(1):167;

Taxa	Locality	Source
	70IS; 101IS; 120IS; 133IS; 139IS; 144IS; 153IS	WA
Compsothraupis loricata	37LM; 152LM; 154LM; 168LM; 25IS; 41IS; 101IS	AMNH 245681-245683; FMNH 63537, 63538; WA
Conirostrum speciosum	38LM; 49LM; 59LM; 60LM; 61LM; 62LM; 77LM; 91LM; 98LM; 100LM; 109LM; 111LM; 121LM; 1IS; 25IS; 32IS; 39IS; 41IS; 70IS; 133IS; 153IS	FMNH 62813-62816; FNJV 6738; LACM 43593-43596; MPEG 15848, 15892, 43574; RBO 4(1):65, 15(1):51; RBO+ 11(1):170; WA
Conirostrum bicolor	65LM; 77LM; 119LM; 169LM; 15IS; 20IS; 54IS; 64IS; 119IS; 143IS; 144IS; 160IS	AMNH 245242, 245243, 245255; FMNH 62819, 62820; WA
Sicalis citrina	120IS	WA
Sicalis flaveola	39IS; 41IS; 48IS; 55IS; 70IS; 90IS; 132IS; 133IS; 144IS; 153IS; 60LM; 60LM; 60LM; 60LM; 89LM; 89LM; 122LM; 122LM; 122LM; 168LM	AMNH 244982, 244983, 322131, 322132, 516588; FMNH 63705-63708; Pinto (1944) 2:642; WA
Sicalis columbiana	NS; 6IS; 15IS; 17IS; 41IS; 75IS; 133IS; 153IS	GZ 9:51; WA
Chlorophanes spiza	176LM	MNRJ 11591
Hemithraupis guira	59LM; 61LM; 60LM; 62LM; 77LM; 91LM; 98LM; 100LM; 110LM; 111LM; 121LM; 128LM; 140LM; 154LM; 169LM; 176LM; 1IS; 8IS; 23IS; 25IS; 39IS; 41IS; 48IS; 49IS; 77IS; 93IS; 120IS; 133IS; 139IS; 153IS	AMNH 245638-245644; FMNH 63563-63567; FNJV 7002; LACM 43590, 43786-43789, 43796; MNRJ 11498, 11802; MPEG 15834, 42063, 42064, 43612-43616; RBO 4(1):65, 15(1):51; RBO+ 11(1):170; WA

Taxa	Locality	Source
Volatinia jacarina	12LM; 20LM; 22LM; 24LM; 33LM; 54LM; 58LM; 59LM; 64LM; 81LM; 91LM; 137LM; 151LM; 172LM; 176LM; 17IS; 24IS; 25IS; 31IS; 34IS; 39IS; 40IS; 41IS; 46IS; 48IS; 58IS; 60IS; 62IS; 70IS; 90IS; 95IS; 101IS; 139IS; 144IS; 153IS; 155IS	FMNH 63702-63704; LACM 43950-43952; LSUMZ 71874, 71875; MNRJ 14363, 14382; MPEG 40962, 42202, 44312, 44334, 44394, 44395, 44421, 44422, 47997-48000, 49784-49790, 50811-50816, 50843-50846, 77019; RBO$^+$ 11(1):171; WA
Eucometis penicillata	7LM; 12LM; 36LM; 51LM; 77LM; 97LM; 136LM; 140LM; 151LM; 154LM; 159LM; 167LM; 169LM; 174LM; 176LM; 6IS; 17IS; 20IS; 34IS; 40IS; 41IS; 101IS; 120IS; 132IS; 133IS; 153IS	AMNH 245122-245129, 245567, 245568; FMNH 63590-63592; MNRJ 11867-11870; MPEG 34834, 34835, 36877, 37649-37653, 40943-40948, 42070-42072, 42421-42425, 43603-43608, 68718-68722; WA
Coryphospingus pileatus	34LM; 37LM; 38LM; 61LM; 81LM; 91LM; 100LM; 110LM; 111LM; 152LM; 158LM; 8IS; 41IS; 39IS; 32IS; 26IS; 25IS; 23IS; 101IS; 120IS; 133IS; 139IS; 153IS; 160IS	AMNH P136559; FMNH 63661-63667, 63674; LACM 43826-43846; LSUMZ 67882, 67883; MPEG 15836, 15837, 15885-15888, 50826, 50832, 50833, 68816; RBO 4(1):65, 15(1):51; WA
Coryphospingus cucullatus	44LM; 1IS	MPEG 37446; WA
Lanio surinamus	11LM; 58LM	MPEG 38692-38697, 76925
Lanio luctuosus	4LM; 58LM; 59LM; 1IS	MPEG 38552-38554, 76831; RBO+ 11(1):170; WA
Lanio cristatus	11LM; 44LM; 58LM; 59LM; 85LM; 93LM; 176LM; 177LM; 1IS	FMNH 63621-63624; MNRJ 12735, 12737, 12738; MPEG 2516, 2517, 21571, 37457, 38698, 76797, 76922; RBO$^+$ 11(1):170; WA
Tachyphonus rufus	3IS; 17IS; 20IS; 23IS; 25IS; 31IS; 34IS; 39IS; 40IS; 41IS; 101IS; 116IS; 120IS; 129IS; 139IS; 144IS; 149IS; 153IS; 9LM; 12LM; 15LM; 33LM; 34LM; 36LM; 58LM; 59LM; 64LM; 77LM; 91LM; 100LM;	FMNH 63574, 63575, 63577-63580; LACM 43768-43776; LSUMZ 71856-71863; MCZ 157025; MNRJ 12743, 12744, 12746, 12747; MPEG 15830, 34992, 37938, 40955, 42419, 42420, 43601, 43602, 50837-50841,

Taxa	Locality	Source
	111LM; 136LM; 141LM; 151LM; 172LM; 176LM; 178LM	52344, 76928, 76931; RBO 4(1):65, 15(1):51; RBO+ 11(1):170; WA
Ramphocelus carbo	7LM; 14LM; 22LM; 34LM; 38LM; 44LM; 53LM; 58LM; 59LM; 60LM; 61LM; 62LM; 64LM; 89LM; 91LM; 98LM; 111LM; 121LM; 133LM; 136LM; 137LM; 140LM; 146LM; 151LM; 152LM; 160LM; 161LM; 163LM; 164LM; 167LM; 168LM; 169LM; 177LM; 1IS; 3IS; 11IS; 18IS; 25IS; 26IS; 27IS; 31IS; 39IS; 40IS; 41IS; 46IS; 47IS; 48IS; 62IS; 70IS; 71IS; 95IS; 101IS; 103IS; 119IS; 133IS; 136IS; 139IS; 143IS; 144IS; 153IS	AMNH 245479-245496; FMNH 63548-63554; FNJV 6910; LACM 43694-43707; LSUMZ 71855; MNRJ 11993-11997, 12000; MPEG 8253, 8254, 15838-15840, 18023, 18024, 21584, 21585, 30481-30485, 37456, 40956, 42067-42069, 42197, 42417, 42418, 49781, 54846-54848, 68760, 76929, 76933, 76941, 77055; ZUEC 722-724; Pinto (1944) 2:501; RBO 4(1):65; RBO+ 11(1):170; WA
Charitospiza eucosma	9LM; 53LM; 60LM; 77LM; 100LM; 111LM; 169LM; 172LM; 8IS; 23IS; 39IS; 41IS; 49IS; 120IS; 152IS	AMNH 245135; FMNH 63712-63718; FNJV 7435; MPEG 43623-43630; RBO 4(1):65, 15(1):51; WA
Tersina viridis	15LM; 1IS; 39IS; 153IS	MPEG 37939; WA
Cyanerpes caeruleus	30IS; 40IS; 51LM; 177LM; 178LM	MNRJ 11594; MPEG 34833, 34991; WA
Cyanerpes cyaneus	89LM; 89LM; 89LM; 89LM; 89LM; 89LM; 89LM; 89LM; 89LM; 89LM; 89LM; 91LM; 91LM; 91LM; 138LM; 138LM; 138LM; 138LM; 138LM; 138LM; 161LM; 163LM; 163LM; 163LM; 163LM; 172LM; 172LM; 39IS; 40IS; 94IS; 133IS	AMNH 128912, 128913; FMNH 62822-62830; LACM 43578, 43579; MNRJ 11581, 11583, 11584, 11586; MPEG 8242-8250, 23806; WA

Taxa	Locality	Source
Dacnis cayana	38LM; 41LM; 61LM; 85LM; 89LM; 91LM; 93LM; 163LM; 110LM; 154LM; 161LM; 169LM; 172LM; 176LM; 8IS; 23IS; 27IS; 39IS; 40IS; 41IS; 94IS; 139IS; 143IS; 144IS; 153IS	AMNH 245236-245241; FMNH 62807-62812; LACM 43539-43554; MNRJ 11607, 11657; MPEG 2511, 8240, 15872, 15883, 15884, 18007, 18008,; 18030; RBO 4(1):65; WA
Coereba flaveola	33LM; 34LM; 36LM; 38LM; 40LM; 44LM; 58LM; 59LM; 61LM; 62LM; 64LM; 83LM; 91LM; 98LM; 100LM; 110LM; 133LM; 137LM; 160LM; 161LM; 163LM; 168LM; 176LM; 177LM; 1IS; 3IS; 7IS; 8IS; 19IS; 25IS; 26IS; 40IS; 41IS; 47IS; 70IS; 93IS; 101IS; 132IS; 133IS; 143IS; 144IS; 153IS	AMNH 245205-245214; FMNH 62831-62834; FNJV 4763, 6711; LACM 43569-43573; LSUMZ 71846-71848; MCZ 145598; MNRJ 11667-11669, 11674, 11683, 12003, 12005, 12006; MPEG 15849-15851, 37454, 37743, 42184, 42185, 43573, 50805-50808, 76974, 77020, 77038; RBO 4(1):64, 15(1):51; RBO+ 11(1):171; WA; XC
Tiaris fuliginosus	11LM; 15LM; 43LM; 51LM; 59LM; 64LM; 136LM; 167LM; 16IS; 17IS; 25IS; 39IS; 41IS	LSUMZ 71876-71885; MPEG 30476-30479, 34841, 34842, 37964, 38699, 42435, 68791-68795, 74008; RBO^{+} 11(1):171; WA
Sporophila lineola	59LM; 91LM; 128LM; 174LM; 17IS; 40IS; 41IS; 50IS; 61IS; 75IS; 101IS; 120IS; 143IS; 144IS; 146IS; 147IS; 153IS	MPEG 46325, 50851, 50852; RBO+ 11(1):171; WA; XC
Sporophila plumbea	8IS; 41IS; 57IS; 152IS	WA
Sporophila americana	1LM; 58LM; 1IS; 40IS; 127IS	MPEG 77012, 77016; RBO 12 (2):145; WA
Sporophila collaris	17IS; 22IS	WA
Sporophila nigricollis	22LM; 24LM; 54LM; 59LM; 64LM; 89LM; 100LM; 151LM; 1IS; 8IS; 17IS; 20IS; 23IS; 25IS; 40IS; 41IS; 72IS; 73IS; 101IS; 137IS; 144IS; 153IS	LSUMZ 71886-71890; MNRJ 14395; MNRJ 14398; MPEG 48001, 49791-49800, 50847-50850; Pinto (1944) 2:622; RBO 15(1):51; RBO^{+} 11(1):171; WA

Taxa	Locality	Source
Sporophila caerulescens	91LM; 17IS; 25IS; 147IS	LACM 43905, 43906; WA
Sporophila albogularis	41IS; 153IS	WA
Sporophila leucoptera	81LM; 17IS; 71IS	FMNH 63681; WA
Sporophila bouvreuil	22LM; 54LM; 146LM; 151LM; 163LM; 17IS; 40IS; 55IS; 61IS; 127IS; 103IS	AMNH 514670; FMNH 63599, 63600; MNRJ 14741, 14742; MPEG 49801, 50853-50856; Pinto (1944) 2:627; WA
Sporophila minuta	58LM; 17IS; 26IS; 31IS; 40IS; 46IS; 81IS; 143IS	MPEG 77009; WA
Sporophila angolensis	51LM; 58LM; 59LM; 64LM; 91LM; 100LM; 111LM; 176LM; 178LM; 1IS; 39IS; 46IS; 72IS; 120IS; 127IS; 144IS	LACM 43897-43901, 43904; LSUMZ 71891-1894; MNRJ 14744, 22465, 22466, 34840, 34996, 76992, 77013, 77023, 77024; RBO 4(1):65, 15(1):51; RBO+ 11(1):171; WA
Sporophila maximiliani	NS	GZ 9:51
Emberizoides herbicola	47LM; 151LM; 162LM; 1IS; 10IS; 17IS; 34IS; 36IS; 37IS; 40IS; 70IS; 75IS; 126IS; 127IS	AMNH 245068, 245069; FMNH 63721-63723; MNRJ 14765-14767; WA
Saltatricula atricollis	9LM; 15LM; 30LM; 59LM; 60LM; 61LM; 62LM; 77LM; 98LM; 8IS; 26IS; 39IS; 120IS; 133IS	FMNH 63634-63637; FNJV 7111; MPEG 37936, 43619-43622; RBO 4(1):65; RBO^{+} 11(1):170; WA
Saltator maximus	7IS; 1IS; 10IS; 17IS; 20IS; 25IS; 34IS; 39IS; 40IS; 41IS; 70IS; 101IS; 120IS; 127IS; 133IS; 139IS; 153IS; 9LM; 12LM; 14LM; 15LM; 34LM; 40LM; 52LM; 53LM; 58LM; 59LM; 62LM; 64LM; 89LM; 91LM; 100LM; 121LM; 136LM; 137LM; 138LM; 140LM; 167LM; 176LM; 178LM	FMNH 63650-63652; FNJV 7056, 7057; LACM 43848-43860; LSUMZ 71870, 71871; MNRJ 6891; MPEG 8256, 8257, 15710-15714, 17981, 17982, 30486, 34994, 36988, 37932-37935, 40949-40953, 42073-42076, 42201, 42429-42434, 50831, 68841-68845, 76932; Pinto (1944) 2:589; RBO

Taxa	Locality	Source
		4(1):64, 15(1):51; RBO+ 11(1):170; WA; XC
Saltator coerulescens	59LM; 64LM; 91LM; 110LM; 1IS; 25IS; 31IS; 34IS; 50IS; 54IS; 70IS; 137IS; 147IS	LACM 43861, 43862; LSUMZ 71868, 71869; RBO 4(1):65; RBO+ 11(1):170; WA
Saltator similis	151LM	MNRJ 6868
Saltator grossus	4LM; 11LM; 58LM; 59LM; 176LM; 1IS; 147IS	MNRJ 12584, 12585, 12587, 12588; MPEG 38560, 38704, 76876; RBO+ 11(1):171; WA
Thlypopsis sordida	20LM; 22LM; 34LM; 62LM; 64LM; 91LM; 98LM; 151LM; 17IS; 26IS; 41IS; 47IS; 51IS; 101IS; 144IS; 153IS	LACM 43790; LSUMZ 71866, 71867; MNRJ 11818, 11821, 11823, 11824, 11826; MPEG 49779, 50827, 50828; RBO 4(1):65; WA
Cypsnagra hirundinacea	9LM; 35LM; 38LM; 60LM; 77LM; 81LM; 131LM; 169LM; 8IS; 39IS; 41IS; 49IS; 95IS; 120IS; 152IS	AMNH 245585; FMNH 63612-63618; FNJV 6979; MNRJ 11857; MPEG 43609; WA
CARDINALIDAE		
Piranga flava	9LM; 32LM; 60LM; 64LM; 77LM; 112LM; 154LM; 169LM; 173LM; 23IS; 30IS; 39IS; 41IS; 49IS; 77IS; 101IS; 120IS; 133IS	AMNH 128942, 245514-245520; FMNH 63555-63559; MPEG 6870, 43592-43600; WA
Granatellus pelzelni	59LM; 1IS	RBO+ 11(1):170; WA
Caryothraustes canadensis	58LM; 59LM; 85LM; 176LM; 1IS; 40IS; 41IS; 89IS; 101IS; 133IS; 139IS; 144IS; 153IS	FMNH 63539; MNRJ 10498, 10908; MPEG 2518-2520, 76879; RBO+ 11(1):170; WA
Periporphyrus erythromelas	11LM; 178LM	MPEG 34995, 38702, 38703

Taxa	Locality	Source
Amaurospiza moesta	172LM; 41IS; 153IS	CM P136526; FMNH 63694; WA
Cyanoloxia rothschildii	11LM; 44LM; 51LM; 59LM; 64LM; 176LM; 1IS; 40IS; 41IS	FMNH 63719; LSUMZ 71872, 71873; MNRJ 14745; MPEG 34836-34839, 37451-37453, 38706; RBO+ 11(1):171; WA; XC
Cyanoloxia brissonii	41IS	WA
FRINGILLIDAE		
Spinus yarrellii	120IS	WA
Euphonia chlorotica	59LM; 60LM; 61LM; 62LM; 64LM; 71LM; 77LM; 84LM; 91LM; 98LM; 100LM; 109LM; 111LM; 121LM; 146LM; 176LM; 15IS; 25IS; 39IS; 40IS; 41IS; 51IS; 55IS; 91IS; 101IS; 120IS; 133IS; 139IS; 140IS; 143IS; 144IS; 153IS	FMNH 63334-63337; LACM 43731, 43732; LSUMZ 67775, 71849; MPEG 2513-2515, 15853, 15854, 43575; Pinto (1944) 2:453; RBO 4(1):65, 15(1):51; RBO+ 11(1):170; WA
Euphonia violacea	59LM; 64LM; 85LM; 89LM; 91LM; 137LM; 138LM; 161LM; 163LM; 172LM; 176LM; 177LM; 1IS; 20IS; 25IS; 31IS; 33IS; 39IS; 40IS; 41IS; 58IS; 59IS; 71IS; 93IS; 115IS; 133IS; 144IS	FMNH 63361-63367; LACM 43721-43729; LSUMZ 71852; MNRJ 12188, 12191, 12193, 12195; MPEG 2512, 42203, 42204; Pinto (1944) 2:457; RBO+ 11(1):170; WA
Euphonia cayennensis	59LM; 177LM	MNRJ 12322; RBO+ 11(1):170
ESTRILDIDAE		
Estrilda astrild	41IS; 70IS; 143IS; 144IS; 153IS	WA
PASSERIDAE		
Passer domesticus	NS; 15IS; 17IS; 23IS; 25IS; 26IS; 39IS; 40IS; 41IS; 62IS; 70IS; 72IS; 119IS; 120IS; 131IS; 133IS; 135IS; 140IS; 143IS; 144IS; 148IS; 153IS; 160IS	GZ 9:51; WA

See codes for localities in Appendix II. Museum: AMNH - American Museum of Natural History, CM - Carnegie Museums, CUMV - Cornell University Museum of Vertebrates, FMNH - Field Museum Natural History, KU - KU Natural History Museum, LACM - Natural History Museum of Los Angeles, LSUMZ - Louisiana Museum of Natural History, MCZ - Museum of Comparative Zoology (Harvard), MVZ - The Museum of Vertebrate Zoology (Berkeley), UMMZ - Museum of Zoology University of Michigan, USNM - Smithsonian National Museum of Natural History, FNJV - Fonoteca Neotropical Jacques Vielliard, MNRJ - Museu Nacional do Rio de Janeiro, MPEG - Museu Paraense Emílio Goeldi, MZUSP - Museu de Zoologia da Universidade de São Paulo, ZUEC - Museu de Zoologia da Universidade Estadual de Campinas; Literature: AO - Atualidades Ornitologicas, BMPEG - Boletim Museu Paraense Emílio Goeldi, Cotinga - Cotinga Ornithological Journals, GZ - Goeldiana Zoologia, JFO - Journal of Field Ornithology, Helmmayr (1929) - A Contribution to the ornithology of Northeastern Brazil, Ornithologia – Journal of CEMAVE/ICMBio (Centro Nacional de Pesquisa e Conservação de Aves Silvestres/ Instituto Chico Mendes de Conservação da Biodiversidade), ON - Ornitologia Neotropical, Pinto (1938) - Catálogo das Aves do Brasil, Pinto (1944) - Catálogo das aves do Brasil e lista dos exemplares existentes na coleção do Departamento de Zoologia, RBO - Revista Brasileira de Ornitologia; RBO+ - Brazilian Journal of Ornithology – previously Ararajuba, Interactive sites: XC - Xeno-canto, WikiAves – WikiAves.

Appendix II

Codes for species localities obtained from Literature and Museum (LM), andInteractive Sites (IS).

Literature and Museum		Interactive Sites	
Code	**Locality**	**Code**	**Locality**
1LM	Açailândia	1IS	Açailândia
2LM	Açailândia, Belém-Brasília Highway	2IS	Água Doce do Maranhão
3LM	Açailândia, EFC	3IS	Alcântara
4LM	Açailândia, Itinga River, BR 010 Km 21, Cobras Farm	4IS	Aldeias Altas
5LM	Alcântara	5IS	Altamira do Maranhão
6LM	Alcântara (Cajual Island)	6IS	Alto Alegre do Maranhão
7LM	Alcântara, Itaúna Island (Cajual)	7IS	Alto Alegre do Pindaré
8LM	Aldeia do Ponto	8IS	Alto Parnaíba
9LM	Alto Parnaíba (Inhuma Farm[NI])	9IS	Amapá do Maranhão
10LM	Alto Turi	10IS	Amarante do Maranhão
11LM	Alto Turiaçu Indigenous Land, Zé Gurupi Indigenous Village	11IS	Anajatuba
12LM	Amarante do Maranhão, Barro Vermelho Farm (A)	12IS	Anapurus
13LM	Amarante do Maranhão, Barro Vermelho Farm (B)	13IS	Apicum-Acu
14LM	Amarante do Maranhão, Centro Farm	14IS	Araguanã
15LM	Amarante do Maranhão, Serra da Conceição	15IS	Araioses
16LM	Aprendizado[NI]	16IS	Arame
17LM	Arame	17IS	Arari
18LM	Arari	18IS	Axixá
19LM	Arari, Rural Zone	19IS	Bacabal
20LM	Bacabal, Bambú River, Lefts Stream of Ipixuna Açu River	20IS	Bacabeira
21LM	Bacabal, BR 316	21IS	Bacuri
22LM	Bacabal, Estiva River, Left Stream of Mearim River	22IS	Bacurituba
23LM	Bacabal, Estiva River, Right Stream of Ipixuna Açu River	23IS	Balsas
24LM	Bacabal, Mearim River, Left Riverbank, Estiva Farm	24IS	Barão de Grajaú
25LM	Bacabal, Mearim River, Left Riverbank, Santa Fausta Farm	25IS	Barra do Corda
26LM	Bacabal, Mearim River, Left Riverside, BR 316 km 30	26IS	Barreirinhas
27LM	Bacabal, next to UESB Campus	27IS	Benedito Leite
28LM	Bacabal, Urban Area	28IS	Bernardo do Mearim
29LM	Baía de São Marcos, between São Luís and Pinheiro	29IS	Boa Vista do Gurupi
30LM	Balsas	30IS	Bom Jardim

Literature and Museum		Interactive Sites	
Code	Locality	Code	Locality
31LM	Balsas River	31IS	Bom Jesus das Selvas
32LM	Balsas River (Mouth)	32IS	Brejo
33LM	Balsas, Balsas River, Right Riverbank, Canto Alegre Farm	33IS	Buriti Bravo
34LM	Balsas, Matão River, Right Stream of Balsas River	34IS	Buriticupu
35LM	Balsas, São Raimundo das Mangabeiras	35IS	Cachoeira Grande
36LM	Balsas, São Rodrigo Farm	36IS	Cajari
37LM	Barão de Grajaú	37IS	Cândido Mendes
38LM	Barra do Corda	38IS	Capinzal do Norte
39LM	Benedito Leite	39IS	Carolina
40LM	Between Alto Turi and Santa Inês	40IS	Carutapera
41LM	Boa Fé[NI]	41IS	Caxias
42LM	Bom Jardim, REBIO Gurupi	42IS	Caxias
43LM	Bom Jesus das Selvas	43IS	Caxias, Amelinha Farm
44LM	Buriticupu, Forest of Companhia Vale do Rio Doce	44IS	Caxias, Inhamum Ecological Reserve
45LM	Buritizinho	45IS	Caxias, Recanto dos Tucuns Farmstead
46LM	Caeté, Left Riverbank of Igarapé das Palmeiras	46IS	Cedral
47LM	Campos dos Perizes	47IS	Centro Novo do Maranhão
48LM	Cantanhede, Palmeiral	48IS	Chapadinha
49LM	Carapó[NI]	49IS	Cidelândia
50LM	Carolina	50IS	Codó
51LM	Carutapera, Gurupi River, Pedra Chata	51IS	Coelho Neto
52LM	Carutapera, Gurupi River, Santa Bárbara Farm	52IS	Colinas
53LM	Caxias	53IS	Conceição do Lago-Açu
54LM	Caxias, Parnaíba River, Left Riverbank, Sabiá Farm	54IS	Coroatá
55LM	Caxias, Parnaíba River, Left Riverbank, São Miguel	55IS	Costa do Maranhão 135 nautical miles
56LM	Caxias, Recanto dos Tucuns Farmstead	56IS	Cururupu
57LM	Centro Novo do Maranhão, REBIO Gurupi (A)	57IS	Estreito
58LM	Centro Novo do Maranhão, REBIO Gurupi (B)	58IS	Feira Nova do Maranhão
59LM	Cidelândia (Central point btween the farms)	59IS	Fernando Falcão
60LM	Codó (Cocos)	60IS	Godofredo Viana
61LM	Codó, Sipauba Farm	61IS	Governador Edison Lobão
62LM	Colinas, Santa Rita Farm	62IS	Governador Nunes Freire
63LM	Coroatá	63IS	Graça Aranha

Literature and Museum		Interactive Sites	
Code	Locality	Code	Locality
64LM	Coroatá, Caximbo Farm	64IS	Grajaú
65LM	Cururupu	65IS	Grajaú, Road for Grajaú River
66LM	Cururupu, Caçacueira Island	66IS	Guimaraes
67LM	Cururupu, Croa Alta	67IS	Gurupi Biological Reserve
68LM	Cururupu, Maiaú Island	68IS	Humberto de Campos
69LM	Cururupu, Mangue Seco	69IS	Icatu
70LM	Cururupu, Mangunça Island (A)	70IS	Igarapé do Meio
71LM	Cururupu, Mangunça Island (B)	71IS	Igarapé Grande
72LM	Cururupu, Ponta da Croa	72IS	Imperatriz
73LM	Cururupu, Ponta do Muricitiua	73IS	Itapecuru Mirim
74LM	Cururupu, Porto Alegre	74IS	Itinga do Maranhão
75LM	Cururupu, São João Mirim	75IS	Junco do Maranhão
76LM	Cururupu, São Lucas	76IS	Lago da Pedra
77LM	Estiva (Ilha de São Luis)	77IS	Lagoa do Mato
78LM	Estreito, UHE Estreito (Dam)	78IS	Lajeado Novo
79LM	Fortaleza Arcoverde[NI]	79IS	Loreto
80LM	Golfão Maranhense	80IS	Lower Itaueiras River
81LM	Grajaú	81IS	Luís Domingues
82LM	Grajaú, Araribóia Indigenous Land	82IS	Magalhães de Almeida
83LM	Grajaú, TransMaranhão km 36, Canto da Onça Farm	83IS	Maracaçume
84LM	Guimarães	84IS	Marajá do Sena
85LM	Guimarães, Jutaizal village	85IS	Maranhãozinho
86LM	Gurupi Biological Reserve (A)	86IS	Matinha
87LM	Gurupi Biological Reserve (B)	87IS	Matões
88LM	Gurupi River[NI]	88IS	Matões do Norte
89LM	Humberto de Campos (Miritiba)	89IS	Milagres do Maranhão
90LM	Iguará Island (Cururupu)	90IS	Mirador
91LM	Imperatriz	91IS	Miranda do Norte
92LM	Imperatriz, Belém-Brasília Highway	92IS	Mirinzal
93LM	Imperatriz, Estreito Dam, Tocantins River 100 km S	93IS	Monção
94LM	Ipixuna-Açu	94IS	Montes Altos
95LM	Itapari (São Luis)	95IS	Morros
96LM	Itaueiras River	96IS	Nova Colinas

Literature and Museum		Interactive Sites	
Code	**Locality**	**Code**	**Locality**
97LM	Lago Verde, São Francisco Farm	97IS	Nova Iorque
98LM	Lagoa do Mato, Tabocal Farm	98IS	Nova Olinda do Maranhão
99LM	Lapela, Mearim River	99IS	Paço do Lumiar
100LM	Mancha verde	100IS	Palmeirândia
101LM	Manga	101IS	Paraibano
102LM	Manuel Alves Grande River	102IS	Parnarama
103LM	Maracaçumé, Pirocaua Mountain	103IS	Pastos Bons
104LM	Maranhão (Central Point)	104IS	Paulino Neves
105LM	Maranhão, Coast (A)	105IS	Pedreiras
106LM	Maranhão, Coast (B)	106IS	Pedro do Rosário
107LM	Maranhão, Coast (C)	107IS	Penalva
108LM	Maranhão/Pará (Open Sea)[NI]	108IS	Peri Mirim
109LM	Mata do Raimundinho Doce	109IS	Peritoró
110LM	Matões, Castiça Farm	110IS	Pindare Mirim
111LM	Matões, São Gonçalo Farm	111IS	Pinheiro
112LM	Mirador	112IS	Pio XII
113LM	Mirador, Santa Rita Farm	113IS	Porto Franco
114LM	Norte-sul Railroad, between Açailândia and São Francisco do Brejão	114IS	Porto Rico do Maranhão
115LM	Nova Iorque	115IS	Presidente Dutra
116LM	Panaquatira	116IS	Presidente Juscelino
117LM	Paraguassú[NI]	117IS	Presidente Medici
118LM	Parnaíba (Parnahyba), Caeira Island	118IS	Presidente Sarney
119LM	Parnaíba River (Cacira Island)	119IS	Primeira Cruz
120LM	Parnaíba River (Delta)	120IS	Raposa
121LM	Parnarama, Normasa Farm	121IS	Riachão
122LM	Pastos Bons (Valentim Mountain)	122IS	Ribamar Fiquene
123LM	Pedreiras, Riacho das Flores, Mearim River, Marianópolis Village	123IS	Road for Lagoa dos Patos
124LM	Pedreiras	124IS	Rosário
125LM	Pedreiras, Mearim River (A)	125IS	Santa Helena
126LM	Pedreiras, Mearim River (B)	126IS	Santa Inês
127LM	Pedreiras, Riacho das Flores, Mearim River	127IS	Santa Luzia
128LM	Peritoró	128IS	Santa Luzia do Paruá
129LM	Peritoró, Km N Santa Inês	129IS	Santa Quitéria do Maranhão

Literature and Museum			Interactive Sites	
Code	Locality		Code	Locality
130LM	Ponta Seca		130IS	Santa Rita
131LM	Ponto (Canella)		131IS	Santana do Maranhão
132LM	Porto Franco		132IS	Santo Amaro do Maranhão
133LM	Primeira Cruz		133IS	Santo Antônio dos Lopes
134LM	Raposa, Curupu Island		134IS	São Benedito do Rio Preto
135LM	Riachão		135IS	São Benedito do Rio Preto
136LM	Riachão, Feira Nova Village, Arroz Farm		136IS	Sao Bento
137LM	Riachão, Malhadinha Farm		137IS	São Bernardo
138LM	Rosário		138IS	São Domingos do Maranhão
139LM	Rosário, Upper River Itapicuru		139IS	São Francisco do Brejão
140LM	Sambaíba, Fazenda Brejo da Lagoa		140IS	São João do Carú
141LM	Santa Ana do Parnaíba		141IS	São João do Soter
142LM	Santa Filomena (Piroaba)		142IS	São João dos Patos
143LM	Santa Inês		143IS	São João dos Patos, Mancha Verde community
144LM	Santa Rita (Kelru, Kelsú ou Queiru)		144IS	São João dos Patos, Raimundinho Doce community
145LM	Santana, Island		145IS	São José de Ribamar
146LM	Santo Amaro (Boa Vista)		146IS	São Luís
147LM	Santo Amaro Lake, Alagadiço		147IS	São Luís, Lagoa da Jansen
148LM	Santo Amaro Lake, Guaperiba Lake / Ponta Verde		148IS	São Mateus do Maranhão
149LM	Santo Amaro Lake, Taquari		149IS	São Pedro da Água Branca
150LM	São Mateus, Lago Verde, Right Riverbank of Mearim River		150IS	São Raimundo das Mangabeiras
151LM	São Bento		151IS	São Vicente Ferrer
152LM	São Francisco do Brejão		152IS	Senador Alexandre Costa
153LM	São Francisco, Parnaíba River		153IS	Sítio Novo
154LM	São João dos Patos		154IS	Tasso Fragoso
155LM	São João dos Patos, Jatobá dos Noletos Village, Raposa Montain (A)		155IS	Timon
156LM	São João dos Patos, Jatobá dos Noletos Village, Raposa Montain (B)		156IS	Trizidela do Vale
157LM	São João dos Patos, Jatobá dos Noletos Village, Raposa Montain, Carreteiro (A)		157IS	Tufilândia
158LM	São João dos Patos, Jatobá dos Noletos Village, Raposa Montain, Carreteiro (B)		158IS	Tuntum
159LM	São João dos Patos, União Village, Vão do Macaco[NI]		159IS	Tuntum, Road for Irupu-Sigana
160LM	São José de Ribamar		160IS	Turiaçú

Literature and Museum		Interactive Sites	
Code	**Locality**	**Code**	**Locality**
161LM	São Luís	161IS	Turilândia
162LM	São Luís (Island)	162IS	Tutóia
163LM	São Luis, Anil (A)	163IS	Urbano Santos
164LM	São Luis, Anil (B)	164IS	Vargem Grande
165LM	São Luís, Bom Fim Island	165IS	Viana
166LM	São Pedro da Água Branca	166IS	Vila Nova dos Martírios
167LM	São Roberto, Canaã Village	167IS	Vitória do Mearim
168LM	Tabocas	168IS	Zé Doca
169LM	Timon (Mangueras, Flores)	169IS	Coast Border
170LM	Timon, Metálica Bridge		
171LM	Tocantins River, Estreito UHE (Between Maranhão State and Darcinópolis (TO))		
172LM	Tranqueira		
173LM	Tranqueira, Upper River Parnaíba		
174LM	Tuntun, Presidente Dutra Br 226 km 48, Leão Farm		
175LM	Turi[NI]		
176LM	Turiaçu		
177LM	Turiaçu, Alto da Alegria		
178LM	Turiaçu, Maracaçumé River / Paruá River, Bom Jesus da Mata		
179LM	Turiaçu, São João do Meio[NI]		
180LM	Urbano Santos, Monte Carlo Farm		
181LM	Vila Nova dos Martírios		
182LM	Vila Nova Parnaíba		
183LM	Vitória do Mearim, Ipixuna-Açu River		
184LM	Alto Alegre do Maranhao, Rio Mearim, BR 316 km 28 W, Fazenda Lagoa Nova		
185LM	Vitoria do Mearim (Victoria, Queimadas)		
NS	Not Specified		

[NI] – Not Identified

Capítulo 2

Delimiting priority areas for the conservation of endemic and threatened Neotropical birds using niche-based gap analysis

O capítulo II desta tese foi elaborado e formatado conforme as normas da publicação científica *Plos One*, as quais se encontram em anexo (Anexo 2).

Short title: Conservation of Neotropical birds with niche-based gap analysis

Title: Delimiting priority areas for the conservation of endemic and threatened Neotropical birds using a niche-based gap analysis

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Abstract

Knowledge of spatiotemporal distribution of biodiversity is still very incomplete in the tropics. This is one of the major problems preventing the assessment and effectiveness of conservation actions. Mega-diverse tropical regions are being exposed to fast and profound environmental changes, and the amount of resources available to describe the distribution of species is generally limited. Thus, the tropics is losing species at unprecedented rates, without a proper assessment of its biodiversity. Species distribution models (SDMs) can be used to fill such biogeographic gaps within a species' range and, when allied with systematic conservation planning (e.g. analyses of representativeness, gap analysis), help transcend such data shortage and support practical conservation actions. Within the Neotropics, eastern Amazon and northern Cerrado present a high variety of environments and are some of the most interesting ecotonal areas within South America, but are also among the most threatened biogeographic provinces in the world. Here, we test the effectiveness of the current system of Protected Areas (PAs), in protecting 24 threatened and endemic bird species using SDMs. We found that taxa with wider distributions are potentially as protected as taxa with smaller ranges, and larger PAs were more efficient than smaller PAs, while protecting these bird species. Nonetheless, Cerrado PAs are mostly misallocated. We suggest six priority areas for conservation of Neotropical birds. Finally, we highlight the importance of indigenous lands in the conservation of Neotropical biodiversity and recommend the development of community management plans to conserve the biological resources of the region.

Keywords: Amazon forest, Cerrado, protected areas, species distribution model, species richness

Introduction

The world is undergoing rapid and intense environmental changes that are, directly or indirectly, caused by human activities. Habitat loss and fragmentation, deposition of anthropogenic fixed nitrogenous substances, and the rise of atmospheric carbon dioxide concentration related to climatic changes are or will be the main drivers of such alterations [1,2]. Under this scenario, high-quality species distributional data are essential to set efficient conservation actions [3–5]. However, those biogeographic information are often lacking, being one of the major setbacks preventing the assessment of need and effectiveness of these actions (the Wallacean shortfall) [4,6]. Such a scenario is even more concerning in tropical regions [7–9], because these are mega-diverse areas, that have been suffering fast environmental changes [10,11], and in general, the amount of resources to describe the distribution of species is limited

[12–14]. Consequently, the tropics are losing species at unprecedented rates [15–17], often without properly identifying and describing their biodiversity (the Linnean shortfall) [4,18].

One way to fight back against the Wallacean shortfall is to use species distribution models (SDMs) [19–21]. These models correlate known occurrences of target species with climatic, land-use, and topographic data to delimit the multidimensional bioclimatic requirements for the modeled taxa, reflecting their environmental preferences [22]. SDMs can be overlaid upon the geographic range space to fill biogeographic gaps within species' ranges [23], even for elusive and seldom recorded species [24–27]. In conservation, SDMs have been widely and successfully used to 1) predict the distribution of rare, endemic and threatened species [25,28–31], 2) perform niche-based gap analyses and discover species that are not protected (i.e. do not occur in any protected area; PA hereon) [32–34], 3) predict suitable areas for the invasion of exotic species [35–38], 4) evaluate the potential effects of future climate changes [39,40], 5) determine suitable areas for the reintroduction of rescued fauna [41,42], and 6) establish and evaluate priority areas for conservation [43–45], amongst other examples.

Therefore, one of the first steps for setting a conservation plan may be to ally SDMs with systematic conservation planning [46], particularly in the analysis of representativeness, also known as gap analysis [20,34,47–49]. Gap analysis consists of the identification, classification, and examination of the existing system of PAs based on the assessment of the representation of species, vegetation types or biomes within those PAs network and identification of gaps of distribution in its coverage [23,50]. Representativeness is one of the four main principles of systematic conservation planning, the others: comprehensiveness, adequacy and efficiency [46,51–55].

The region encompassing eastern Amazon and northern Cerrado (Fig 1) is one of the most heterogeneous regions throughout the Amazon basin. This area presents a high variety of environments, as tropical rainforests (*terra firme* and *várzea*), floodplains, campinas, extensive mangroves in the coastal zone, being a large ecotonal area with the Cerrado [56–58]. All this diversity has been affected by intense anthropogenic pressure, mainly due to high deforestation rates and a strong expansion of agribusiness. Noteworthy, 61% of the endangered birds in the Brazilian Amazon occur primarily or exclusively in this portion of the Amazon basin, which constitutes the Belém area of endemism (BAE) [59], while Cerrado is the second most threatened biodiversity hotspot of Brazil [3,60–63].

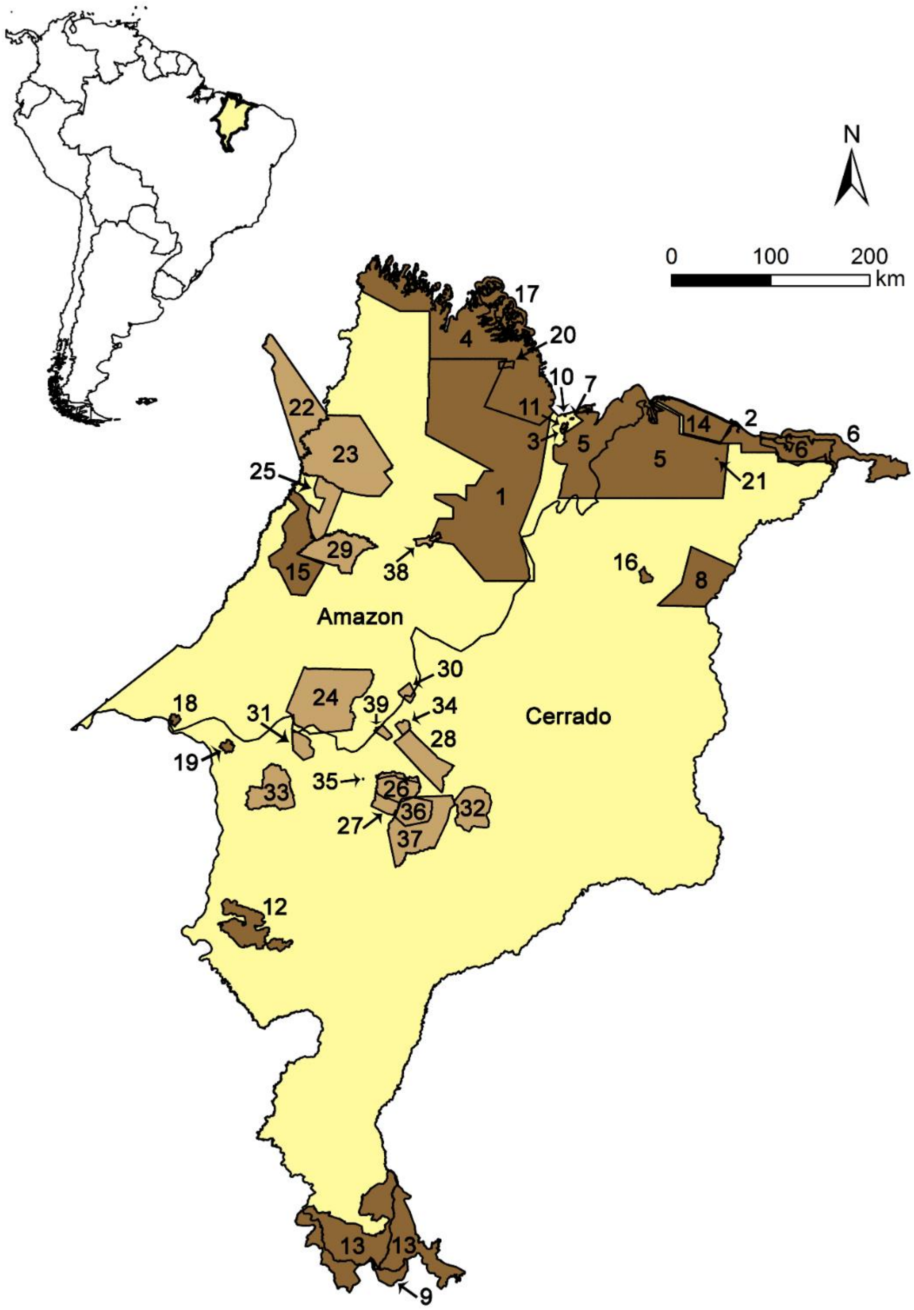

Fig 1. Map of the study area. Location of Protected Areas (PAs): conservation units (dark brown) and indigenous lands (light brown), within the Amazon and Cerrado biomes. See table 1 for PAs identification (ID).

Within Eastern Amazon, the state of Maranhão (Fig 1) has already lost about 30% (24,412 km²) of its historical Amazon forest, and 21% (436 km²) of Cerrado's native vegetation [64]. Nonetheless, this is the less affected area (within BAE and Cerrado), and still preserves one of the richest avifauna of Brazil, mainly due to the aforementioned diversity of ecosystems [65,66]. The birds' list of Maranhão has over 640 species [67], corresponding to 34% of the total number of species in Brazil [68]. Of those, 49 (21%) are included on the Brazilian official list of threatened species [59], and several taxa from the BAE have the highest level of local vulnerability [67]. The state further includes 10 endemic bird species within Cerrado (DL Carvalho et al. in prep). These features make Maranhão an interesting region to test the effectiveness of the state system of PAs (both in Amazonian forest and the Cerrado biomes), in protecting threatened and endemic bird species using SDMs. Specifically, here we used SDMs to perform a gap analysis, and seek to know if 1) taxa with relatively wider distributions are more protected (i.e. have higher percentage of area within PAs) than taxa with smaller distributions and 2) if relatively larger PAs are more efficient (i.e. have higher species richness) than smaller PAs. Finally, based on our results, we also suggested new conservation areas for the target taxa and discuss the effective implementation of new conservation practices in the Neotropical region, in order to allow a more significant conservation of its bird species.

Materials and Methods

Study area

The study area has a total area of 331,983.29 km², corresponding to the Brazilian state of Maranhão, the eighth largest Brazilian state. Political borders are biologically meaningless, but conservation actions mostly depend on political actions, so we chose to use this political delimitation to study a biologically relevant ecotonal area, located between the Amazon forest (west), Cerrado (south and southwest), and small patches of Caatinga biome (east) (Fig 1) [69].

The state’s economy is structured in two main areas of development and integration: extensive cattle ranching and logging in the Amazonian portion; and mineral and metallurgical complex, agriculture and production of energy in the Cerrado [70]. As aforementioned, despite the intense anthropogenic actions, Maranhão holds one of the largest patches of forest within BAE, and native Cerrado vegetation [64].

In this study, we considered 39 protected areas (PAs) distributed along the biomes of Amazon and Cerrado (Fig 1). Of these, 24 are conservation units: 13 are Federal PAs (eight of sustainable use and four of full protection), while 10 are state PAs (six of sustainable use and two of full protection). The other 18 are indigenous lands delimited and homologated by the Federal government (Table 1).

Table 1. Protected areas in the study area. Instance, kind of usage, biome, extent area according to World Wildlife (www.worldwildlife.org), and priority according to MMA [71].

ID	Protected áreas	Instance		Usage		Biome		Area (km²)	Priority
		Federal	State	Sustainable use	Full protection	Amazon	Cerrado		
1	APA Baixada Maranhense		X	X		X	X	17285	EH
2	APA Foz Do Rio Das Preguiças / Pequenos Lençóis Região Lagunar Adjacente		X	X			X	2062	
3	APA Região Do Maracanã		X	X		X		22	
4	APA Reentrâncias Maranhenses		X	X		X		26285	EH
5	APA Upaon-Açú / Miritiba / Alto Preguiças		X	X		X	X	14567	
6	APA Delta Do Parnaíba	X		X			X	3076	
7	APA Itapiracó		X	X		X		4	
8	APA Morros Garapenses		X	X			X	2343	
9	APA Serra Da Tabatinga	X		X			X	352	
10	ESEC Sítio Rangedor		X		X	X		1	
11	Estadual Park Bacanga		X		X	X		26	
12	PARNA Chapada das Mesas	X			X		X	1600	
13	PARNA Nascentes do Rio Parnaíba	X			X		X	7243	
14	PARNA Lençóis Maranhenses	X			X	X	X	1566	
15	REBIO Gurupi	X			X	X		2903	EH
16	RESEX Chapada Limpa	X		X			X	120	
17	RESEX Cururupu	X		X		X		1852	
18	RESEX Ciriaco	X		X		X		81	
19	RESEX Mata Grande	X		X			X	114	
20	RESEX Quilombo Frechal	X		X		X		93	EH

ID	Protected áreas	Instance		Usage		Biome		Area (km²)	Priority
		Federal	State	Sustainable use	Full protection	Amazon	Cerrado		
21	RPPN Prata[a]*						X	1	
22	Alto Rio Guamá					X	X	2799	
23	Alto Turiaçu						X	5305	EH
24	Araribóia					X		4133	EH
25	Awa						X	1166	EH
26	Bacurizinho[b]						X	134	EH
27	Bacurizinho						X	840	EH
28	Cana Brava / Guajajara					X	X	1373	EH
29	Caru					X	X	1727	EH
30	Geralda Toco Preto						X	185	EH
31	Governador						X	416	EH
32	Kanela					X		1252	
33	Krikati					X		1448	
34	Lagoa Comprida					X	X	132	EH
35	Morro Branco						X	48	
36	Porquinhos[b]**						X	795	
37	Porquinhos dos Canela / Apanjekra					X		3010	
38	Rio Pindaré					X		150	
39	Urucu / Juruá					X	X	127	EH

[a]Private area created by voluntary act of owner and established by government. [b]Overlaid area composed by different tribes. APA, Environmental Protection Area; ESEC, Ecological Station; PARNA, National Park; REBIO, Biological Reserve; RESEX, Extractive Reserve; RPPN, Private Reserve of Nature Patrimony. EH, Extremely high.

Target species and occurrence dataset

Our total dataset includes 24 terrestrial, non-migratory bird taxa, with enough occurrence records available (Table 2). Fourteen are classified as threatened in the Belém area of endemism (BAE) in Amazonia [59,72], and 10 are endemics to the Cerrado biome [73–76], including two species considered Vulnerable to extinction [59,72].

We gathered distribution data for each taxon from literature records, online databases [VertNet (http://vertnet.org/), Species Link (http://splink.cria.org.br), Global Biodiversity Information Facility (http://www.gbif.org), Wikiaves (http://www.wikiaves.com.br), xenocanto (http://www.xeno-canto.org)], museum collections (Louisiana Museum of Natural History, Museu Paraense Emílio Goeldi and Museu Nacional do Rio de Janeiro) and personal observation (DLC, GG, and PVC; see S1 for a complete list of records). We checked all occurrences and excluded dubious records based on the known distribution of the species [72]. Geographical coordinates were obtained directly from the original sources or from Ornithological Gazetteer of Brazil [77]. Bird nomenclature follows the Brazilian Ornithological Records Committee [68].

Table 2. Modeled bird taxa. Points: number of records (4.5 × 4.5 km cells), AUC and TSS: mean values, and respective standard deviation values, ER/study area: estimated range in number of cells in the study area, ER/biome: estimated range in number of cells in the study area by biome (Amazon/Cerrado), %PA/biome: percentage of occurrence in protected areas, Status: conservation status according to IBAMA[59] and IUCN[72]*, and biome of occurrence.

Taxon	English name	Points	AUC	TSS	ER/study area	ER/biome	% PA/biome	Status[b]	Biome
Crax f. pinima[a]	Bare-faced Curassow	5	0.97±0.00	0.96±0.01	498	496	52	CR	Amazon
Psophia obscura[a]	Dark-winged Trumpeter	7	0.97±0.00	0.87±0.21	1420	1420	63	CR	Amazon
Guaruba guarouba	Golden Parakeet	20	0.96±0.01	0.80±0.18	2976	2168	60	VU	Amazon
Pyrrhura coerulescens	Pearly Parakeet	31	0.92±0.03	0.65±0.14	3488	3385	42	VU	Amazon
Neomorphus geoffroyi[a]	Rufous-vented Ground-Cuckoo	8	0.95±0.01	0.89±0.02	5270	3641/1801	51/43	VU	Amazon/Cerrado
Pteroglossus b. bitorquatus	Red-necked Aracari	30	0.95±0.02	0.77±0.12	2581	2470	54	VU (EN)	Amazon
Celeus obrieni	Kaempfer's Woodpecker	37	0.93±0.02	0.75±0.09	369	369/3450	93/10	VU (EN)	Amazon/Cerrado
Piculus paraensis[a]	Belem Golden-green Woodcreeper	9	0.97±0.00	0.93±0.01	2454	2082	60	EN (LC)	Amazon
Phlegopsis n. paraensis	Black-spotted Bare-eye	35	0.97±0.02	0.83±0.10	1374	1402	57	VU[c]	Amazon
Hylopezus paraensis	Snethlage's Antpitta	23	0.95±0.01	0.83±0.10	3078	2317	54	VU (LC)	Amazon
Dendrocincla m. badia	White-chinned Woodcreeper	18	0.97±0.01	0.90±04	250	246	74	VU[c]	Amazon
Dendrexetastes r. paraensis[a]	Cinnamon-throated Woodcreeper	9	0.98±0.00	0.96±00	827	827	70	EN[c]	Amazon
Dendrocolaptes medius	Todd's Woodcreeper	46	0.93±0.02	0.74±0.06	6157	4105	43	VU (LC)	Amazon
Hylophilus o. rubrifrons	Tawny-crowned Greenlet	34	0.79±0.02	0.77±0.08	1197	1235	58	-[c]	Amazon
Alipiopsitta xanthops	Yellow-faced Parrot	70	0.83±0.03	0.51±0.10	4	4	0	(NT)	Cerrado
Cercomacra ferdinandi	Bananal Antbird	31	0.95±0.02	0.75±0.09	1430	981	3	VU	Cerrado
Herpsilochmus longirostris	Large-billed Antwren	67	0.85±0.02	0.55±0.07	52	49	4	(NT)	Cerrado
Melanopareia torquata	Collared Crescentchest	46	0.79±0.05	0.47±0.09	4768	4102	12	(NT)	Cerrado
Antilophia galeata	Helmeted Manakin	70	0.84±0.03	0.53±0.10	360	375	15	(LC)	Cerrado
Suiriri affinis	Chapada Flycatcher	27	0.85±0.02	0.61±0.05	1362	799	18	(LC)	Cerrado
Cyanocorax cristatellus	Curl-crested Jay	97	0.93±0.04	0.47±0.06	5403	5214	11	(LC)	Cerrado
Charitospiza eucosma	Coal-crested Finch	73	0.80±0.05	0.51±0.06	8078	7360	11	VU	Cerrado
Saltatricula atricollis	Black-throated Saltator	110	0.82±0.03	0.44±0.21	8209	6561	10	(LC)	Cerrado
Porphyrospiza caerulescens	Blue Finch	26	0.78±0.06	0.55±0.16	2766	2399	6	(NT)	Cerrado

[a]Jackniffe approach result $p<0.05$.[b]IUCN status is in parentheses when different from IBAMA's. [c]No IUCN status. Abbreviations: IUCN, International Union for Conservation of Nature; IBAMA, Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis; CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern.

Environmental layers, modeling procedures, thresholds and evaluation

Occurrence records were overlaid on grid of cells of 2.5 arc-min (~4.5 x 4.5 km). A buffer of 200 km was set around all records to define total extent area (Fig S2). Using this same grid and considering all 19 bioclimatic variables from WorldClim (http://www.worldclim.org/), we performed a pair-wise Pearson correlation test of all variables to remove those highly correlated and reduce their collinearity [78]. In the case of high correlation ($r > 0.8$ or $r < -0.8$), we used only one of the variables in the distribution modeling. We selected nine predictor variables as our environmental variables (Annual Mean Temperature, Mean Diurnal Range, Isothermality, Max Temperature of Warmest Month, Annual Precipitation, Precipitation of Driest Month, Precipitation Seasonality, Precipitation of Warmest Quarter and Precipitation of Coldest Quarter).

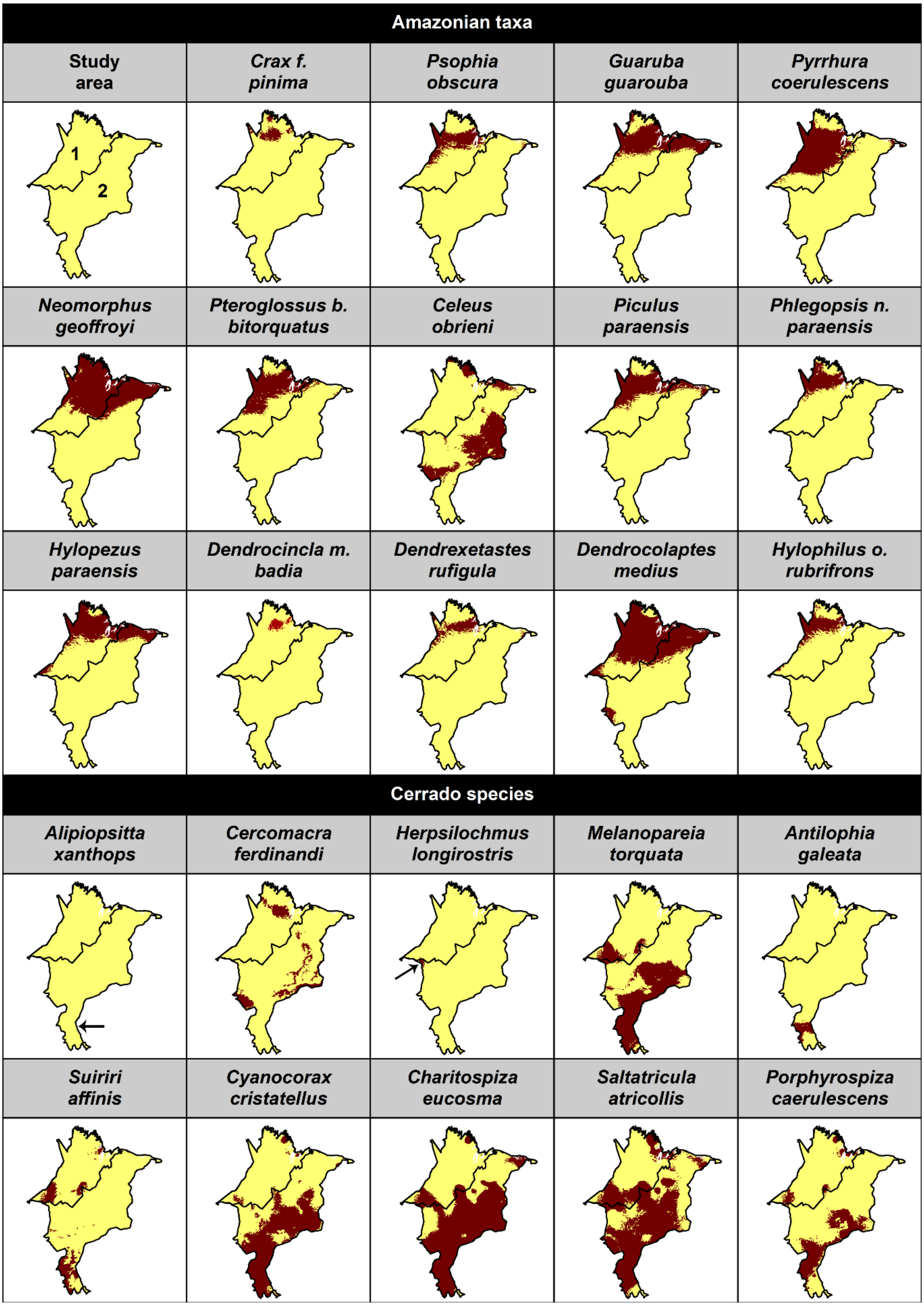
Amazonian taxa
Study area
1
2
Crax f. pinima
Psophia obscura
Guaruba guarouba
Pyrrhura coerulescens
Neomorphus geoffroyi
Pteroglossus b. bitorquatus
Celeus obrieni
Piculus paraensis
Phlegopsis n. paraensis
Hylopezus paraensis
Dendrocincla m. badia
Dendrexetastes rufigula
Dendrocolaptes medius
Hylophilus o. rubrifrons
Cerrado species
Alipiopsitta xanthops
Cercomacra ferdinandi
Herpsilochmus longirostris
Melanopareia torquata
Antilophia galeata
Suiriri affinis
Cyanocorax cristatellus
Charitospiza eucosma
Saltatricula atricollis
Porphyrospiza caerulescens

Fig 2. Species distribution models for the study area. Estimated range of taxa from Amazon 1) and Cerrado 2) biomes.

All models were trained with MaxEnt 3.3.3 [79,80]. This method computes the suitable distribution of maximum entropy for the set of climatic variables associated to the occurrence records of the target species, however this procedure can be constrained by the incomplete knowledge about the distribution of the species [79,81]. MaxEnt is a presence/background method that requires only presence data as input, and consistently performed well in comparison to other methods [48], especially at low samples sizes [28,82,83].

Due to limited availability of suitable occurrence data for five modeled taxa (<10 records), we used the Jackknife approach, also known as leave-one-out method [28], to predict their potential distributions. Then, we evaluated the resulting distributions with the same subsets. For the remaining 19 taxa, we used 10 subsets dividing the occurrences into 70% training and 30% testing records. We used the threshold that balances both omission and commission errors while modeling the species distributions to cut the suitability matrices of the modeled species in modeling algorithm into presence-absence maps [84,85]. The statistically significant probability ($p<0.05$) indicate that the model predictions are reliable, despite some eventual omission and/or commission. All probabilities were evaluated in R 3.3.1 (www.r-project.org). We further used both Area Under the receiver–operator Curve (AUC) [86] and the True Skilled Statistics (TSS) [87] to assess models' performance. AUC and TSS account for the sensitivity (quantifies omission errors), and specificity (quantifies commission errors) of the models [87]. AUC values vary between 0 and 1, with values ≤0.5 representing models no better than random and values around 1 representing a perfect fitting between the observed and the predicted species distribution. Thus, we considered acceptable distribution models to be those with

AUC≥0.7 [86,88]. TSS varies from −1 to +1, where negative and around zero values indicate that distributions are no better than random, while values near +1 represent perfect agreement between the observed and the modeled distributions. Acceptable and excellent models were those with TSS values of at least 0.5 and ≥0.7, respectively [87]. We used 10.000 random pseudo-absences in all model evaluation procedures. A mean consensual distribution map for each taxon was made with those models which achieved TSS >0.4. This method was considered to be the best to delimit the final distribution of a given taxon for several different modeling algorithms [89].

Estimated protected range, species richness and identification of priority areas for conservation

As our group of target taxa occurs in two distinct biomes, one predominantly forested (Amazon) and another dominated by savanna (Cerrado), it is expected that predominantly forest-dependent taxa from the Amazon biome are not present in protected areas dominated by savanna, while endemic species from Cerrado are not expected to occur in PAs dominated by forest. Accordingly, we considered two different approaches to estimate the proportion of protected area for each taxon, and species richness, and so to perform the statistical tests related to the gap analysis. In the first approach, we considered all 24 taxa together, and in the second, taxa from each biome were considered separately. *Neomorphus geoffroyi* and *Celeus obrieni* were considered in both Amazon and Cerrado analyses, since each are known to occur in both biomes. We obtained the modeled species richness by summing the final distribution of each taxon.

We used the shapefile of the world ecoregions available at the World Wildlife website (http://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world) to depict PAs (conservation units and indigenous lands) within the study area. PAs were converted to raster files with grid cells of approximately the same resolution used in the modelling procedures (0.041° or ~4 km near the Ecuador). We identified the grid cells in which each bird taxon was predicted to occur in protected area.

We used linear regressions and power functions to evaluate the effectiveness of PAs. To evaluate the relationship between the size of PAs individually and the estimated species richness covered in each PAs, we used the same two approaches, and so considered three scenarios: 1) the maximum value of Amazon species richness present in the Amazon biome; 2) the maximum value of endemic Cerrado's species richness present in Cerrado; 3) the maximum value of all target taxa richness throughout the study area. A 95% confidence interval for the slope for all regression analyses was selected.

Finally, to identify priority areas for conservation, we overlaid the predicted species richness for each biome separately with maps of deforestation in the Amazon biome (PRODES data from [64]), and remnants of native vegetation in Cerrado [90]. Protected Areas fully covered by native vegetation, and in which more than half of the target taxa potentially occurs, were considered priority areas for conservation.

Results

Species distribution models

We collected a total of 1,534 occurrence records, from which 929 were used (sample size varied between 5 and 110; S1) to generate the potential distribution maps of the 24 target bird taxa (S2; Fig 2). Six out of the 24 SDMs presented errors of omission and/or commission (*Dendrocincla m. badia*, *Alipiopsitta xanthops*, *Herpsilochmus longirostris*, *Antilophia galeata*, *Suiriri affinis* and *N. geoffroyi*). SDMs for *A. xanthops*, and *H. longirostris* had considerably reduced potential area of occurrence within the study area (Figs 2; S2). Yet, all SDMs showed fair to excellent predictive capability (Table 2). AUC values varied between 0.78 and 0.98. TSS values were always higher than 0.5, except for the endemic species from Cerrado, *Saltatricula atricollis* (TSS=0.4). Models for taxa with less than 10 records (*Crax f. pinima*, *Psophia obscura*, *Neomorphus geoffroyi*, *Piculus paraensis*, *Dendrexetastes r. paraensis*) predicted taxa distributions better than random (p<0.05), according to the leave-one-out method (Table 2). Thus, all taxa were considered in the following analyses. In the study area, predominantly forest-dependent taxa had higher probabilities of occurrence in the Amazon biome, and Cerrado endemics were mostly assigned to occur in this biome (Fig 2). Also, as expected, *C. obrieni* was predicted to be present in both biomes. However, SDM for *N. geoffroyi* estimated the distribution of this species to be mostly restricted to the Amazon (Fig 2). Therefore, further results were mostly focused in the approach separating taxa by biome (with *N. geoffroyi* excluded from analyses considering Cerrado taxa), and results considering total target taxa and the entire study area are only presented for comparison.

Estimated protected range and species richness

Percentage of protected area for each taxon varied between 41% (*Pyrrhura coerulescens*) and 94% (*C. obrieni*) considering the Amazon biome only, and 0% (*A. xanthops*) and 11% (*S. affinis*) for Cerrado taxa (Table 2).

Our linear regression analyses indicated that both conservation units and indigenous lands are protecting the target taxa better than random (Fig 3). For the species within the Amazon, for every 202.5 km^2 of distribution range (10 grid cells), there was a gain of protection of about 81 km^2 (four cells; Fig 3A). On average, 59%±13% of estimated ranges for the Amazonian species is protected in this biome. In Cerrado portion of the study area, for every ≈69.000 km^2

(3400 cells of distribution), there was a gain of protection of only 20.25 km^2 (one cell; Fig 3B). The protected range of species from Cerrado averaged only 12%±11% of their distribution. Using the entire study area and the total dataset of target taxa, we obtained a gain of protection of 40.5 km^2 (two cells), for every 202.5 km^2 (10 cells of distribution) (Fig 3C). For all 24 species in the whole study area, the average of protected range was 38%±26%.

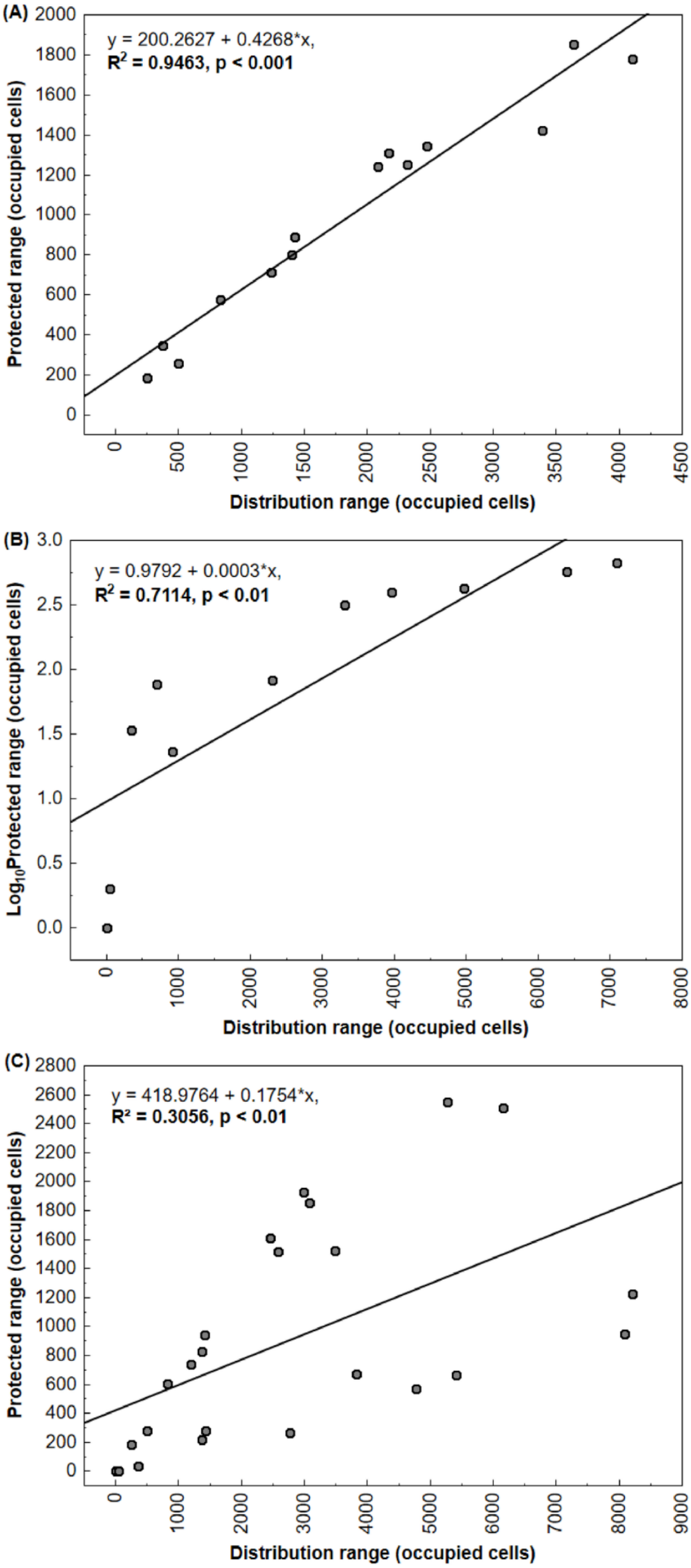
(A)
y = 200.2627 + 0.4268*x,
R² = 0.9463, p < 0.001
Protected range (occupied cells)
Distribution range (occupied cells)
(B)
y = 0.9792 + 0.0003*x,
R² = 0.7114, p < 0.01
Log10Protected range (occupied cells)
Distribution range (occupied cells)
(C)
y = 418.9764 + 0.1754*x,
R² = 0.3056, p < 0.01
Protected range (occupied cells)
Distribution range (occupied cells)

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Fig 3. Distribution of protected range in relationship to total range size within the study area. We observed a positive relationship between the total range and the protected range size of threatened taxa from Amazon (A), Cerrado (B) and all target species in the whole study area (C).

Considering Amazonian threatened taxa (n=14), within this biome, we observed that areas with higher estimated species richness (n≥7, i.e. ≥50%) are located in the north-western region of the study area (Fig 4A). The relationship between the sizes of each PA and the estimated species richness in this biome was positive (Fig 5A), i.e. the largest protected areas in this region have a wider number of species. For each 2.025 Km^2 (100 grid cells), a gain of protection of one species was obtained (Fig 5A). Regarding only the Cerrado's potential species richness, areas with higher values (n≥6, i.e. ≥50%) are inserted in patches in the southeast and south of the study area (Fig 4B). There was no relationship between the size of PAs of this biome and the estimated species richness, since the random model was sufficient to explain the observed variation (R^2 =0.201, p >0.05, y =0.8253*x^0.2276).

Considering the 24 target taxa together in the entire study area, the highest values of species richness (n≥12, i.e. ≥50%) were in the Amazon biome, and only some patches were highlighted in Cerrado, mainly in the southern part of the study area (Fig 4C). Within Cerrado, the estimated species richness with all target taxa reached a maximum of only 16% (Fig 4C). The relationship between estimated species richness and the size of each PA in the entire study area was positive (Fig 5B). For each 1.012 Km^2 (50 grid cells) a gain of protection of one taxon was obtained (Fig 5B).

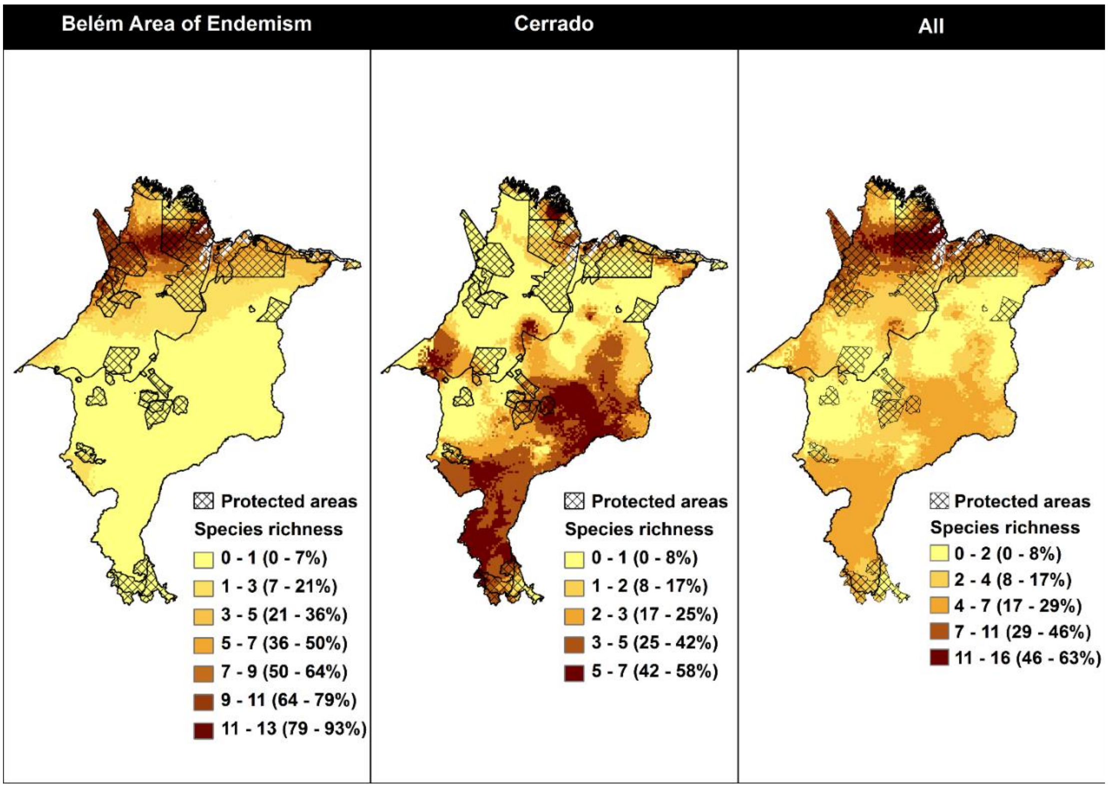

Fig 4. Estimated species richness in relationship to protected areas in study area.

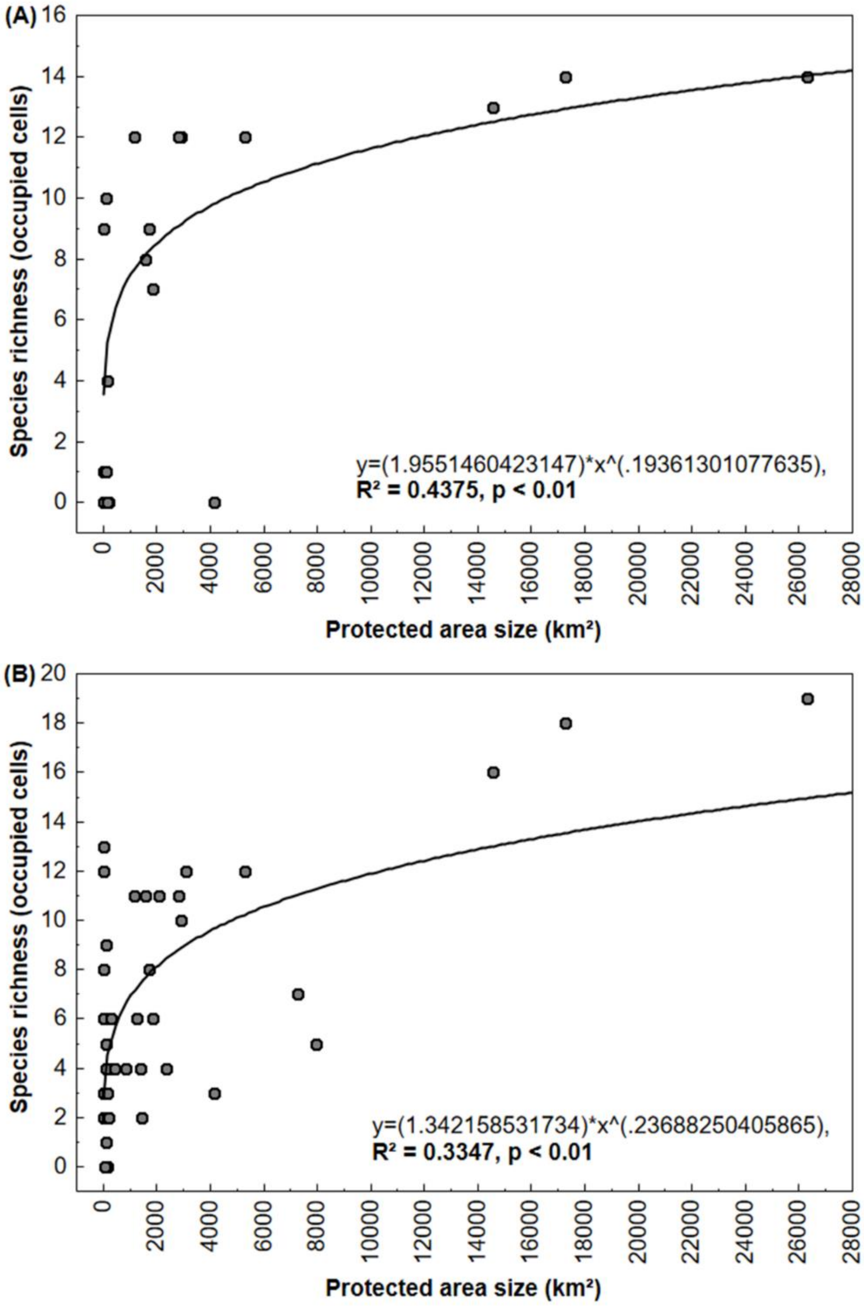

Fig 5. Distribution of species richness in relationship to the size of each protected area individually. A) Amazon biome and B) the whole study area.

Identification priority areas for conservation

Again, using the approach of analyzing Amazon and Cerrado, and their taxa, separately, we highlight two priority areas for conservation in the Amazon biome, and four areas in Cerrado (Fig 6). As aforementioned, these priority areas for conservation have a species richness ≥50% and still maintain native vegetation.

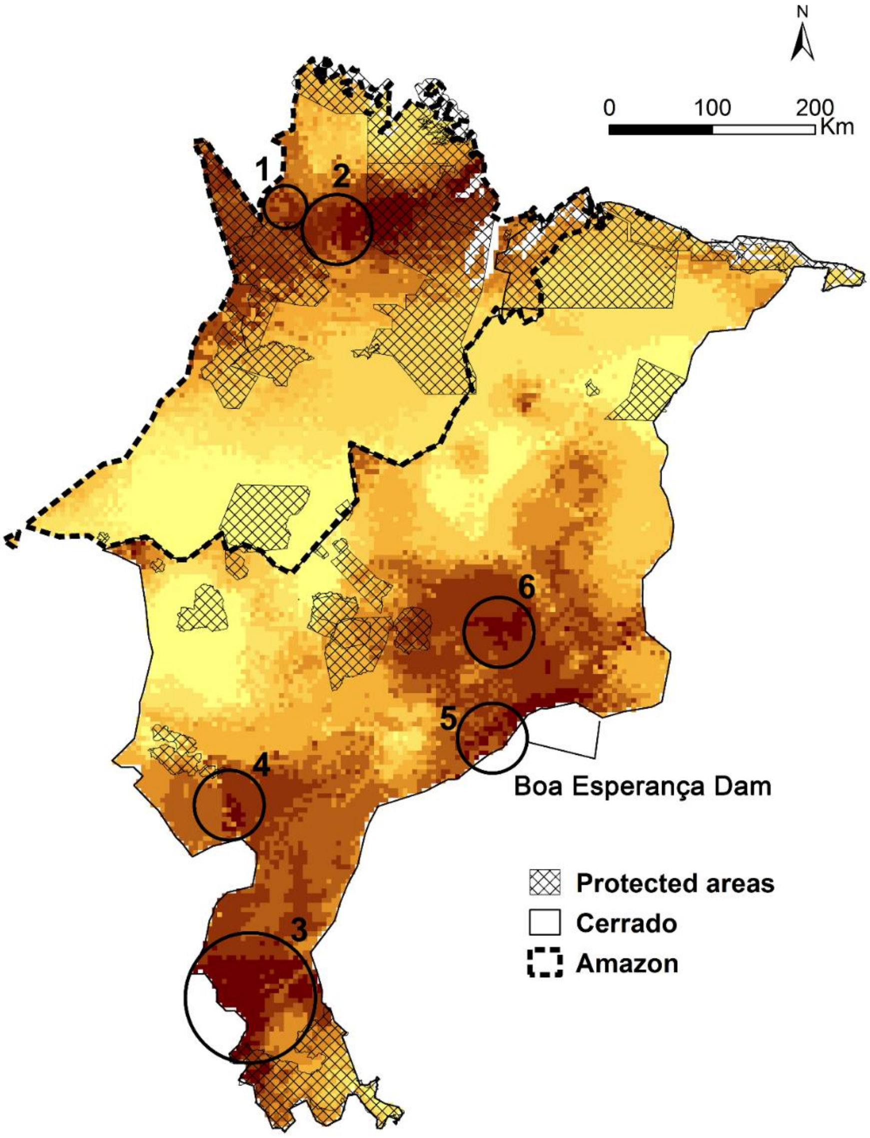

Fig 6. Priority areas for conservation. Study area showing the currently existing protected areas and indicating new priority areas for conservation according to the estimated species richness in the Amazon and Cerrado biomes, separately. 1 - Regions connecting APA Baixada Maranhense with indigenous land Alto Turiaçu; 2 – Extension of indigenous land Alto Turiaçu; 3 - Polígono das Águas in southern Maranhão; 4 - Southwestern Plateau; 5 - Mirador/ Uruçuí; 6 - Extension of the Maranhão semideciduous forest area, in central Maranhão.

Discussion

Species distribution models

Overall, our species distribution models (SDMs) agree with known distributions and ecological requirements of target taxa. Most target Amazon taxa have a high specificity for forested habitats [67], and in fact had predicted distributions mostly restricted to those regions. Only for *Crax f. pinima*, *Guaruba guarouba*, *Neomorphus geoffroyi*, *Hylopezus paraensis* and *Dendrocolaptes medius*, SDMs predicted their occurrence also in Cerrado, although these are forest-dependent taxa. In fact, these were predicted to occur in mangrove areas in coastal zones, because of the similar climatic features of mangroves and the neighboring rainforests. Cerrado and open areas taxa had SDMs consistent with their known habitat affinity [91–93]. For conservation purposes, models that estimate the full niche requirements are preferred [34]. Thus, our SDMs express the full niche of our target taxa, and so are adequate to perform gap analysis [86,87], even for taxa with low numbers of records (this study; [28,94]). As detailed in the next sections, we add support to the use of SDMs in the systematic conservation planning of Neotropical organisms, as previously shown not only for birds, but also other different taxonomic groups such as odonata [34], anura [6], turtles [49], and mammals [95].

Nonetheless, we know that the potential distribution maps are an abstraction that might not reflect species occurrence at fine geographic scales [96,97]. Furthermore, in ecotonal areas such as ours, which might represent a limit of distribution for several distinct taxa, species might have different ecological requirements than at the core of their distributions, and do not fully express their niches (incomplete niche expression), and finer-scale studies may be necessary to addresses some species-specific questions [98,99]. This is particularly important in the current fast climatic changing scenario all natural species are facing. As our SDMs show, Amazonian and Cerrado birds seem to have totally distinct climatic requirements, and so may respond differently to climate change. Thus, to decrease the Wallacean shortfall, we propose that more studies are necessary in such transition regions in the Neotropics, considering the lack of information and that the ecotonal condition may promote a high species richness [100].

Species estimated protected distribution

Taxa with broad distributions are potentially as protected as taxa with smaller distributions within the study area. Nonetheless, despite the positive relationship between the amount of potential range and the amount of potential range that is protected, this latter proportion varied enormously between biomes.

Taxa with a potential area of distribution wider than 250,000 km^2 must have at least 10% of its distribution protected, and taxa with smaller distributions (around 10^3 km^2), should be fully protected, i.e. 100% of its potential distribution must be included in PAs [101]. Within the study area, most target taxa had potential distributions greater than 10^4 km^2. Thus, no less than about 60% of their potential ranges should be protected [102]. For the target Amazonian taxa, this is close to the mean percentage of potential protected area estimated, suggesting these species are well protected. However, the Critically Endangered *C. f. pinima* and *P. obscurus,* and the

Threatened *P. paraensis*, *N. geoffroyi* and *D. r. paraensis* occur at low population densities, even in well-preserved areas, and most of them have already been indicated as likely extinct at a regional level, even in still forested areas, due to degradation and hunting, particularly in western BAE [67,103–108]. This implies that, despite our results on linear regression analyses, these taxa might need further conservation actions. More importantly, they exemplify the need to gather the most up to date information available on Neotropical species; otherwise more recent impacts of habitat loss and degradation might be overlooked.

Within the Cerrado portion of the study area, the mean potential area of distribution estimated to be currently protected was only of 12%; a percentage close to the 10% recommended by Rodrigues' et al.[101] for widespread species. Yet, it is alarming that, even considering the whole biome, hardly any Cerrado species will overcome this threshold, because current PAs system within Cerrado is highly inefficient in conserving bird species [39]. Only 12 (32%) of the target species analyzed by Nóbrega & De Marco [33] had 5% of their distribution protected, even when authors considered all Brazil, and none of them even reached the 10% threshold if considering only large reserves [33]. Furthermore, protected potential distribution of Cerrado species might be insufficient to maintain viable populations, due to the high level of fragmentation, especially within the southern part of the biome [109]. In fact, endemic Cerrado birds are already presenting signs of a decreasing gene flow due to anthropogenic habitat fragmentation and degradation [110]. Moreover, Cerrado endemics have highly specific habitat requirements, such as the Vulnerable *C. ferdinandi* [59,72,111]. Its potential protected distribution was estimated to be only 3% in the study area, despite occurring in more than about 22,000 km^2. The demand for a specific conservation plan for this species was already stressed elsewhere [39], and our results further support this recommendation.

Our study reinforces the need to overcome the huge Wallacean shortfalls that prevents proper conservation planning of Neotropical species. Assessments based on species-specific information, not only occurrence data, but also biological and ecological data, should be added to general conservation plans [46], and must be thorough and updated frequently, due to fast land-use changes. Not only the Amazon and Cerrado are losing native vegetation at a fast rate, but many other Neotropical regions are equally or more threatened. For instance, the Brazilian Atlantic forest, the tropical Andes, and the Chilean Winter Rainfall-Valdivian Forests were, almost two decades ago, highlighted as hotspots of biodiversity [3], and their degree of threat has still not changed [15].

Estimated endemic and threatened species richness

According to our data, larger PAs are more efficient, i.e. have higher species richness, than smaller PAs. Relationship between the size of Amazonian PAs and potential Amazon species richness was positive, but with a low explaining power. The low coefficient of determination obtained (R^2=0.43) was influenced by the indigenous lands Alto Turiaçu, Alto Rio Guama, Awa, and Caru, and the conservation unit REBIO Gurupi, which altogether assemble the forest block of Gurupi, totaling 13,900 km². These distinct PAs, have distinct kinds of usage, and so were analyzed separately, but biologically they seem to be in fact a unit, having a similar species richness as bigger PAs (APA Baixada Maranhense, 17,285 km² and APA Reentrâncias Maranhenses, 26,285 km²). Considering the forest block of Gurupi as a unique PA would increase the coefficient of determination, and so the positive relationship (data not shown). This relationship is in agreement with previous findings [112,113]. Peres [112] further states that only a well-connected network of mega-reserves, exceeding an area of 10,000 Km², would cover a major portion of regional biodiversity, preserving populations of rare predators, but also species with seasonal movements (e.g. *G. guarouba* and *A. xanthops*), and animals impacted by hunting (e.g. among our target taxa, *P. obscurus* and *C. f. pinima*). In fact, within eastern Amazon, roads seem to impact on avian species richness and composition due to habitat fragmentation but also by facilitating logging, fire, hunting, and other traffic disturbances [114]. Additionally, considering the potential effects of the predicted climate changes upon overall biodiversity, patch connectivity may become even more important to guarantee species dispersal in the future. Mega-reserves are considered to enable species to better overcome climatic changes than smaller PAs [115], since larger areas potentially enable species to maintain larger population sizes, with greater genetic diversity, allowing them to adapt their niches and distributions in changing environments [113].

Within Cerrado, we did not find a relationship between PA size and species richness, but Cerrado PAs are mostly misallocated, covering areas of low species richness, and not suitable for cultivation. As abovementioned, Cerrado PAs are failing in protecting the biome´s biodiversity (this study;[39]).

Our results agree with Marini et al. [39], Bini et al. [6], and Peres [112] in that more (and larger) PAs are needed to maintain eastern Amazon and Cerrado biodiversity. Noteworthy, both Amazon and Cerrado PAs face the same anthropogenic pressure as other Neotropical regions [116–118], so similar studies are still needed throughout the Neotropics to review the systems of PAs (but see [119–121]).

Identification of priority areas for conservation

Considering the entire BAE, less than 17% of its area is currently protected (1.4% conservation units of full protection, 9.77% conservation units of sustainable use, and 6.49% indigenous lands [65]). Currently, the greatest rates of deforestation, within the Amazon, occur precisely in the east, due to a stronger pressure from economic groups that occupy public and private lands for the development of agricultural production, logging and cattle-raising [122]. One of the most important areas currently protected, REBIO Gurupi, has also lost 20% of its area due to illegal occupation for agricultural exploitation, extraction of wood, burning and deforestation made by squatters and other landowners [67,123–125]. REBIO Gurupi is part of the forest block of Gurupi, that together with APA Baixada Maranhense, and APA Reentrâncias Maranhenses were identified as Important Bird Areas (IBAs), with the occurrence of Endangered and Near Threatened species' populations and "trigger species", and also considered of "extreme importance" (this study;[71,103,124]). Thus, and according to Peres' [112] recommendations to extend PAs networks into mega-reserves, we highlight the regions connecting APA Baixada Maranhense with indigenous land Alto Turiaçu, and an extension of this last PA as priority for conservation actions.

Cerrado holds 5% of the planet's biodiversity and is considered the richest savanna in the world, but one of the most threatened regions in Brazil, which has lost about 48% of its native vegetation until 2008, and has only 2.2% of protected area [60,62,69]. Estimates indicate that at least 20% of endemic and threatened species within the whole biome remain outside parks and reserves [126]. As extensively debated above, Cerrado system of PAs needs to be revised (this study,[6,39]), but the better location of new PAs has been contentious. According to Bini et al. [6], weighting for the knowledge on species distribution, new areas in the north of the biome should be priority, but for Marini et al. [39] and Diniz-Filho et al. [127,128], these new areas should be in the southern part of the biome, since species richness was higher there. The priority areas for conservation we suggest, not only had higher species richness and still hold extensive native vegetation, but also were already recommended to acquire conservation unit status by MMA [71] (Polígono das Águas in southern Maranhão, Southwestern Plateau, and Mirador/ Uruçuí). The last area was also indicated as an IBA for the presence of endemic species as *A. xanthops*, *M. torquata*, *C. cristatellus*, *P. caerulescens*, *C. eucosma*, *S. atricollis* and the threatened *C. obrieni* [124]. In central Maranhão, we recommend the extension of the Maranhão semideciduous forest area (also already highlighted by [71]).

Finally, our results highlight the importance of indigenous lands in the conservation of Neotropical biodiversity. Among the areas with higher species richness (≥50% of taxa), more than a half were indigenous lands. Brazil's forestry code (Law 12651, Article 3, 25 May 2012) classifies indigenous lands as areas of full protection. However, Rylands [129] and Instituto Socioambiental et al. [92] categorize indigenous lands as areas that allow human occupation and/or sustainable management activities, having a conflicting view about the land uses that should be allowed in these areas [131]. Given the value of indigenous lands for conservation, the development of community management plans is essential to conserve the biological resources of the region, and is beneficial for all society [67].

Conclusions

Protected Areas in Eastern Amazon are large and, at least in part, well connected, holding high biodiversity. Nonetheless, the lack of overall biological knowledge, and the high rate of deforestation, habitat degradation, and mostly economic pressures make studies such as ours only useful if accompanied by an increase of public awareness, adequate governmental policy, and proper conservation planning. Noteworthy, this is most striking in Cerrado, where scientific debate on conservation actions has been quite intense and controversial, but habitat degradation has increased. Nonetheless, our results further validate governmental reports on the implementation of new PAs, and encourage putting these findings into practice.

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S1 Fig Occurrences for the taxa analyzed. A-X) Twenty-four maps depicting 929 records obtained from the literature (triangles), museum collections (diamonds), online databases(crosses), and field expeditions (circles).

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(B) Psophia obscura

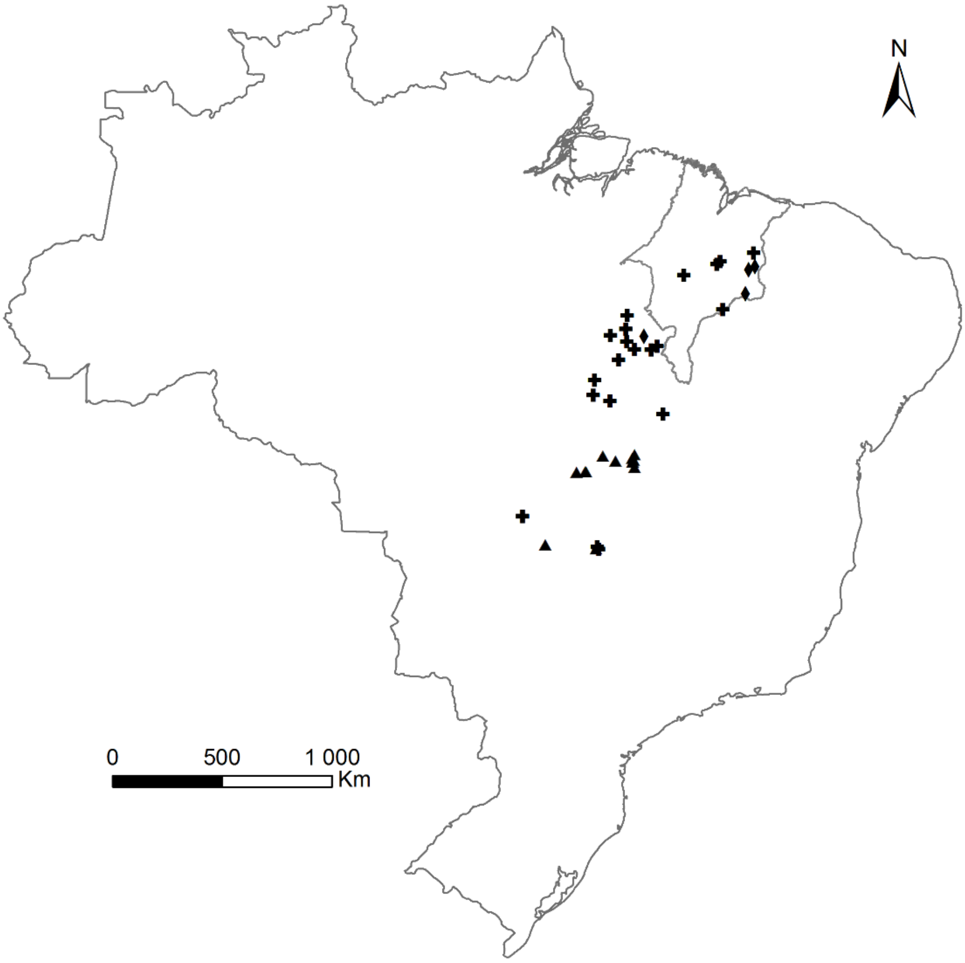
(C) Guaruba guarouba

(D) Pyrrhura coerulescens

(E) Neomorphus geoffroyi

(F) Pteroglossus bitorquatus bitorquatus

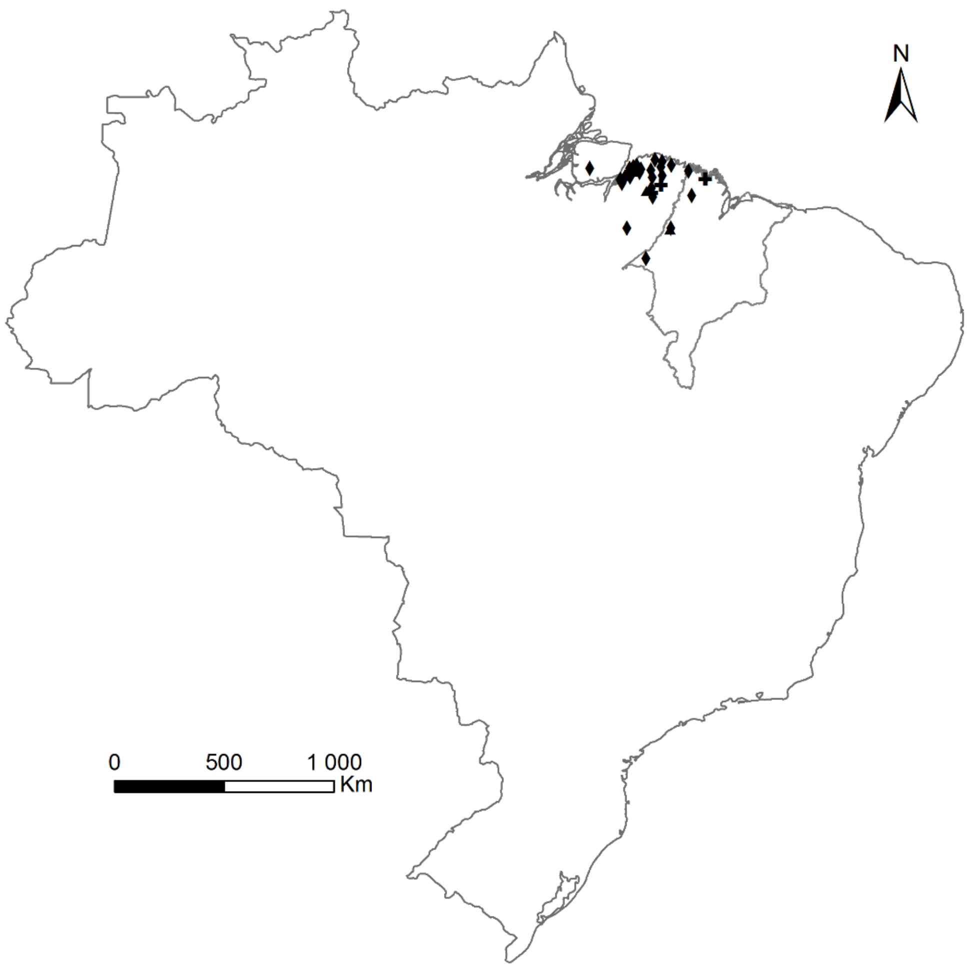
(G) Celeus obrieni



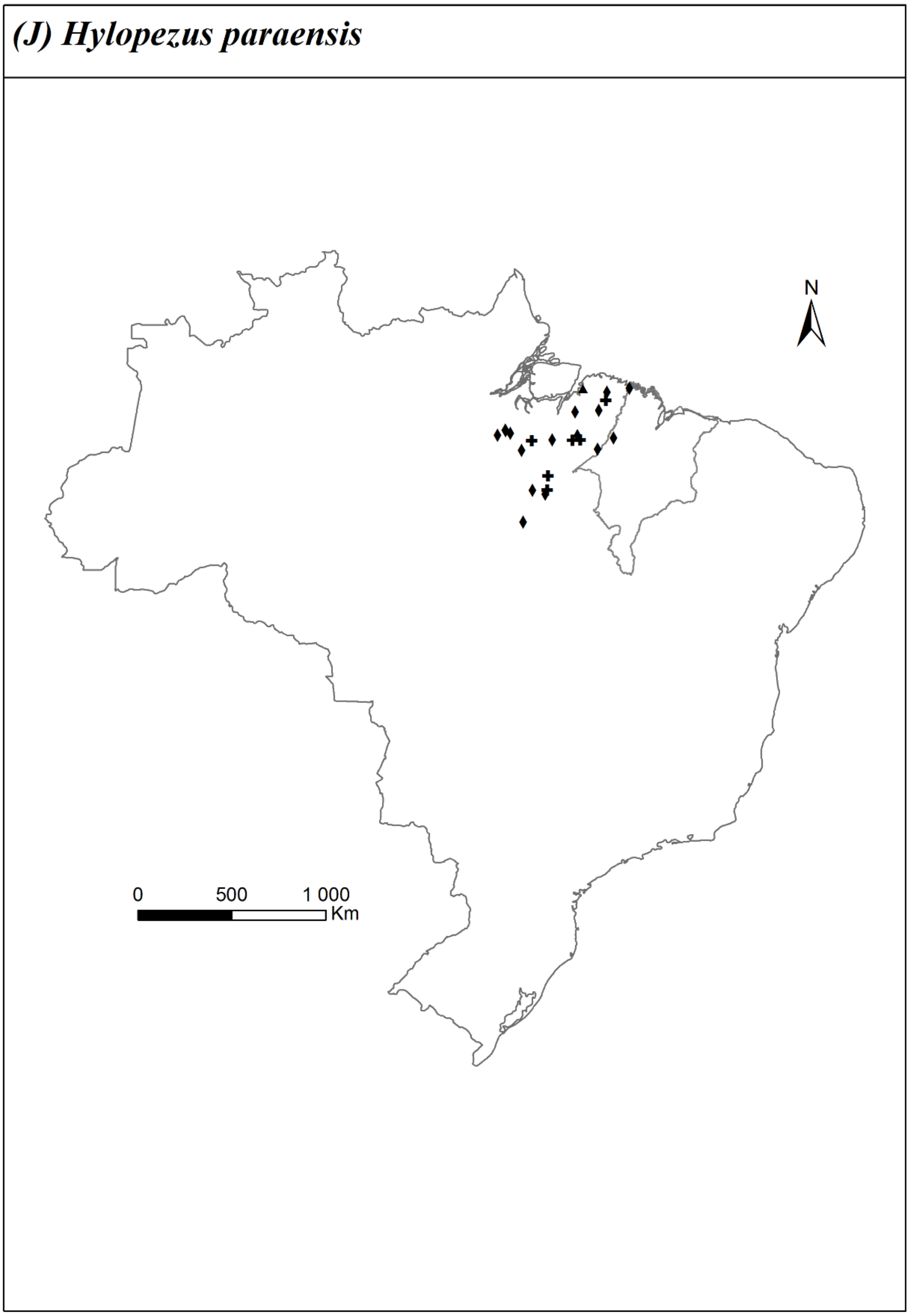
2154

(H) *Piculus paraensis*

(I) Phlegopsis nigromaculata paraensis



2156



(K) Dendrocincla merula badia


(L) Dendrexetastes rufigula paraensis
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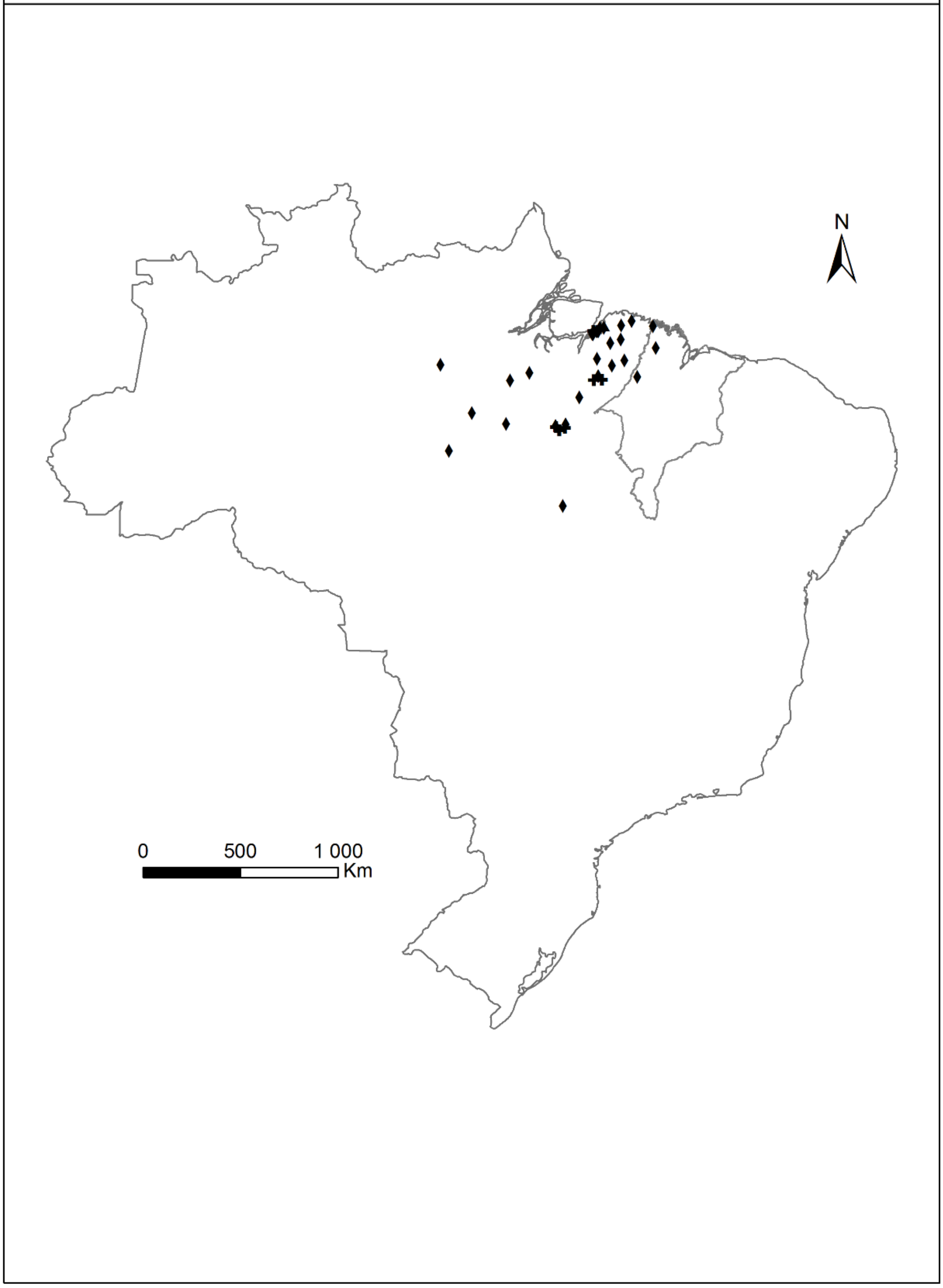
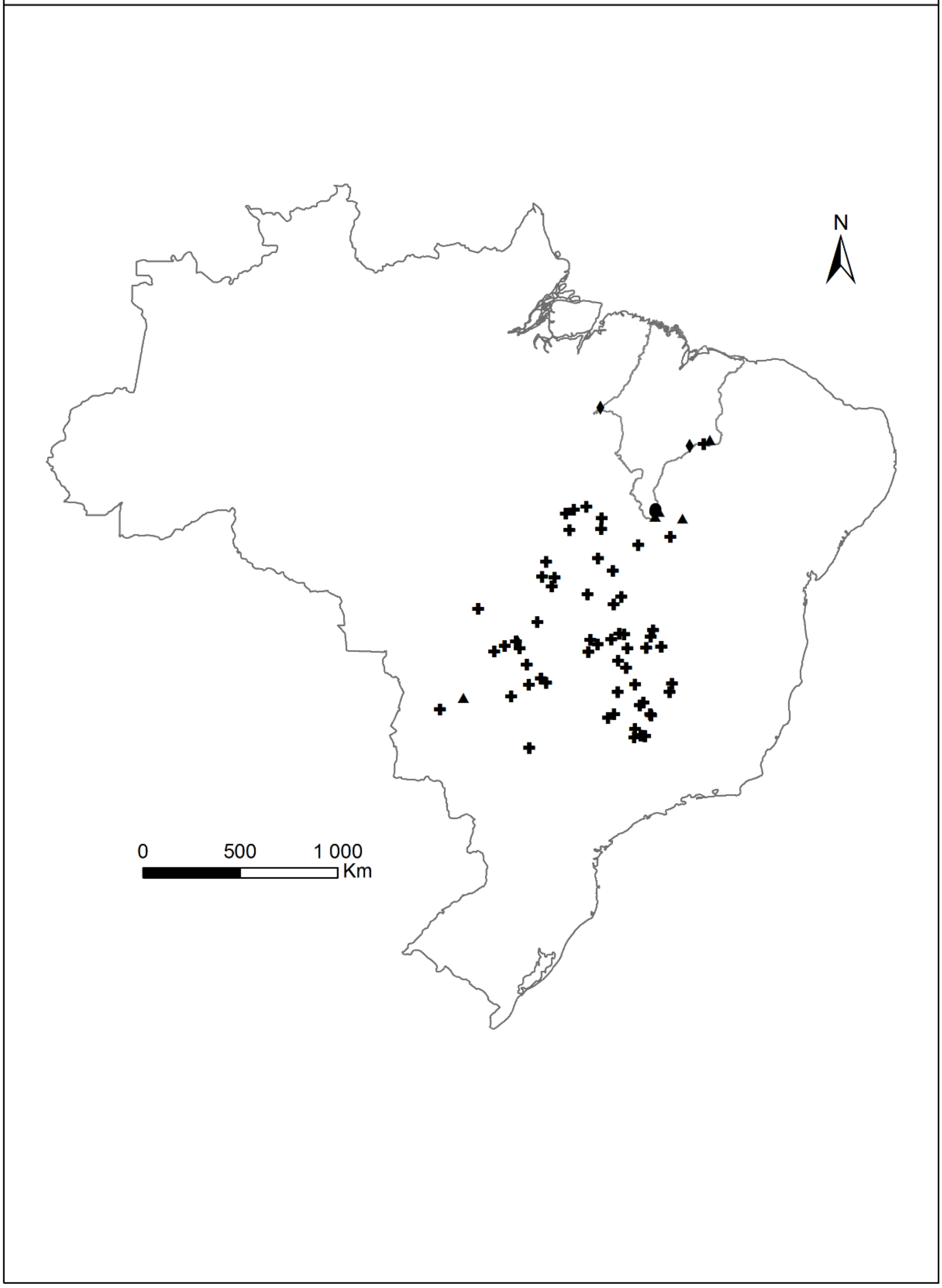
(M) Dendrocolaptes medius

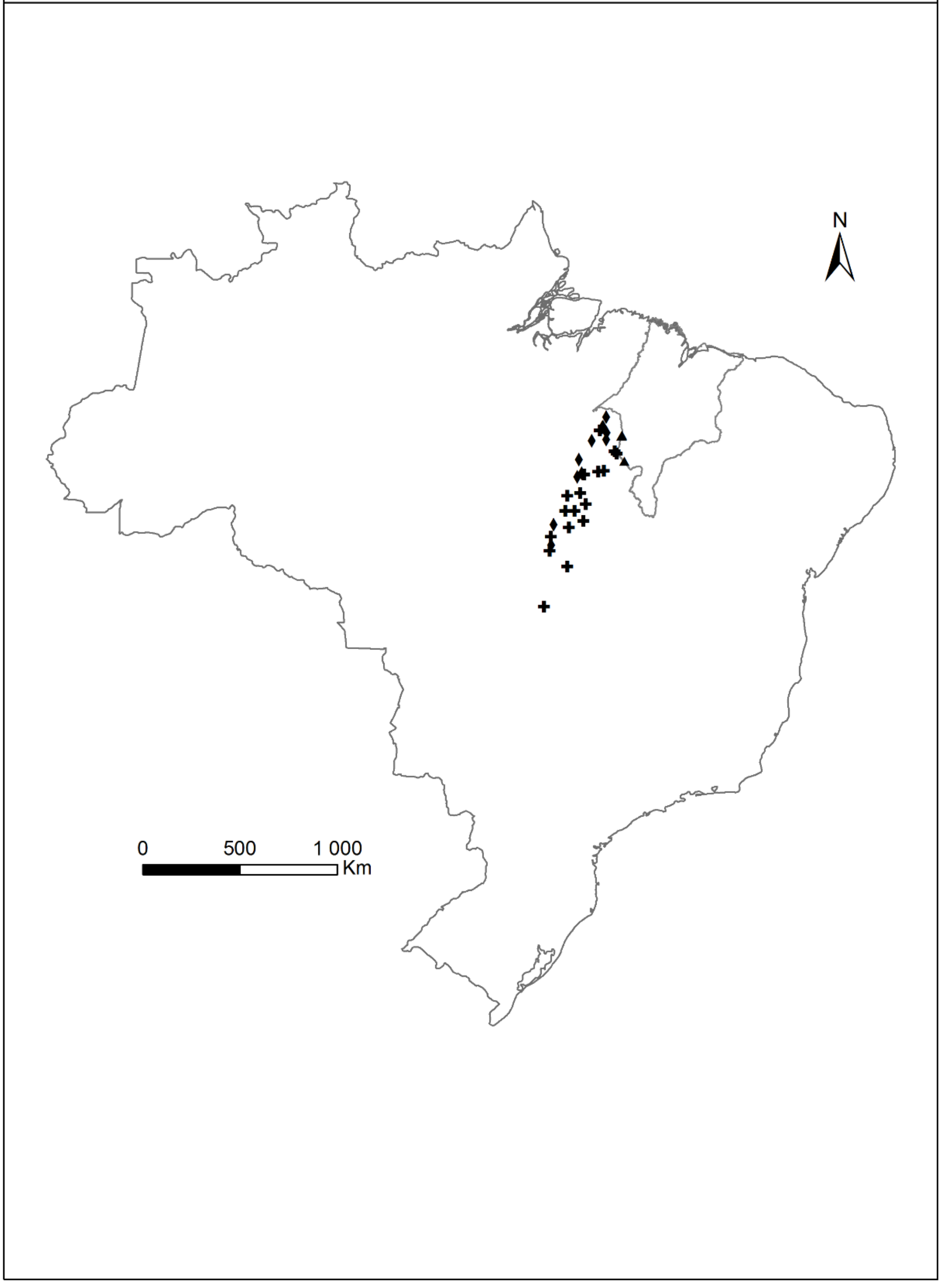
(N) Hylophilus ochraceiceps rubrifrons



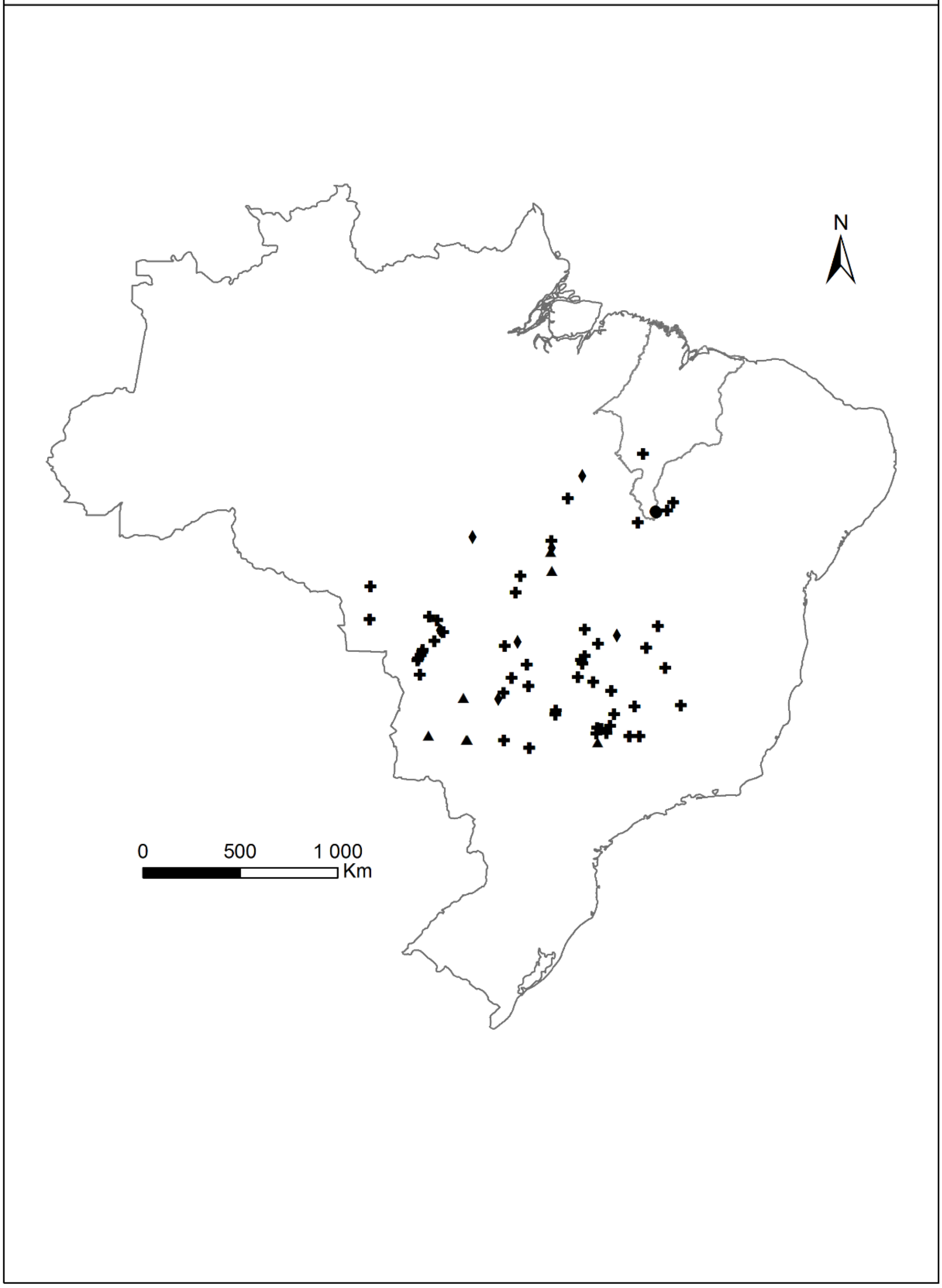
(O) Alipiopsitta xanthops



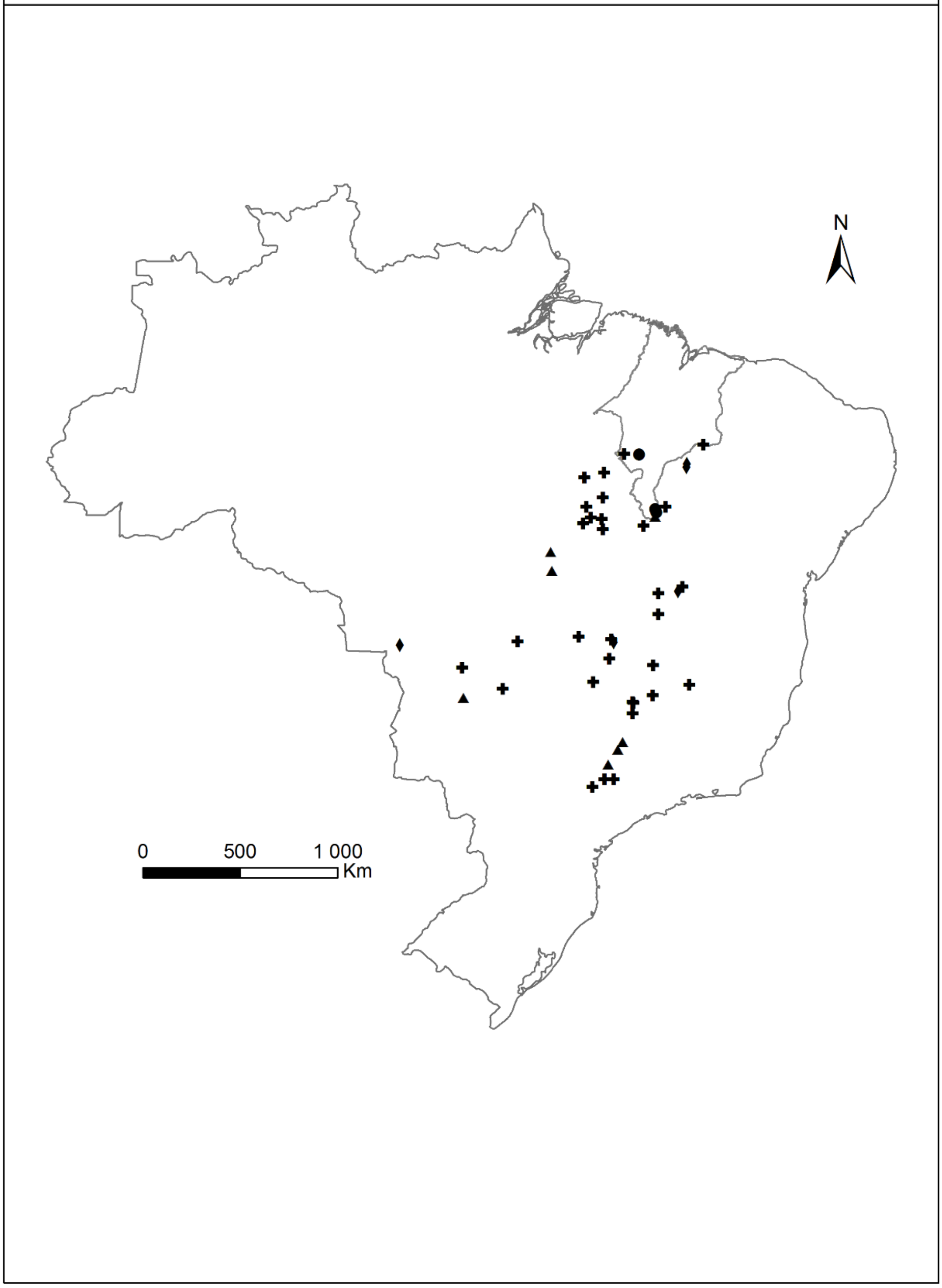
(P) Cercomacra ferdinandi



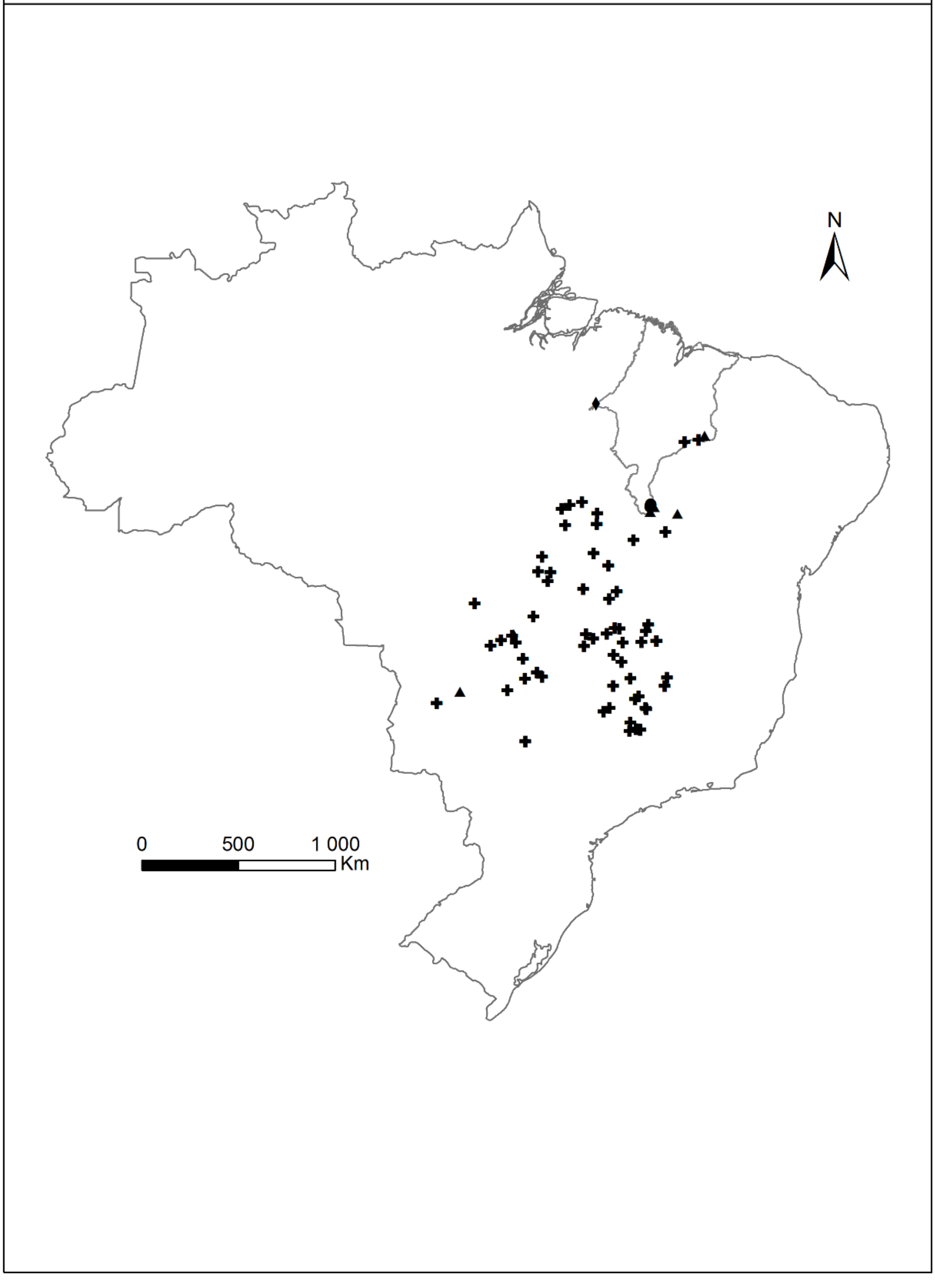
(Q) Herpsilochmus longirostris



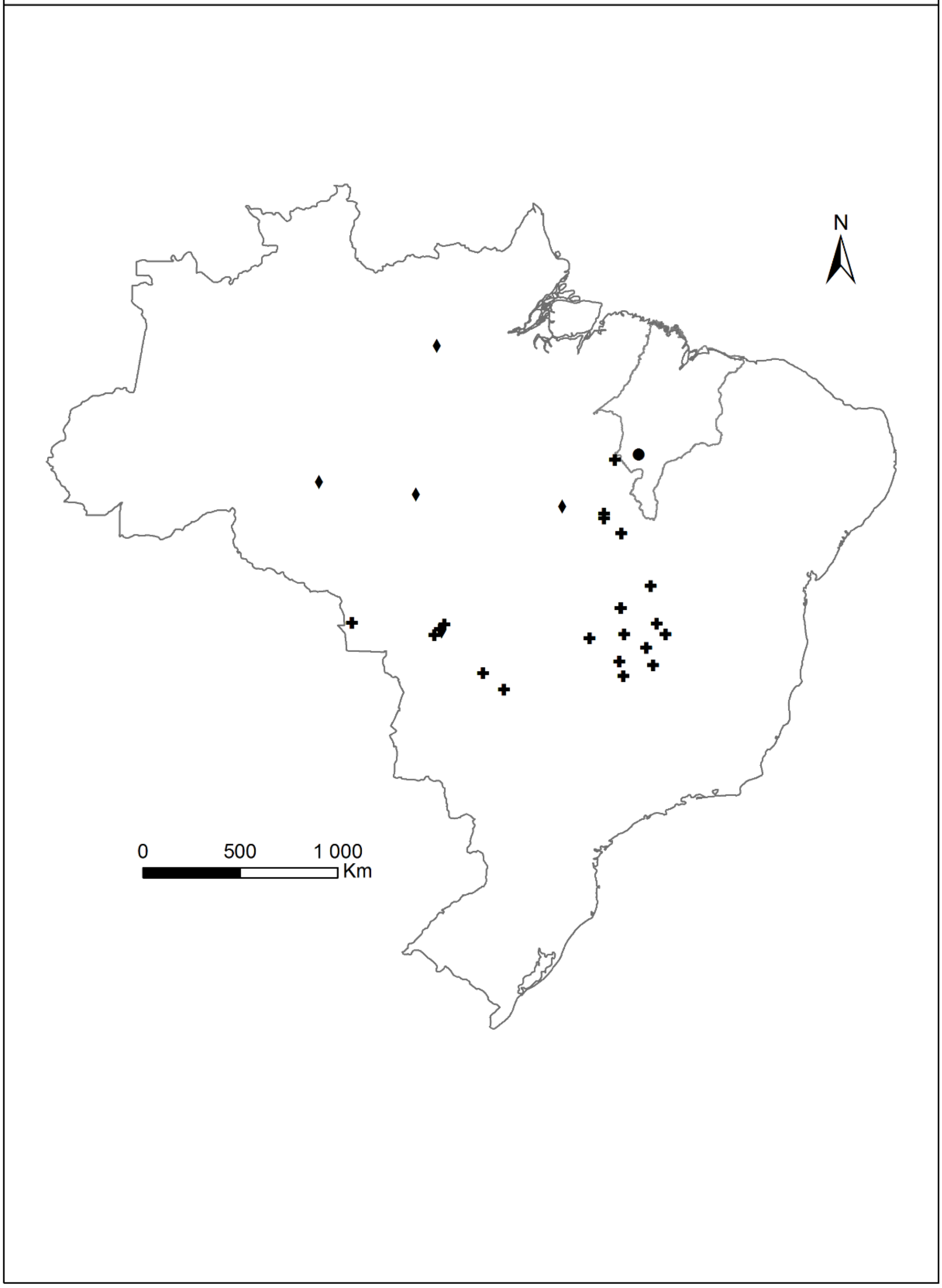
(R) Melanopareia torquata



(S) Antilophia galeata



(T) Suiriri affinis



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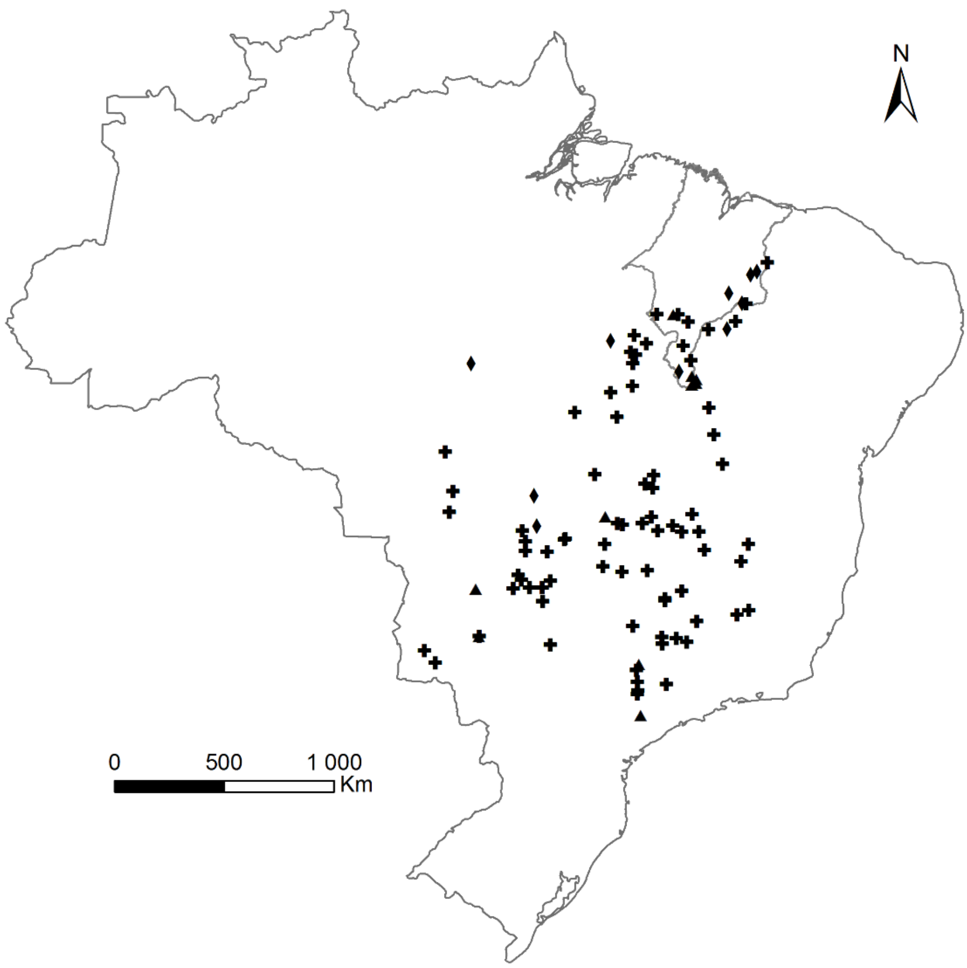
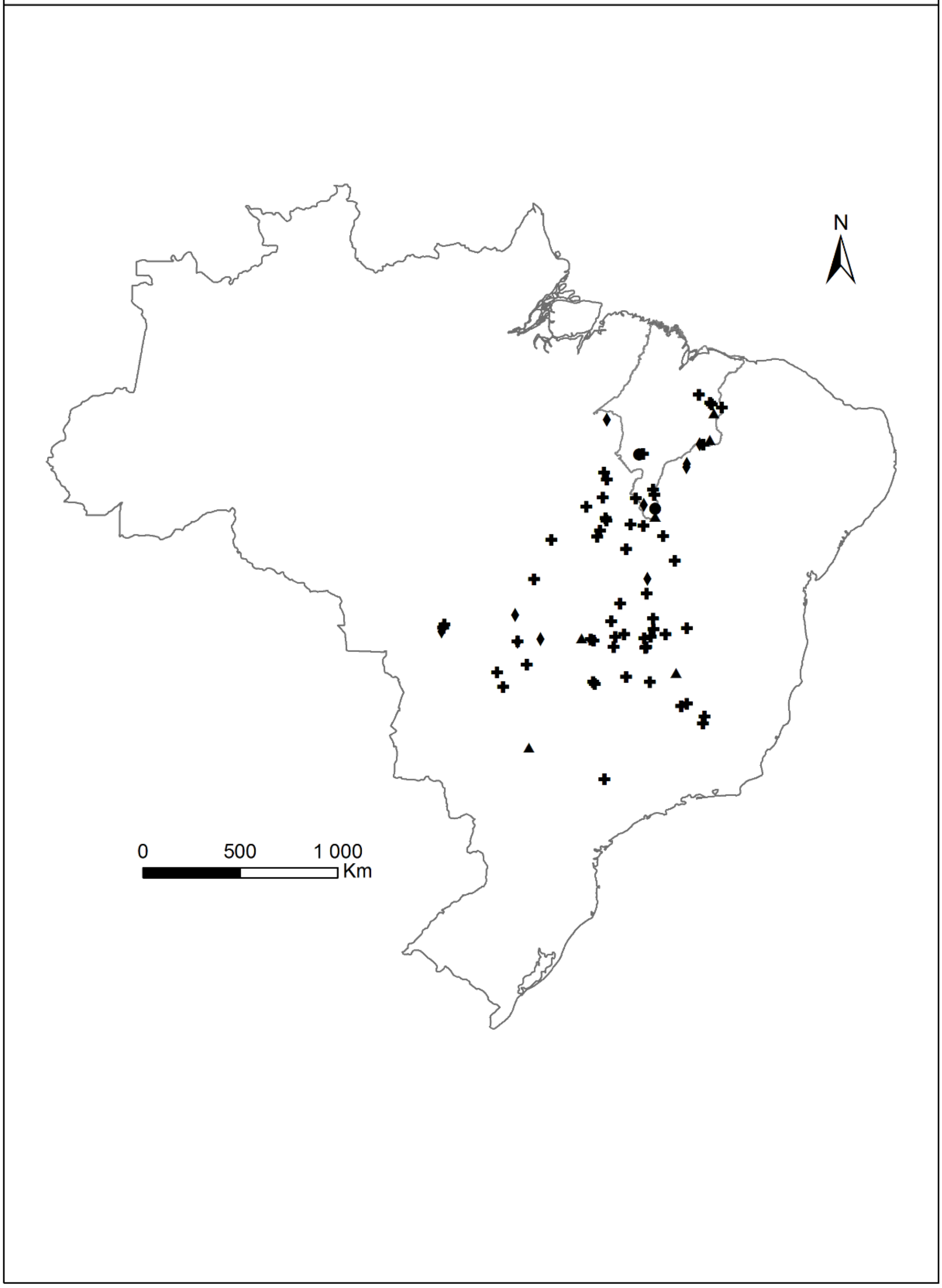
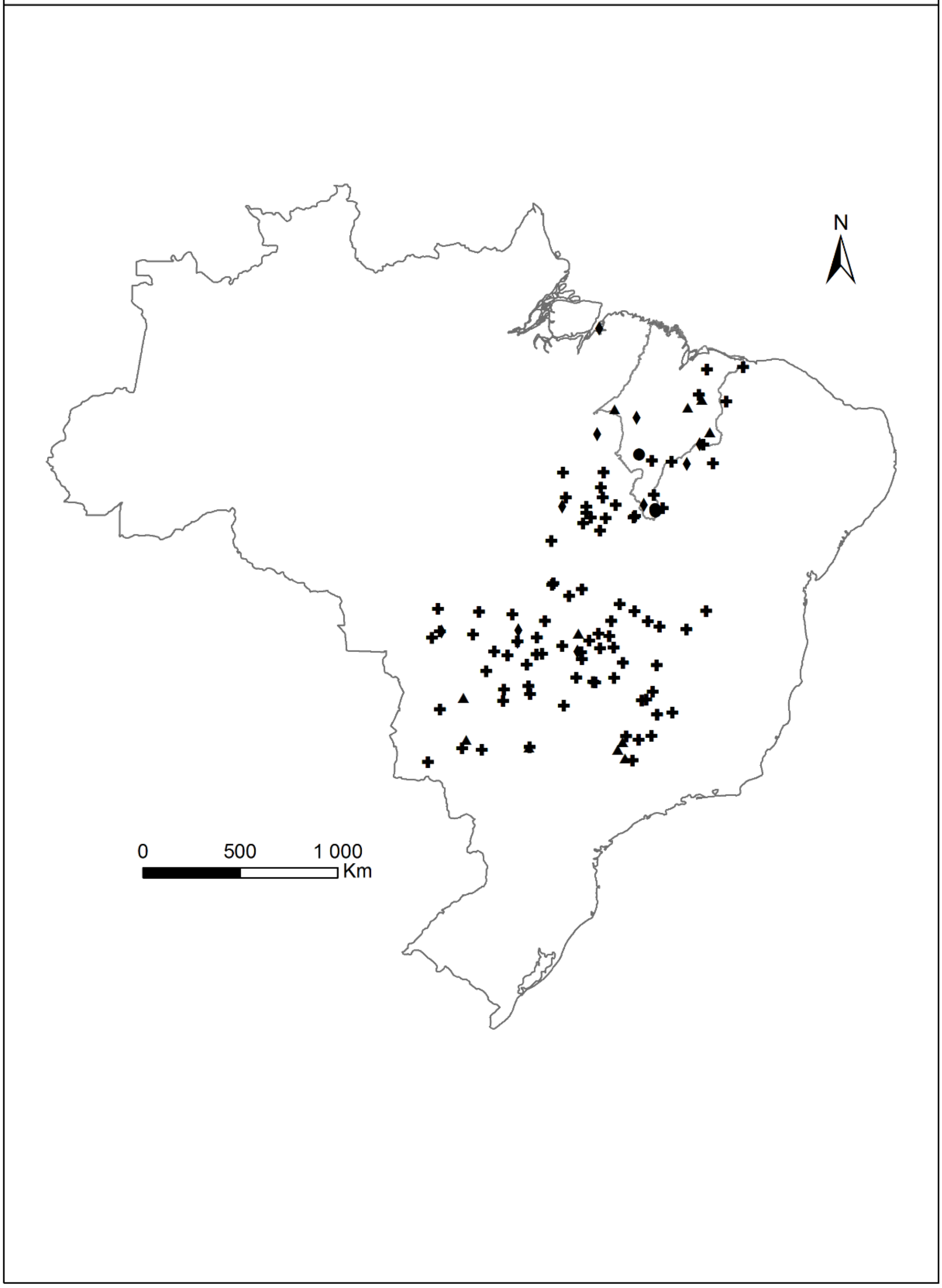
(U) Cyanocorax cristatellus



(V) Charitospiza eucosma



(W) Saltatricola atricollis



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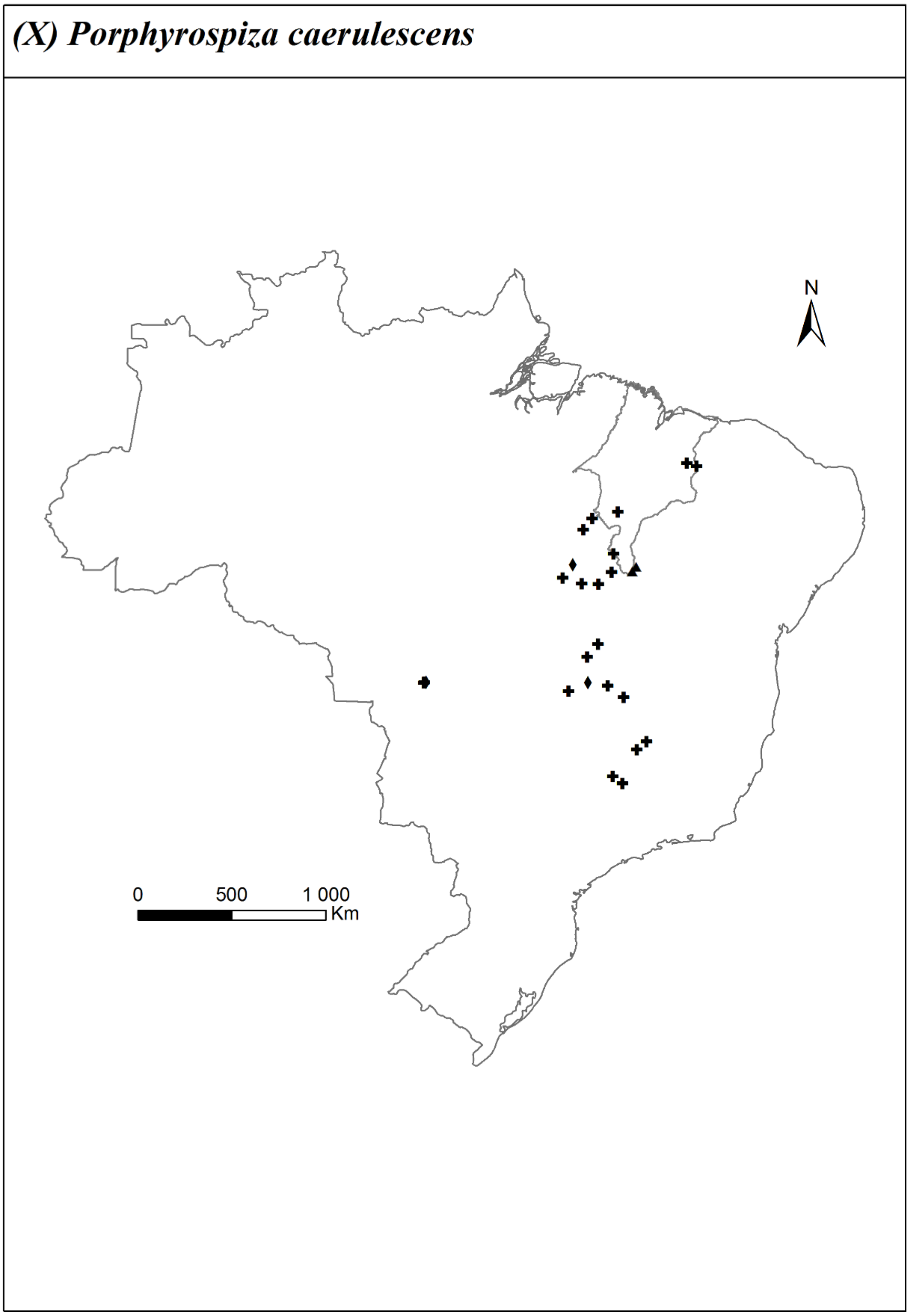
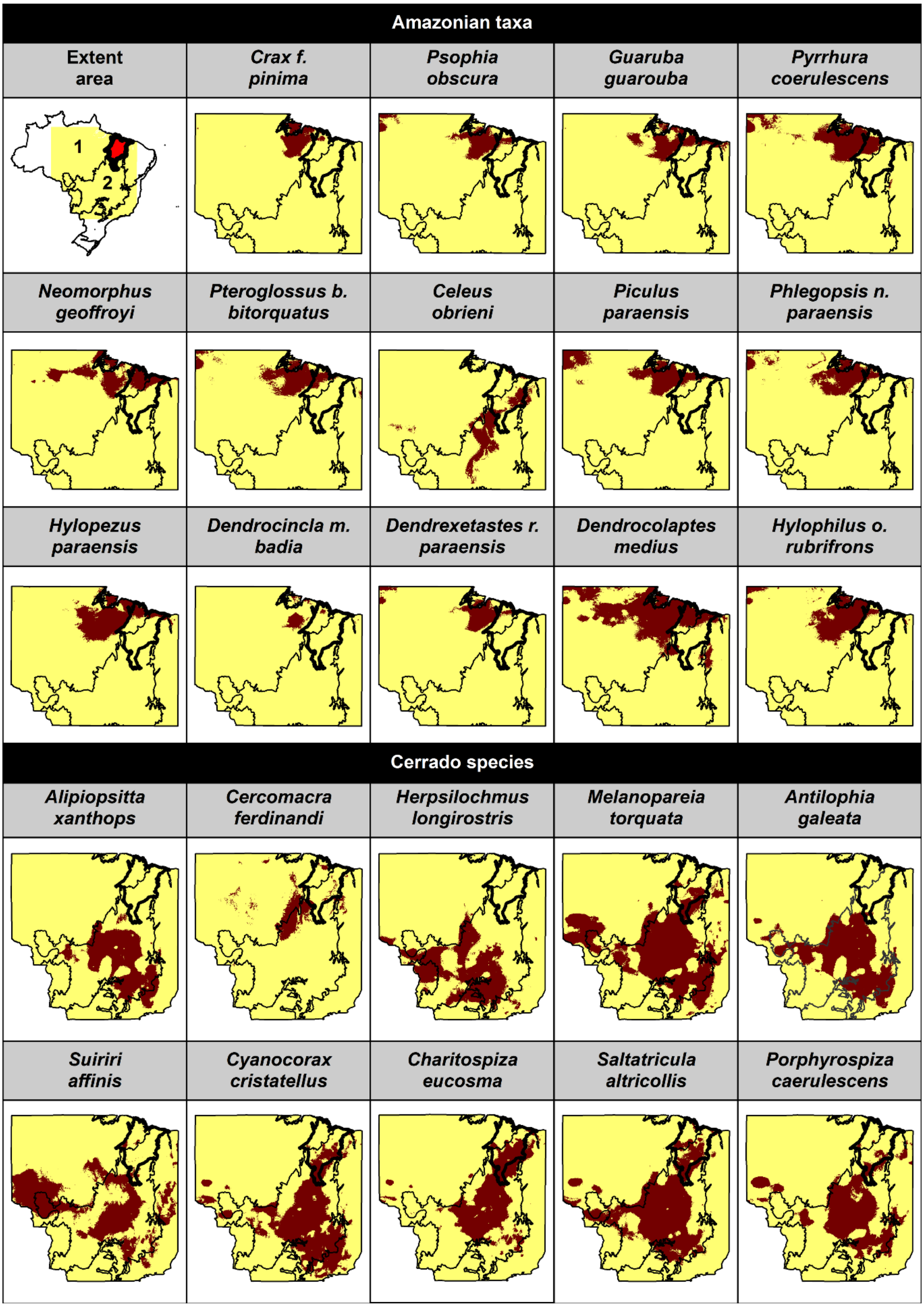


S2 Fig Species distribution models. First map depicts the extent area in yellow, and the study area in red, Amazon 1) and Cerrado 2) biomes, and all the other maps represent the 24 SDMs estimated. SDMs for *Herpsilochmus longirostris* and *Alipiopsitta xanthops* include potential distributions overlaid by the border of the study area.



Capítulo 3

Predicting the future of endangered birds from a Neotropical ecotone

O capítulo III desta tese/Dissertação foi elaborado e formatado conforme as normas da publicação científica *Conservation Biology*, as quais se encontram em anexo (Anexo 3).

Predicting the future of threatened birds from a Neotropical ecotone area

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Abstract

Climate change affects ecosystems in different ways. These effects are particularly worrying in the Neotropical region, where species are most vulnerable to these changes because they live closer to their thermal limit of safety. Thus, the establishment of conservation priorities, particularly for the definition of protected areas (PAs), becomes a priority. However, some PAs systems within the Neotropics are not effective even under present environmental conditions. Here, we test the effectiveness of a PAs system, within an ecotone in northern Brazil, in protecting 24 endangered bird species under current and future (RCP8.5) climatic scenarios. We use species distribution modelling, and dispersal corridor modelling to describe priority

areas for conservation. Our results indicate that several threatened bird taxa are and will potentially be protected, i.e. occur within PAs. Nonetheless, the amount of protected area is and will be insufficient to maintain the species in the ecotone. Moreover, the majority of taxa will probably present drastic declines in their range sizes, and some were even predicted to go globally extinct in the near future. Thus, we highlight the location of a potentially effective system of dispersal corridors that connects PAs in the ecotone. We reinforce the need to implement public policies, and raise public awareness to maintain and mitigate anthropogenic effects within PAs, corridors, and adjacent areas, aiming to conserve the richness and diversity of these already threatened species.

Keywords: Amazon forest; Cerrado; Climate change; Dispersal corridors

Introduction

Climate is a primary control of wild species distributions and ecosystem processes (Townsend et al. 2003). As climate changes, mostly induced by anthropogenic actions resulting in increasing levels of greenhouse gases in the atmosphere (Siegenthaler et al. 2005; IPCC 2007), ecosystems are affected in different ways. Entire biomes are subject to rapid modifications due to regimes disturbances, colonization of new species, local extinction of populations or even extinction of whole species, among others (Parmesan & Yohe 2003; Thomas et al. 2004; Parmesan 2006; Lemes & Loyola 2013).

These effects are particularly worrying in the Neotropical region (Williams et al. 2007). The Neotropics hold several hotspots of biodiversity (Myers et al. 2000), where species are exceptionally vulnerable to climate changes (Williams et al. 2007; McCain 2009; Khaliq et al. 2014), because they already live closer to their limit of thermal safety (Dillon et al. 2010; Sinervo et al. 2010; Huey et al. 2012). This fact prevents their fit development to even higher temperatures, which will likely be reached sooner than previously though (Tewksbury et al. 2008), and that so will probably exceed species thermal tolerance very rapidly (Araújo et al. 2013).

Therefore, ongoing climate changes are undoubtedly recognized as a primary concern for the establishment of conservation priorities (Thomas et al. 2004; Thuiller et al. 2005), and so to the definition of protected areas (PAs) (Dudley et al. 2010, Vale et al. 2018). Protected areas play a prominent role in conservation under climate changing scenarios, sustaining different microclimatic conditions in heterogeneous habitats, and so avoiding species to face extreme climatic conditions (Sunday et al. 2014). However, the establishment of most PAs in the Neotropical region was not designed under objective criterions and planning methods, resulting in an insular system of PAs (Rylands & Pinto 1998). Such systems are only suitable for temporary insular ecosystems, and are more likely to turn populations even more vulnerable, increasing the risk of local extinctions (Hansen et al. 2007). To overcome this limitation and connect isolated PAs, the creation of dispersal/ecological corridors has been recommended and successfully tested (Haddad et al. 2003; Crooks & Sanjayan 2006).

Dispersal corridors are habitat portions that allow the species movement between habitat patches (Beier et al. 2008). Corridors are an important conservation management tool to increase connectivity in heterogeneous landscapes, constituted by patches of suitable and unsuitable habitats (Crooks & Sanjayan, 2006), which may promote gene flow between more or less isolated populations, and mitigate other habitat fragmentation effects (Brudvig et al. 2009; Gilbert-Norton et al. 2010), such as reducing chances of inbreeding depression (Brown et al.2004). and decreasing rates of stochastic extinction (Fahrig & Merriam1994). Nonetheless, the identification of corridors requires a thorough mapping of landscape permeability to the movement of target species, and the modeling of possible paths of organisms through that landscape (Koen et al. 2010). Connectivity models need to be developed to predict the least cost way to estimate the multiple paths of movement (Beier et al. 2008; Cushman et al. 2007; Pinto & Keitt 2009), considering not only the resistance of the landscape, i.e. suitability of each habitat composing the landscape to the species movement, but also the species movement behavior, and movement risk (McRae & Beier 2007; McRae et al. 2008; McRae et al. 2016).

Neotropical birds constitute a group of interest for wildlife conservation, since several studies predict large declines in their future geographic distributions (Anciães & Peterson 2006; Marini et al. 2009a; Marini et al. 2009b; Loiselle et al. 2010; Foden et al. 2013), which thus seriously threatens the world biodiversity (Lawler et al. 2009). The highest number of bird species is found in the Neotropics, even surpassing other vertebrate species, and this is also the most threatened and poorly known group of vertebrates worldwide, with new species being discovered routinely (reviewed by Jenkins et al. 2013).

Eastern Amazon, in northern Brazil, is an ecotone region comprising Amazon forest and Cerrado, a tropical savanna. This is an excellent region for a case study to understand vulnerability of bird species to climate changes. This region is one of the most heterogeneous within the Amazon basin, presenting a wide variety of landscapes (Ab'Saber 1977; Mello et al. 2000; IBGE 2013). In this ecotone, biodiversity is threatened by the intensive anthropic pressure, and high rates of deforestation, mostly due to the massive expansion of agribusiness (Nepstad et al. 1999; Wood & Porro 2002). Noteworthy, 61% of the threatened bird species from the Brazilian Amazon mainly or exclusively occur in this portion of the Amazon basin (IBAMA 2014), whereas Cerrado is the second biome with the highest number of threatened bird species in Brazil (Marini and Garcia, 2005). Protected areas within eastern Amazon constitute an insular system of PAs, although an ecological corridor was recently proposed to connect some of the biggest PAs (Celentano et al. 2018). Nonetheless, Celentano et al. (2018)

did not evaluate the utility of the corridor under a scenario of future climate change, and this corridor is still likely to be insufficient to protect bird species within the Cerrado portion of the ecotone, where PAs are currently misallocated (Carvalho et al. 2017). Moreover, ecotones provide opportunities to mitigate the impact of climate change on biodiversity, as populations close to these regions may have distinct genetic characteristics, pre-adapted to the physiological stress of climate change due to micro-environmental constraints in an area where climate stress is the main macro-environmental characteristic (Killeen & Solórzano 2008; Sunday et al. 2014).

In this context, herein we evaluate the potential impacts of future climate change in the distribution and status of conservation for 24 bird taxa currently threatened, in an ecotone region within northern Brazil. First, we compare future potential distributions of the target taxa with the current system of PAs to detect possible gaps in birds protection under a climate change scenario. We also calculate the potential changes in the taxa distribution ranges and species richness estimates for the future. Finally, we identify possible dispersal corridors to enhance conservation of these threatened taxa under ongoing climate change.

Methods

Study area

This study was performed in northern Brazil, in a total area of 331,983.29 km^2, corresponding to the Brazilian federal state of Maranhão. This area comprises great patches of Amazon rain forest, a large proportion of native vegetation of Cerrado, and includes small patches of Caatinga vegetation enclaves within Cerrado (Fig 1) (INPE 2015). Unflooded *terra firme* and flooded *varzea* rain forests, open vegetation areas named *campinas*, wooded savanna, mangroves, xeric shrubland, and other less represented habitats are intermixed along our study area, making this a very heterogenic region, and composing a biologically relevant ecotone area (de Oliveira et al 2007; MMA 2011; Olímpio et al 2016; Serra et al 2016; Carvalho et al. 2017). Extensive cattle ranching, logging, mineral and metallurgical extraction, agriculture, and production of energy are some of the most active anthropogenic actions in the study region (Nepstad et al. 1999; Wood & Porro 2002; FIEMA 2009), adding to the complexity of natural habitats within the ecotone.

This study follows Carvalho et al (2017) work, which has delimited priority areas for conservation of bird species within the study region, under current climatic conditions. Therefore, herein we considered the same 39 PAs previously assessed (Carvalho et al. 2017), which comprise eight federal conservation units of sustainable use, and four of full protection; six state conservation units of sustainable use, and two of full protection; and 18 indigenous lands delimited and homologated by the Federal government (Fig. 1; Table 1 from Carvalho et al. 2017). Considering the perspectives in a future scenario, we added to our PAs data set two indigenous lands that are under delimitation process (Vila Real and Kanela; www.funai.gov.br).

Sampling

Within the ecotone study area, 41 taxa (species and subspecies) are considered threatened by the Brazilian government (IBAMA & MMA 2014). We chose this national list, because ranks regional biodiversity, such as endemic subspecies (e.g. *Celeus torquatus pieteroyensi*, and *Pteroglossus bitorquatus bitorquatus).* From these 41 taxa, 11 are marine, coastal or migratory birds; three represent large-sized birds of prey with relative larger home ranges, and three taxa have less than five independent occurrence records (IBAMA & MMA 2014). Thus, our total data set includes 24 terrestrial, non-migratory, threatened bird species and subspecies, occurring in our ecotone study area, with more than five independent occurrences available (Table 1). Fifteen taxa are known to have distributions restricted to the Amazon biome, four are restricted to Cerrado and Caatinga biomes (here we include *Spinus yarrellii*, the yellow-faced siskin, which was recently, 2007-2017, observed within the Atlantic forest, in the eastern coast of Brazil; Appendix S1; WikiAves), and the other five species have widespread distributions, occurring in all biomes represented in the ecotone study area (Da Silva 1995, 1997; Silva & Bates 2002; IBAMA & MMA 2014; IUCN 2018.1). As abovementioned, all target taxa are classified as threatened on the Brazilian official list of threatened species (IBAMA & MMA 2014), and 14 are considered globally threatened (IUCN 2018.1).

We collected occurrence records for each taxon from the literature, online databases [VertNet (http://vertnet.org/), Species Link (http://splink.cria.org.br), Global Biodiversity Information Facility (http://www.gbif.org), Wikiaves (http://www.wikiaves.com.br), and xenocanto (http://www.xeno-canto.org)], and museum collections (Louisiana Museum of Natural History, Museu Paraense Emílio Goeldi, and Museu Nacional do Rio de Janeiro) (Appendix S1). Dubious records were excluded based on the known distribution of the taxa (IBAMA & MMA 2014; IUCN 2018.1). We used the geographical coordinates directly from the original sources or from the Ornithological Gazetteer of Brazil (Paynter & Traylor 1991). Bird nomenclature followed the Brazilian Ornithological Records Committee (CBRO 2015).

Species distribution modelling procedures

Models of current distribution were already available for 14 of the target taxa herein analyzed (Table 1) (Carvalho et al. 2017). However, only MaxEnt algorithm (Elith et al. 2006; Phillips & Dudík 2008) has been used (Carvalho et al. 2017), but, as detailed below, different species distribution modelling algorithms should be used to estimate future distributions (Sales et al. 2017). Thus, to enable a direct comparison between current and future species distribution models (SDMs), we reanalyzed these 14 data sets using similar modelling procedures for current and future climatic scenarios.

For all 24 target bird taxa, first, we overlaid the each data set of occurrence records on grid of cells of 2.5 arc-min (~4.5 x 4.5 km) delimiting a buffer of 200 km set around all records to define total extent area (Fig 2a-b). We used this same grid considering all 19 bioclimatic variables from WorldClim for current climatic scenario, and the Representative Concentration Pathway 8.5 (RCP8.5) for the future scenario (www.worldclim.org). For both, we performed pair-wise Pearson correlation tests of all variables to remove highly correlated variables, and reduce their collinearity, under each scenario, respectively. In the case of high correlation ($r > 0.8$ or $r < -0.8$), we used only one of the variables to perform the distribution model. For both scenarios, the same eight predictor variables were selected as our environmental variables (Annual Mean Temperature (BIO_1), Mean Diurnal Range (BIO_2), Isothermality (BIO_3), Annual Precipitation (BIO_{12}), Precipitation of Driest Month (BIO_{14}), Precipitation Seasonality (BIO_{15}), Precipitation of Warmest Quarter (BIO_{18}) and Precipitation of Coldest Quarter BIO_{19}) (Fig 2c).

We used a single future climatic scenario (Fig. 2d), because climate projections seem to have less influence in the resultant future putative distributions, than species distribution modelling methods (Sales et al. 2017). Thus, we chose RCP8.5 since this is the most pessimistic of the four RCPs available, representing the most severe future global climate change, as predicts continuous greenhouse emissions derived from anthropogenic actions until 2100 (Moss et al. 2008). We modeled taxa distributions for the time period of 2070 (average for 2061-2080) using seventeen different Atmosphere-Ocean General Circulation Models (AOGCMs): ACCESS1-0 (AC), BCC-CSM1-1 (BC), CCSM4 (CC), CNMR-CM5 (CN), GFDL-CM3 (GF), GISS-E2-R (GS), HadGEM2-AO (HD), HadGEM2-CC (HG), HadGEM2-ES (HE), INMCM4 (IN), IPSL-CM5A-LR (IP), MIROC-ESM-CHEM (MI), MIROC-ESM (MR), MIROC5 (MC), MPI-ESM-

LR (MP), MRI-CGMM3 (MG) and NorESM1-M (NO) downloaded from WorldClim (www.worldclim.org) with the same resolution of 2.5 arc-min (Fig 2e).

For SDMs for both current and future scenarios, we used two different methods to predict the potential distributions accounting for the number of occurrence records for each focal taxon (Fig. 2f). The Jackknife approach (also known as leave-one-out method) was used for five taxa with limited occurrence data (≤10 records) (Pearson et al. 2007); and, for the other 20 taxa (n>10 records), we analyzed 10 subsets of records obtained by randomly dividing the occurrences in training (70%), and testing (30%) records. To have a more explanatory power (Rangel & Loyola 2012), and maximize the possibilities to obtain the best fit predictions to the original data (Elith & Leathwick 2009), we used occurrence records data, which better performed than maps of distribution (Sales et al. 2017), and we trained all models using three SDM algorithms of machine-learning methods, under both current and future climatic scenarios, respectively: Maximum Entropy (MaxEnt) (Phillips et al. 2006; Phillips & Dudík 2008), Support Vector Machine (SVM) (Scholkopf et al. 2001) and Random Forest (RF) (Breiman 2001; Prasad et al. 2006). All SDM algorithms were parameterized in R 3.4.2 (www.r-project.org) (Fig 2g).

To evaluate accuracy of the models obtained, either estimating current or future distributions, we used the statistically significant probability threshold of $p<0.05$ to consider model predictions as reliable for taxa with up to 10 records, despite some eventual omission and/or commission. These probabilities were estimated in R 3.4.2 (www.r-project.org). For all taxa, we considered the threshold that maximizes both omission and commission errors while modeling the species distributions to cut the suitability matrices of the modeled species in modeling algorithm into presence-absence maps (ROC threshold). We used the True Skilled Statistics (TSS) to evaluate the metrics of our models (Allouche et al. 2006). TSS values vary from −1 to +1, where negative values indicate that distributions are no better than random, and values equal to +1 represent perfect fitting between the observed and the modeled distribution. Models with TSS values that reached 0.5 or more than 0.7 were considered as acceptable and excellent models, respectively (Allouche et al. 2006) (Fig. 2h). This metric was calculated using 10,000 random pseudoabsences.

Two final distribution maps for each taxon were obtained by averaging the three SDM algorithms for current and future scenarios, respectively. Future SDMs considered a mean consensual distribution map obtained from all AOGCMs. All consensus distribution maps were obtained using only models which achieved TSS >0.5 (Fig 2h).

Estimated protected range and species richness

Following Carvalho et al. (2017) results, we divided our total data set in a group from the Amazon biome (Amazon taxa data set; n= 20), another grouping taxa with occurrence in Cerrado and Caatinga (Cerrado taxa dataset; n=9), and a third data set including taxa occurring in both the Amazon, Cerrado and Caatinga (Both data set; n= 5). We predicted the proportion of protected area, estimate species richness, perform gap analysis by statistical analysis, and estimate the effectiveness of PAs in our study area, for both present and future scenarios for these three different data sets. We also perform statistical analysis to estimate the effectiveness of PAs considering all study area for taxon with gain or loss in the predicted future distribution. The modeled species richness was obtained by the sum of the final distribution estimated for each taxon (Fig 2i), and overlaid with both the shape file of the world ecoregions (www.worldwildlife.org) and the shapefile of PAs within the study area (as detailed in Carvalho et al. 2017).

The effectiveness of protected areas was first analyzed using linear regressions to evaluate the size of individual PAs in relation to estimated protected distribution of each taxa~~ and, second, using power functions to estimate the relationship between the size of individual PAs and the estimated species richness for each PA~~. We also used paired t-tests to assess possible changes in the estimated range, and in the protected distribution area between present and future scenarios. For all analyses, we used 95% confidence interval for the slope.

Identification of dispersal corridors

We evaluated the connectivity between PAs for the 24 threatened bird species using the program Linkage Mapper, which integrates least cost path (LCP) approaches with circuit theory (McRae and Kavanagh 2011). Least cost path is the single path related with the minimum cost-weighted distance between two core areas (Adriaensen et al. 2003). This tool uses as input data the core areas to connect and a resistance surface associated with habitat variables for the target species. For each studied species we used as core areas the PAs from the Cerrado biome, Amazon or all the set, depending on their habitat requirements. After merging PAs that presented overlapping regions, we obtained seven core areas for the Amazon taxa (20 taxa), 14 for Cerrado's (five species) and 16 for the whole state (four species). This reduction in the number of PAs to be considered also reduces computational time and avoids software errors. Regarding to resistance surfaces, we tested two different habitat variables, land use and climate data. For land usage we downloaded the raster information from TerraClass Amazon (TerraClass 2014) and TerraClass Cerrado (INPE 2013), and we assigned resistance values accordingly with our expert opinion (DLC, and MPD). The values applied to each class of land use ranged from 1 = no resistance to 100 = barrier (Appendix S5, S6). The climate data used were the ensembles obtained previously for each species through the SDM. However, as the values of the ensembles ranged between 0 and 1, representing conductance. Thus, was necessary to standardize and invert the raster values in order to obtain values ranging between 1 and 100 and which represent resistance. To do that, we applied the formula 100 - "ensemble" * 100 to each ensemble of climate rasters.

After mapping the corridors between PAs for each species, we ran the tool Pinchpoint Mapper (McRae 2012). This tool uses circuit theory to identify pinch points within the least-cost corridors (McRae and Shah 2009). Thus, the flow of electricity depends on the resistance value of each cell within each least-cost corridor (McRae and Shah 2009, McRae 2012). The least-cost corridors are clipped, according to the user specified corridor width (Dutta et al. 2015). We applied three different cutoff values depending on the ability of each species to move through a suboptimal habitat: 150 for Amazon species, characterized as rapidly accumulating cost moving through suboptimal habitat, while for Cerrado species and for more generalist species (Both biomes data set) that can move easier the cutoff values were 75 and 50, respectively.

Pinchpoint Mapper identifies sites (called ‘pinch points') with highest current densities within the least-cost corridors (McRae and Shah 2009, Dutta et al. 2015). These locations act as bottlenecks to movement, indicating where the flow is more intensive due to unavailability of alternative pathways. Bottlenecks may denote cover types or constraints caused by physical features adjacent with high-resistance (Dutta et al. 2015). Here, we used this analysis to find pinch points between the entire network of core areas and corridors. This provides a current flow centrality measure to evaluate the importance of linkages and pinch points for maintaining connectivity in the entire landscape (Carroll et al. 2012).

Results

Species distribution models

We used a total of 576 occurrence records for the 24 threatened bird taxa occurring in the ecotone area studied (with 7 – 48 independent occurrence records). We produced the potential global distribution maps for current and future scenarios for each target taxa (Appendixes S2 and S3), and summarized them in terms of gain and loss of area for the time period of 2070, within the study area (Appendix S4). Overall, the accuracy of the SDMs estimated, for both present and future climatic scenarios, was acceptable, despite some minor omission errors in three of the 24 taxa analyzed (Table 1).

Distribution extents, protected range and species richness

Considering the future scenario for the time period of 2070, the predicted range size of suitable area varied considerably for all target taxa, either globally, and within the study area (Table 1; Appendixes S3 and S4). However, these changes in size were not statistically significant while analyzing the three data sets previously described ($t = 0.906$, $df = 19$, $p = 0.376$ for Amazon taxa, $t = -0.622$, $df = 7$, $p = 0.553$ for Cerrado taxa, and ($t = 0.599$, $df = 4$, $p = 0.581$ for taxa occurring in both biomes), since six (out of 15 Amazon taxa), one (out of 4 Cerrado taxa), and two (out of 5 from both biomes) taxa will likely increase their distribution ranges in the future, within the ecotone area studied (Table 1). However, considering groups of taxa predicted to gain ($n= 9$, $t = 4.959$, $df = 15$, $p = 0.0002$) or lose ($n= 15$, $t = -3.769$, $df = 14$, $p = 0.000$) suitable area within the study area resulted in statistically significant changes in taxa distributions.

Noteworthy, five Amazon taxa will probably go globally extinct (*Psophia obscura*, *Celeus t. pieteroyensi*, *Piculus paraensis*, *Dendrexetastes r. paraensis*, and *Piprites c. grisescens*), with 0 to 5% of its global area of distribution remaining in the future climatic scenario tested

(Appendixes S3), and three taxa were predicted to lose about 50% of its putative distribution within the ecotone (Table 1 and Appendix S4). For the Cerrado taxa, *Cercomacra ferdinandi* was predicted to go globally extinct (Appendix S3), *Spinus yarrellii* was predicted to disappear from the study area, and *Penelope jacucaca* will probably lose more than 70% of its predict distribution (Table 1 and Appendix S4). Considering taxa occurring in both biomes, within the study area, *Tinamus tao tao* will lose all suitable areas, and *Neomorphus geoffroyii* will lose about 70% of its current range (Table 1 and Appendix S4).

The percentage of estimated protected range in the current scenario varied between 22% and 100% for the Amazon taxa, 7% and 51% for the Cerrado taxa, and between 8% and 51% for the taxa occurring in both biomes. In the future scenario, the estimated protected range will likely decrease, varying between 0 and 54% for the Amazon taxa, 0 and 73% for the Cerrado taxa, and 0 and 67% for taxa distributed within both biomes (Table 2).

Our linear regressions indicated that both Amazon (Fig 3a, b) and Cerrado (Fig 3c, d) threatened taxa are better protected than random, in both current and future scenarios. For the Amazon taxa, in both scenarios, for every 202,5 km^2 of distribution range (10 grid cells), there was a gain of protection of 81 km^2 (four grid cells; Fig. 3a). In average, 50%±16% of the estimated range for the Amazon taxa are currently protected in this biome, but only 32%±22% will be protected in the future (Fig. 3b). For Cerrado data set, we obtained the same result for the current and future scenario, for every 202,5 km^2 (10 grid cells of distribution range), there was a gain of protection of only 20,25 km^2 (one cell; Fig. 3c-d). In average, 18%±14% and 29%±21% of estimated range for the Cerrado species is and will be protected in this biome, respectively. Considering widespread species in all study area, no statistically significant relationship was observed between the size of PAs and the estimated distribution of the taxa, both under current (R^2 = 0.098, p = 0.608, y = 708.5546+0.1357*x) and future scenarios (R^2 = 0.508, p = 0.176, y = 335.6479+0.206*x).

The highest values of estimated species richness for the current scenario (>50%) were located in the northern and north-western part of the Amazon area within the ecotone for the Amazon taxa (between 10 and 19 taxa), and for the species that occurs in both biomes (maximum four species). For the Cerrado taxa, the highest values of species richness (maximum six species) were observed in the central, eastern, north-eastern and southern of region (Fig 4).

In the future scenario, there was a decrease in the values of estimated species richness for the Amazon taxa (between 10 and 13 species) and those species that occurs in both biomes (maximum three species). The highest values of estimated richness were observed in the same local of the current scenario. For the Cerrado biome, the highest values of potential richness (maximum four species) were located in the north-western, north-eastern and central of the study area. We observed a decrease of the predicted species richness between the current and future scenario considering the three groups. There was a loss of 19.744 km^2 in the Amazon, 13.507 km^2 in Cerrado, and 48.398 km^2 for the species that occurs in both biomes.

However, the paired t-test indicated no statistical support for the difference between the size of estimated distribution of the species richness under current and future scenarios for all data sets (Amazon taxa t = -0.023, df = 19, p = 0.981, Cerrado taxa t = 0.000, df = 6, p = 0.999, and for the data set including those species that occur in both biomes, and considering all the ecotone study area t = 0.599, df = 4, p = 0.581).

The paired t-test supported statistically significant differences between the current and future scenarios for the taxa group with loss and gain of distribution. For the taxa group with loss of distribution (t = 5.713, df = 14, p < 0.001), in mean, 1.586 cell were lost. For the taxa group with gain of distribution (t = -3.769, df = 8, p = 0.005), in mean, the was a gain of 1.938 cells.

Regarding to estimated species richness in the protected areas, the highest values (>50%) of protected richness in the current scenario, was only of 22% for the Amazon taxa, 2% for the Cerrado taxa, and 6% for the species with occurrence in both biomes. In the future scenario, the values decrease to 13% in the Amazon portion, 0% for Cerrado taxa, and 1% for the third group (Fig 4). There was a loss of protected distribution range of 11.198 km² for the Amazon data set, 1.053 km² for Cerrado taxa, and 17.780 km² for the species occurring in both biomes. The paired t-test supported statistically significant differences between the current and future distribution of species richness for the Amazon and Cerrado data sets (Amazon taxa t = 3.152, df = 18, p = 0.005, losing three taxa, in average; and Cerrado taxa t = 2.270, df = 21, p = 0.034), losing just one taxa, in average). For third group, the observed difference is no better than random (t = 1.598, df = 37, p = 0.118).

Identification of dispersal corridors

On a wider scale, corridors predicted from both models of surface resistance (land use and climate) are similar, and present more than one possible corridor between various pairs of core groups of PAs (Appendix S7). In the Amazon region, pinch points are observed between the central and northwest regions, connecting Araribóia, Awa and Caru indigenous lands with Gurupi Biological Reserve and APA das Reentrâncias Maranhenses. Within Cerrado, pinch values are observed in a center-southwest direction between the central block of indigenous lands (Kanela, Porquinhos, Cana Brava / Guajajara, Lagoa Comprida, and Urucu Juruá) towards Araribóia and Krikati, and in a center-northeast direction, with high values between the same central block towards the Environmental Protection Area of Morro dos Garapenses.

Discussion

Species distribution models, protected range and species richness

Here, we modeled the current potential distribution of all data-sufficient terrestrial, non-migratory, threatened bird species and subspecies occurring within an ecotone area located in northern Brazil, comprising Amazon and Cerrado biomes, with Caatinga enclaves. Also, we compared these current putative distributions with those distributions projected into the future time period of 2070 under the most pessimistic climate predictions model (www.worldclim.org).

Under the current scenario, although we have combined different species distribution modelling algorithms, we observe the same patterns obtained by Carvalho et al (2017) for the 14 common target taxa. Thus, despite some minor omission errors, and species distribution models (SDMs) being based only on abiotic variables and so always presenting some uncertainty (Soberón and Peterson 2005, Araújo et al. 2006; Soberón 2007, 2010); overall, our SDMs seem to represent accurately the known distributions of the target taxa (IBAMA & MMA 2014; IUCN 2018.1).This uncertainty is also inherent to the use of SDMs to evaluate the effects of climate change on geographic distribution of species (Diniz-Filho et al. 2009, Anderson 2013, Tessarolo et al. 2014, Stoklosa et al. 2015). Nonetheless, conversely to current SDMs, there is no such simple way to validate future models, and different databases and/ or modelling approaches can produce different results (Wiens et al. 2009). Moreover, we found different distritribution patterns for species sharing ecological requirements within our study area (discussed below). Yet, we obtained consistent results across all algorithms used for each taxon independently. Therefore, we support that the use of our SDMs supply important biological and ecological considerations, and so that are adequate to direct practical conservation actions (Hannah et al. 2007, Heller & Zavaleta 2009, Guisan et al., 2013).

According to our predictions, the majority of the bird taxa analyzed will probably present drastic declines in their range sizes, not only within the ecotone area, as in their global distributions. Some taxa are even predicted to go globally extinct in the near future, widely impacting species richness levels across the ecotone. We have used the future scenario that predicts higher increase in greenhouse gas emissions (www.worldclim.org), and so dramatic changes are expected, but several other studies, using different predictive models, have been observing similar alarming decreases in the species distributions due to climate change, not only for birds in tropical regions worldwide (Marini et al. 2009a, b, Sekercioglu et al. 2012), but also for other vertebrate groups (Mesquita et al. 2013, Vasconcelos et al. 2014, Costa et al. 2016, Bozinovic et al. 2011, Sheth et al. 2014, Ribeiro et al. 2016), and further predicting species extinctions in the tropics (Anciães and Peterson 2006, Sekercioglu et al. 2008, Sinervo et al. 2010).

However, and again, despite we have used the most pessimistic future scenario, some threatened bird taxa were also predicted to have their distributions significantly increased in the ecotone area evaluated (and globally). Species survival depends on them to keeping pace with the climate changes through rapid adaptation to the new climatic conditions or on colonizing new areas of suitable habitat (Sinervo et al. 2010). As our models are based only in abiotic conditions, and no test of future biological adaptation was performed, a putative increase in suitable areas availability may better explain the dispersal variation observed for *Pyrrhura coerulescens, Pyrilia vulturina*, *Pteroglossus b. bitorquatus, Hylopezus paraensis*, *Dendrocincla m. badia*, and *Tunchiornis ochraceiceps* (Amazon taxa), *Xiphocolaptes* *falcirostris* (Cerrado), *Celeus obrieni* and *Lophornis goldii* (occurrence in both biomes), which showed a dispersal pattern with distribution gain higher than loss.

Notwithstanding, this trend to increase their distribution ranges in the future might not be reassuring for these currently threatened birds. Amazon forest taxa usually have a high specificity for forested habitats (Cochrane et al. 2013), and tropical forests are more vulnerable, and likely to disappear, than savannas or grasslands due to climate change (Anjos & Toledo 2018). These forests have a narrow thermal tolerance (Perez et al. 2016), being less resistant to climate stress and higher exposure chance to new climatic conditions (Holmgren et al. 2013, Seddon et al. 2016, Anjos and Toledo 2018). Within eastern Amazon, due to the ongoing precipitation decrease and increasing temperature indices, a replacement of the rain forest by more open savanna-like vegetation is expected (Oyama & Nobre 2003, Malhi et al. 2008, Hilker et al. 2014, Seidl et al. 2017). However, despite the resemblance of this vegetation to a Cerrado phyto-physiognomy, most species of Cerrado trees are predicted to lose at least 50% of their current distribution by 2055, due to climate changes (Siqueira & Peterson, 2003). Furthermore, past climate changes in eastern Amazon likely transformed the composition of the forest than rather transformed the vegetation physiognomy (Cheng et al. 2013). Therefore, unpredicted biotic interactions are likely to threaten these taxa in the future, with unpredictable consequences, despite the increasing distribution trend observed.

Regarding the amount of protected range for each taxon within the ecotone, our linear regressions seem to indicate that for both Amazon and Cerrado bird taxa a wider range corresponds to a higher amount of PA, and this trend will be maintained in the future. Nonetheless, to evaluate effectiveness of PAs, species representativeness in those areas should be considered to vary with the extent of its occurrence, i.e. narrowly distributed species (<1000 km^2) should have whole their ranges fully protected (100%), widespread species (< 250,000

km^2) must have at least 10% of area within PAs, and species with ranges of intermediate size, should have an intermediate protection (Rodrigues et al. 2004a). The majority of our threatened taxa have current potential distributions within the ecotone greater than 5000 km^2 (5.204-196.243 km^2), thus needing a protection range of about 80% to 10%, respectively (Rodrigues et al. 2004a), but have between 70% and 8% of protected potential ranges. Thus, we confirm that current PAs systems within the study area are not totally effective in protecting threatened bird species occurring therein (Carvalho et al. 2017).

Under the future climatic model, predicted ranges vary dramatically, either significantly increasing or decreasing. No trend is detected for gain or loss in the predicted future distribution of the target taxa related to their current distributions being restricted (or not) to either of the biomes within the ecotone. Some species will disappear from the ecotone, other will reach between 2.025 and 69.032 km^2, for those predicted to lose area, corresponding to a percentage of recommended protected area of 10 - 100% (Rodrigues et al. 2004a), and between 3.1367 and 254.138 km^2, for those which will increase their distributions 10 - 20% of recommended area within PAs (Rodrigues et al. 2004a). Protected potential ranges will likely reach in average 45% and 34% of distribution included in PAs for taxa whose ranges will decrease and increase, respectively. Thus, in both time frames, the percentage of potential protected area estimated is often lower than the recommended level (Rodrigues et al. 2004b), suggesting bird taxa are not and will not be effectively protected within the ecotone.

Identification of dispersal corridors and conservation planning concerns

Corridors represented in this study indicate areas with low values of anthropogenic disturbance that can provide ecological connectivity between large protected core areas (PCAs). The maintenance or further decrease of human impact along the corridors should be part of a conservation strategy plan for the ecotone, since a well-connected network of PAs can ensure the opportunity for movement of wild fauna (Gaston et al., 2008, Belote et al., 2016), and consequently enabling the long-term persistence of species (Christie et al. 2015, Watson et al. 2017).

Location of most of our corridors coincide with our SDM results, Celentano et al. (2018) Gurupi corridor, and with the priority areas previously indicated for endemic and threatened bird taxa (Carvalho et al. 2017). However, our corridor models highlight several common pinch points for the analyzed species, indicating numerous common bottleneck locations (Dutta et al. 2015). These locations of unavailable alternative pathways make perfect sense considering all threats the ecotone is currently facing. Within the Brazilian Amazon, the eastern portion has the highest rates of deforestation, leading to a rapid fragmentation of the forest cover (Lees et al. 2006, Michalski et al. 2008, Aldrich et al. 2009). The Amazon region here studied is included in an wider region popularly known as the "Arc of Deforestation," one of the regions mostly impacted by human pressures; and expected to lose 40% of its natural habitat for logging and cattle-raising by the year 2050 (Fearnside 2001, Soares-Filho et al., 2006, Malhi et al. 2008). Within northern Cerrado, loss of natural vegetation has been pressured by agribusiness, with an increase of 86% for planted area between 2005 and 2014 (national average 29%) (Lahsen et al. 2016).

The eastern portion of the Brazilian Amazon presents only around 1.7% of its area protected (Da Silva et al. 2005b). Among these 1.7%, Important Bird Areas (IBAs) shelter threatened and near threatened species populations (MMA 2003, Lees et al. 2012, De Lucca et al. 2009). However, these PAs also have been suffering illegal occupation for deforestation, selective logging and burning by squatters and other landowners (Rylands and Pinto.1998, Couto 2004, De Lucca et al. 2009, Oren and Roma 2011). These anthropic pressures are accounted to create drier and warmer microhabitats more susceptible to fire, inducing local and regional climate instability, and changing water regimes (Malhi et al. 2008, Nepstad et al. 2008). The interaction of deforestation and climate change may be more catastrophic here than each of these isolated impacts (Mantyka-Pringle et al. 2012), making the taxa inhabiting this region extremely vulnerable to extinction (Ribeiro et al. 2016). Thus, a more effective control of human occupation and activities is crucial.

The Cerrado biome is one of the 35 biodiversity hotspots of the world (Myers et al. 2000), and also one of the most impacted by anthropogenic disturbance (Salazar et al. 2015, Azevedo et al. 2016). Considering the entire biome, Cerrado already lost 50% of its native vegetation for agricultural and cattle-rise industries (MMA 2015). In a future scenario of climate changes, as abovementioned, the Cerrado is considered more resilient due to the already strong seasonal variations on moisture and temperature, which characterize the biome (Anjos & Toledo 2018). However, in the future scenario, the dry season would occupy most part of the year, probably favoring fires, and reducing trees coverage, an important temperature and soil humidity regulator (Cochrane & Barber 2009, Bustamante et al. 2012). Additionally, PAs system in Cerrado is highly inefficient (Carvalho et al. 2017). Only 2.2% of Cerrado extent is protected (well below the 10% established by the Convention on Biological Diversity 1992) and most PAs are misallocated (Ratter et al. 1997; Klink & Machado 2005, MMA 2011). In this portion of the ecotone, the establishment of new PAs, and dispersal corridors are the more immediate conservation actions we recommend.

Thus, due to the great number of threats, and their synergetic impact on species richness and diversity, we emphasized the creation of a corridors system for maintenance of the already threatened birds diversity of this ecotonal area (Lima and Gascon 1999, Peres 2005, Hawes et al. 2008, Lees and Peres 2008, Barlow et al. 2010). We also highlight the establishment of effective policy actions, as the maintenance and recovery of natural or low anthropized areas guarantee the possibly of connectivity between the protected area system and the conservation of richness and diversity in this region.

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Table 1. Occurrence records (points), estimated range in number of cells in the globally area for current and future scenarios (ER/G), estimated range in number of cells in the study area for current and future scenarios (ER/A), conservation status according to IBAMA (2014) and IUCN (2017) (status), and biome of occurrence for each taxon (biome).

Taxon	Common name	Points	Current scenarios		RCP8.5 scenarios		Status	Biome
			ER/G	ER/A	ER/G	ER/A		
Psophia obscura[a]	Dark-winged Trumpeter	7	10596	1523	102	7	CR	Am
Guaruba guarouba	Golden Parakeet	20	18024	3736	2896	1175	VU	Am
Pyrrhura coerulescens	Pearly Parakeet	31	50152	9691	78006	11738	VU[c]	Am
Pyrilia vulturina	Vulturine Parrot	20	32553	1428	27033	1549	VU	Am
Pteroglossus b. bitorquatus	Red-necked Aracari	30	15974	4010	24140	5602	VU (EN)[b]	Am
Celeus t. pieteroyensi[a]	Ringed Woodpecker	7	15499	1623	800	1	Enbc	Am
Piculus paraensis[a]	Belem Golden-green Woodcreeper	10	21957	3035	2	0	EN (LC)[b]	Am
Phlegopsis n. paraensis	Black-spotted Bare-eye	36	24034	4481	10791	3409	VU[c]	Am
Hylopezus paraensis	Snethlage's Antpitta	23	37703	6146	49934	6814	VU[c]	Am
Dendrocincla m. badia	White-chinned Woodcreeper	18	13963	3642	35748	7807	VU[c]	Am
Dendrexetastes r. paraensis[a]	Cinnamon-throated Woodcreeper	9	8863	533	0	0	VU[c]	Am
Dendrocolaptes medius	Todd's Woodcreeper	46	22465	3376	37292	1953	VU (LC)[b]	Am
Lepidothrix i. iris	Opal-crowned Manakin	48	27906	1533	13739	844	VU[c]	Am
Piprites c. grisescens[a]	Wing-barred Piprites	8	6685	460	156	0	VU[c]	Am
Tunchiornis ochraceiceps	Tawny-crowned Greenlet	34	32408	2304	29412	3926	VU (LC)[b]	Am
Tinamus t. tao	Gray Tinamou	35	137144	1218	58621	0	VU	Am/Ce
Penelope pileata	White-crested Guan	34	53599	5409	25444	1830	VU	Am/Ce

Taxon	Common name	Points	Current scenarios		RCP8.5 scenarios		Status	Biome
			ER/G	ER/A	ER/G	ER/A		
Neomorphus geoffroyi[a]	Rufous-vented Ground-Cuckoo	8	18404	4914	3134	2132	VU	Am/Ce
Celeus obrieni	Kaempfer's Woodpecker	38	28578	6292	50151	6356	VU (EN)[b]	Am/Ce
Lophornis gouldii	Lophornis gouldii	12	94701	4852	209227	8537	VU	Am/Ce
Cercomacra ferdinandi	Bananal Antbird	31	12106	257	0	0	VU	Ce
Penelope jacucaca	White-browed Guan	32	43674	2689	18403	82	VU	Ce/Ca
Xiphocolaptes falcirostris	Moustached Woodcreeper	24	40422	9074	64691	12550	VU	Ce/Ca
Spinus yarrellii	Yellow-faced Siskin	15	29838	440	2918	0	VU	Ce/Ca/Af

[a]Jackniffe approach result $p<0.05$. [b] IUCN status is in parentheses when different from IBAMA's. [c] No IUCN status. Abbreviations: IUCN, International Union for Conservation of Nature; IBAMA, Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis; CR, critically endangered; EN, endangered; VU, vulnerable; NT, near threatened; LC, least concern; Am, Amazon biome; Ce, Cerrado biome;Ca, Caatinga biome; Af, Atlantic forest.

Table 2. Estimated range in number of cells in the study area by biome for current and future scenarios (ER/B), estimated range in number of cells in the study area by biome under current and future scenarios (ER/UC), percentage of occurrence in protected areas under current and future scenarios (%PA) for each taxon (data set).

Data set	*Taxon*	*Current scenarios*			*RCP8.5 scenarios*		
		ER/B	*ER/AP*	*%PA*	*ER/B*	*ER/AP*	*%PA*
Amazon taxa	*Psophia obscura*	1481	902	61	0	0	0
	Guaruba guarouba	3591	1569	44	1162	624	54
	Pyrrhura coerulescens	2066	2066	100	5832	2253	39
	Pyrilia vulturina	1409	586	42	1526	670	44
	Pteroglossus b. bitorquatus	3831	1620	42	4399	2108	48
	Celeus t. pieteroyensi	1578	969	61	1	0	0
	Piculus paraensis	2649	1472	56	0	0	0
	Phlegopsis n. paraensis	3995	2010	50	2974	1582	53
	Hylopezus paraensis	4945	969	20	5013	2109	42
	Dendrocincla m. badia	3020	1116	37	5406	2160	40
	Dendrexetastes r. paraensis	530	393	74	0	0	0
	Dendrocolaptes medius	2794	1099	39	1884	919	49
	Lepidothrix i. iris	1493	654	44	836	399	48
	Piprites c. grisescens	456	265	58	0	0	0
	Tunchiornis ochraceiceps	2163	1098	51	3220	1608	50
	Tinamus t. tao	1126	548	49	0	0	0
	Penelope pileata	4586	1615	35	1819	882	48
	Neomorphus geoffroyi	3861	1859	48	1621	858	53
	Celeus obrieni	294	66	22	604	157	26
	Lophornis gouldii	2615	1012	39	5039	1945	39
	Mean	2424	1094	49	2067	914	32
	SD	1393	578	18	2066	864	22
Both	*Tinamus tao tao*	1218	535	44	0	0	0
	Penelope pileata	5409	1790	33	1830	869	47
	Neomorphus geoffroyi	4914	2487	51	2132	1422	67
	Celeus obrieni	6292	525	8	6356	578	9
	Lophornis gouldii	4852	1284	26	8537	2694	32
	Mean	4537	1324	32	3771	1113	31
	SD	1943	841	16	3538	1022	27

Data set	***Taxon***	***Current scenarios***			***RCP8.5 scenarios***		
		ER/B	***ER/AP***	***%PA***	***ER/B***	***ER/AP***	***%PA***
Cerrado taxa	*Tinamus tao tao*	84	6	7	0	0	0
	Penelope jacucaca	1456	396	27	71	52	73
	Penelope pileata	1158	332	29	1830	22	1
	Neomorphus geoffroyi	1620	831	51	1077	782	73
	Celeus obrieni	5950	487	8	5725	447	8
	Xiphocolaptes falcirostris	7383	801	11	9780	1511	15
	Lophornis gouldii	2356	307	13	4067	1003	25
	Cercomacra ferdinandi	254	43	17	0	0	0
	Spinus yarrellii	345	29	8	0	0	0
	Mean	2290	359	19	2506	424	22
	SD	2611	311	14	3409	557	30

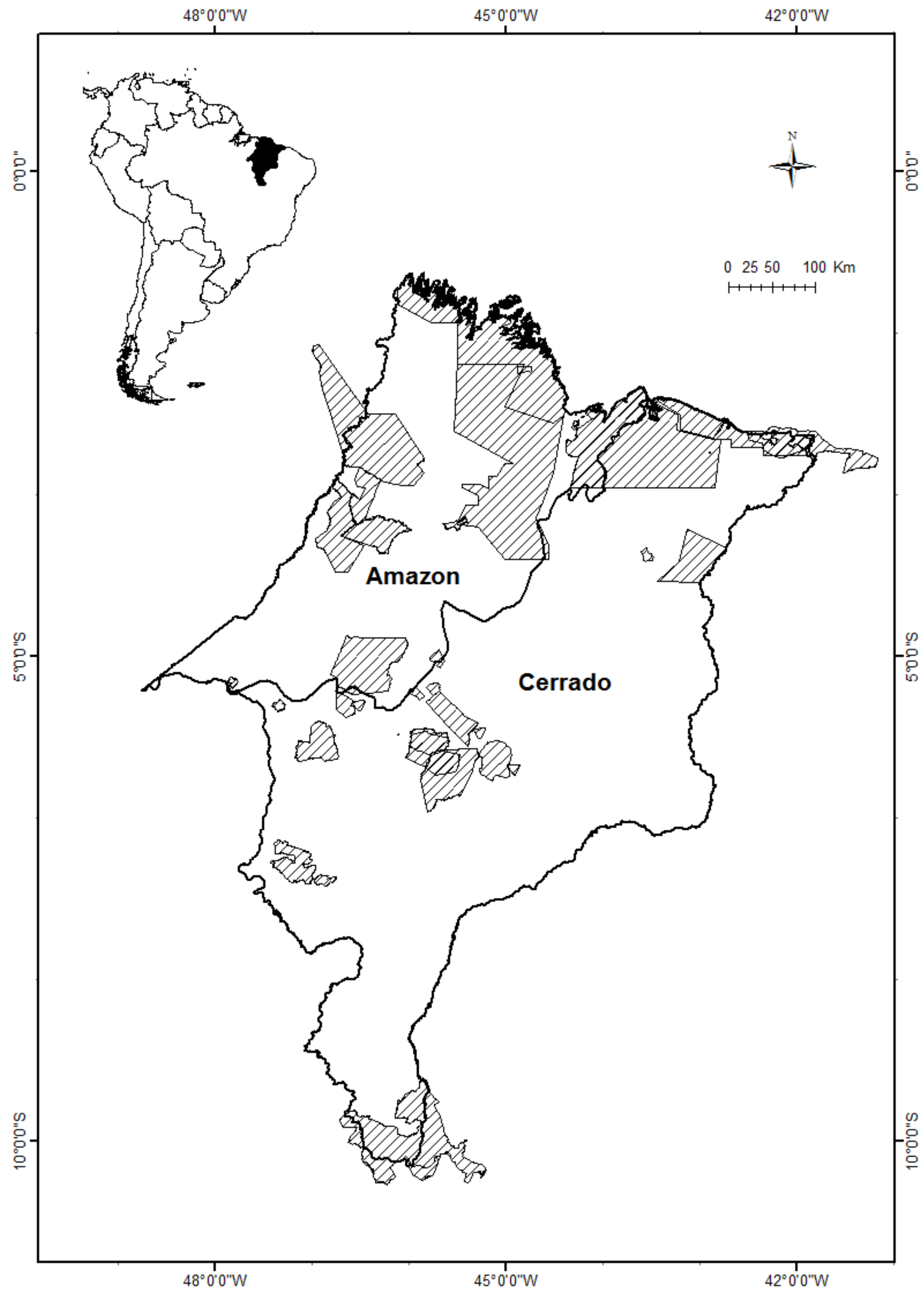


Figure 1. Map of the study area with location of Protected Areas (striped polygons) within the Amazon and Cerrado biomes.

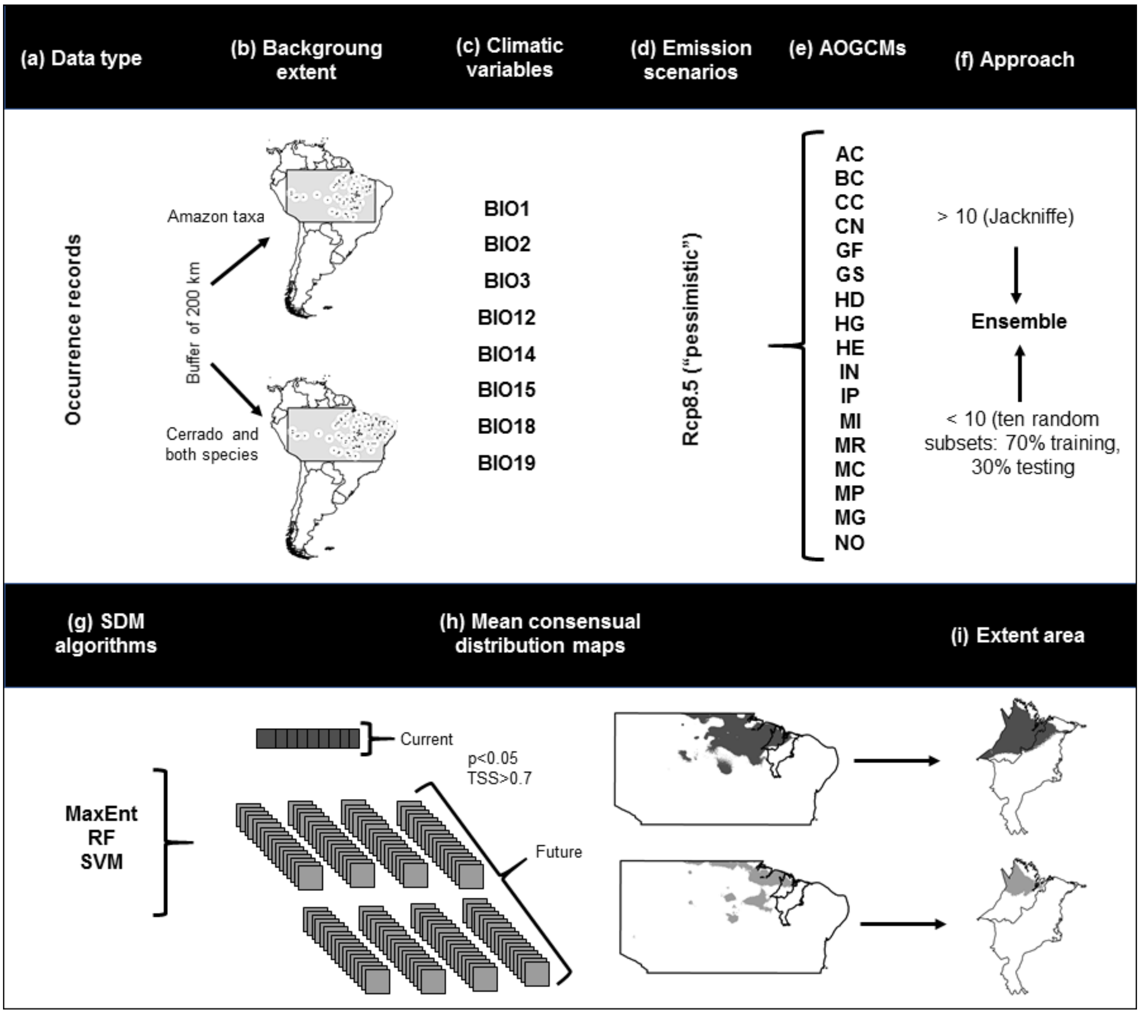


Figure 2. General summary of the methods used in our study. a) Data type; b) Background extent; c) Climatic variables; d) Emission scenarios; e) AOGCMs; f) Approach; g) SDM algorithms; h) Mean consensual distribution maps; i) Extent area.

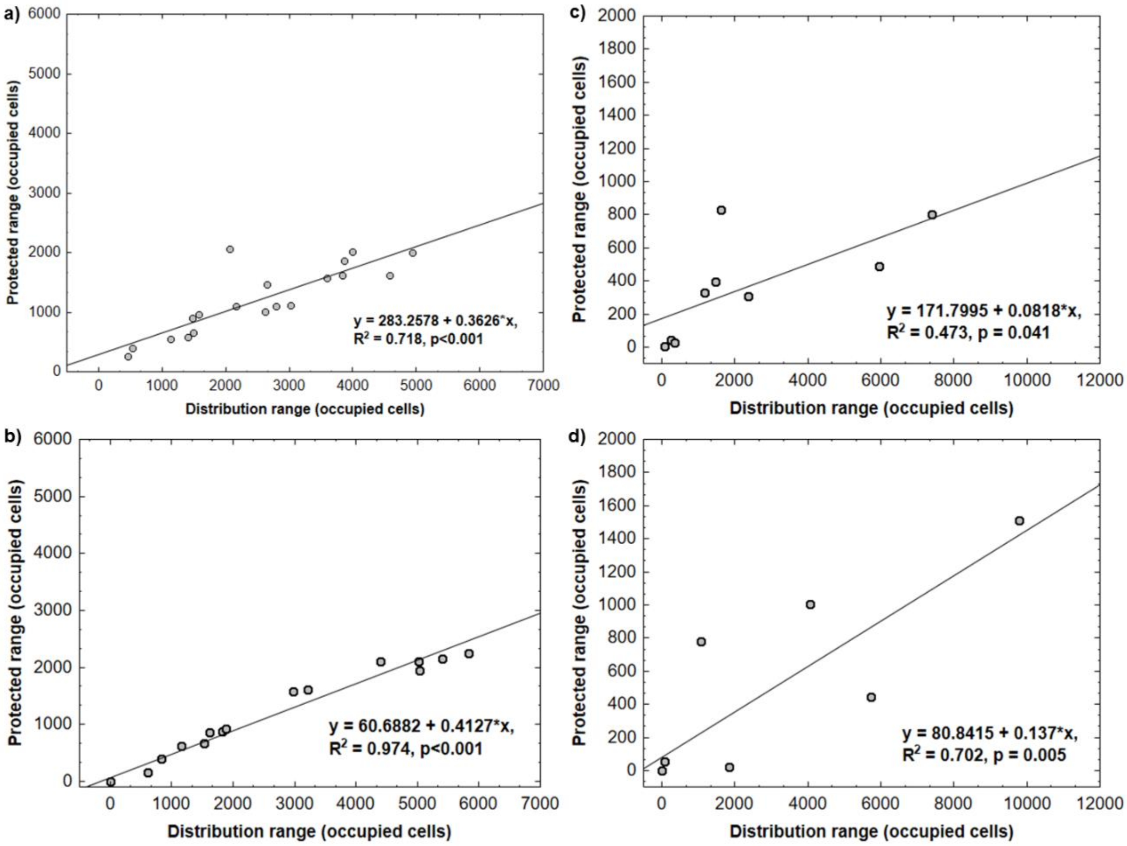


Figure 3. Distribution of protected range in relation to range size within the study area for Amazon (a, b) and Cerrado (c, d) taxa data sets (see Methods for details), under current (a, c), and future (b, d) climatic conditions.

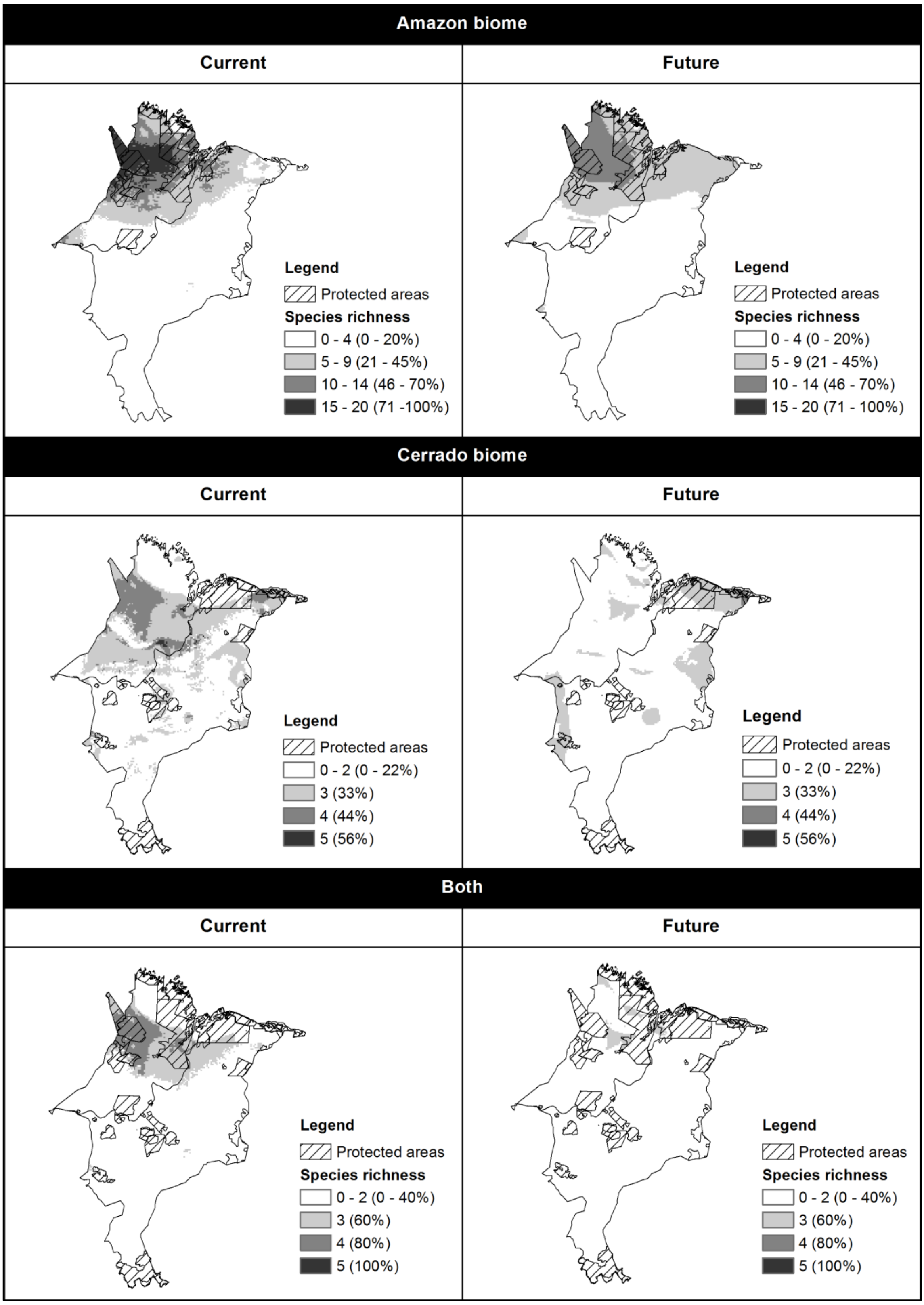
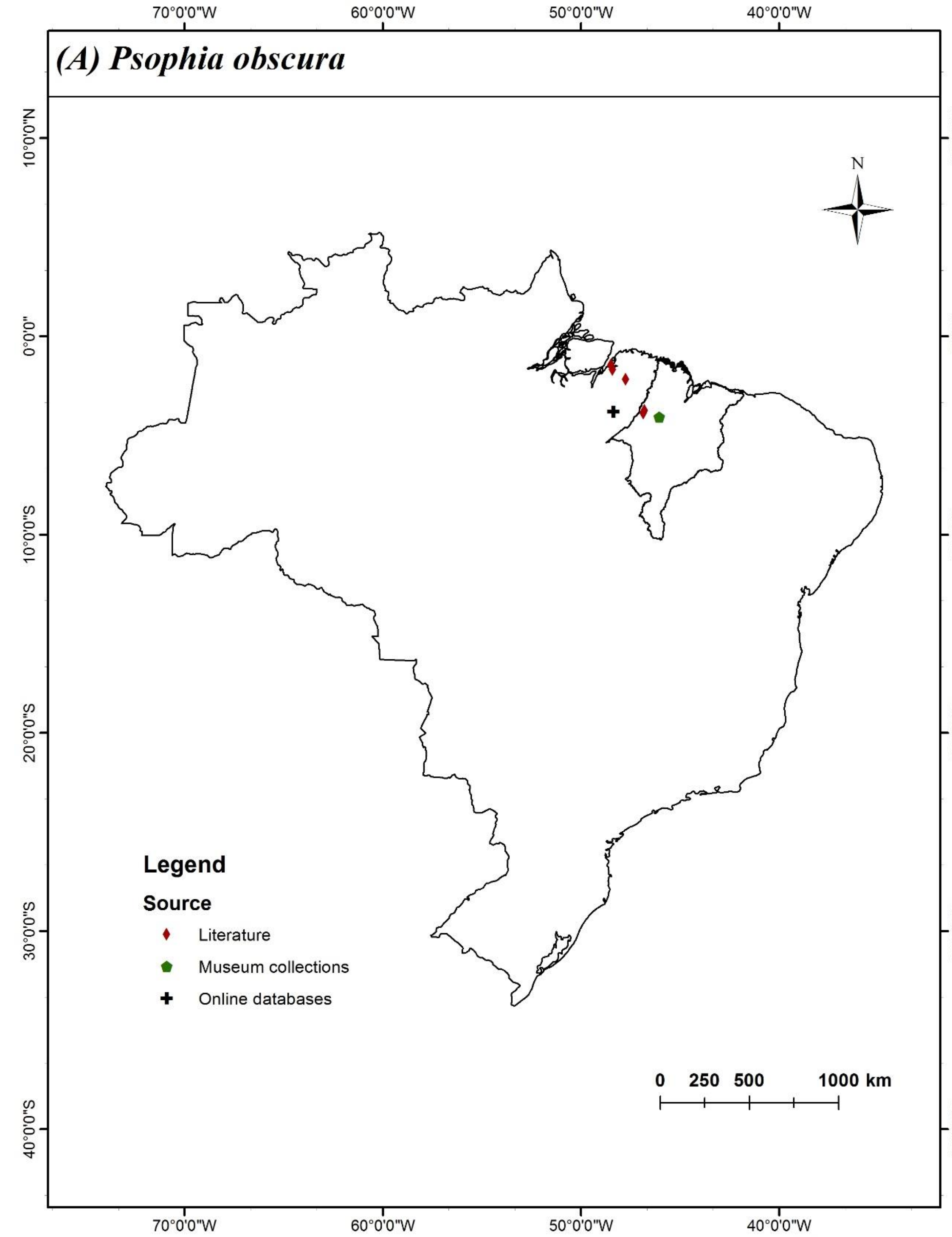
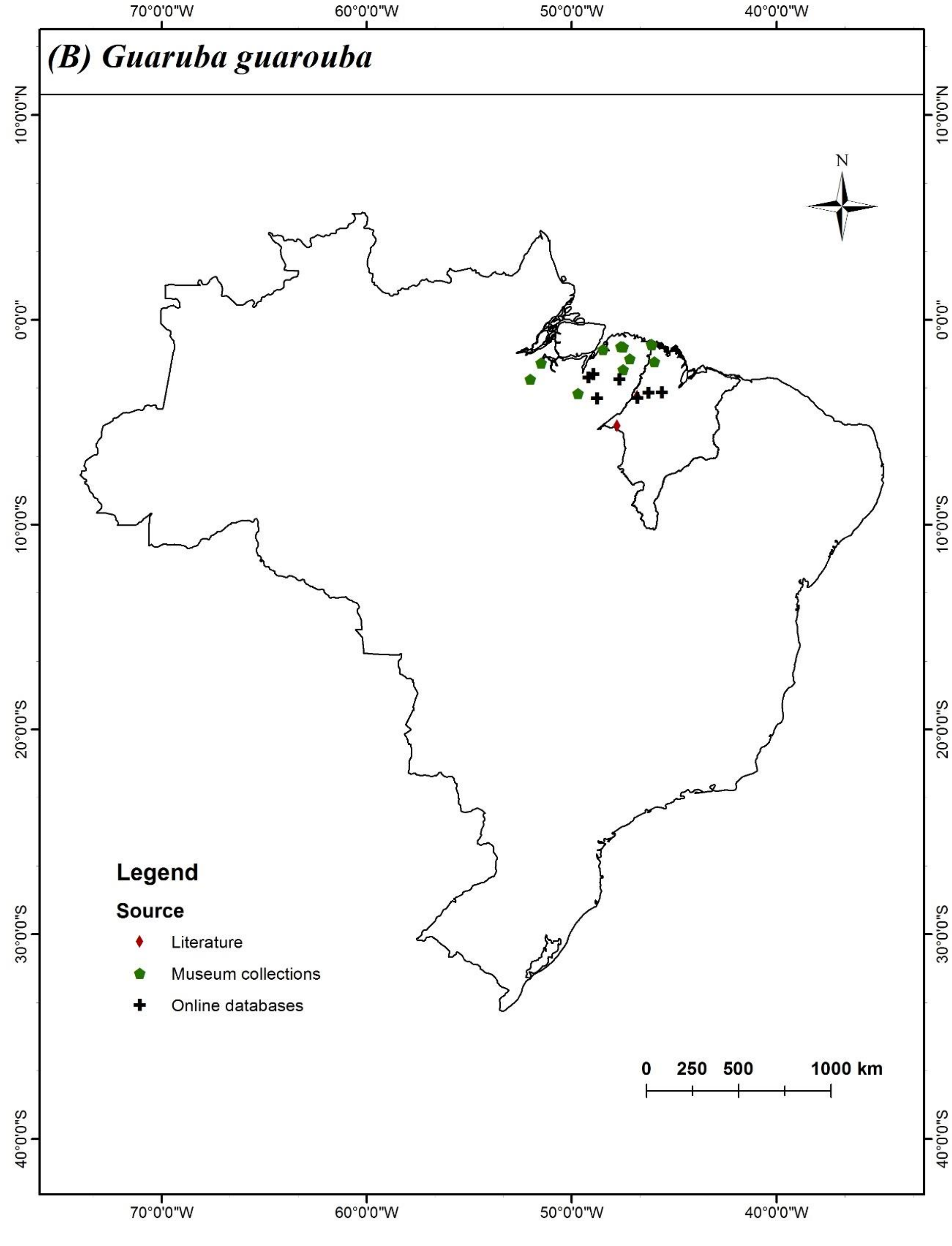


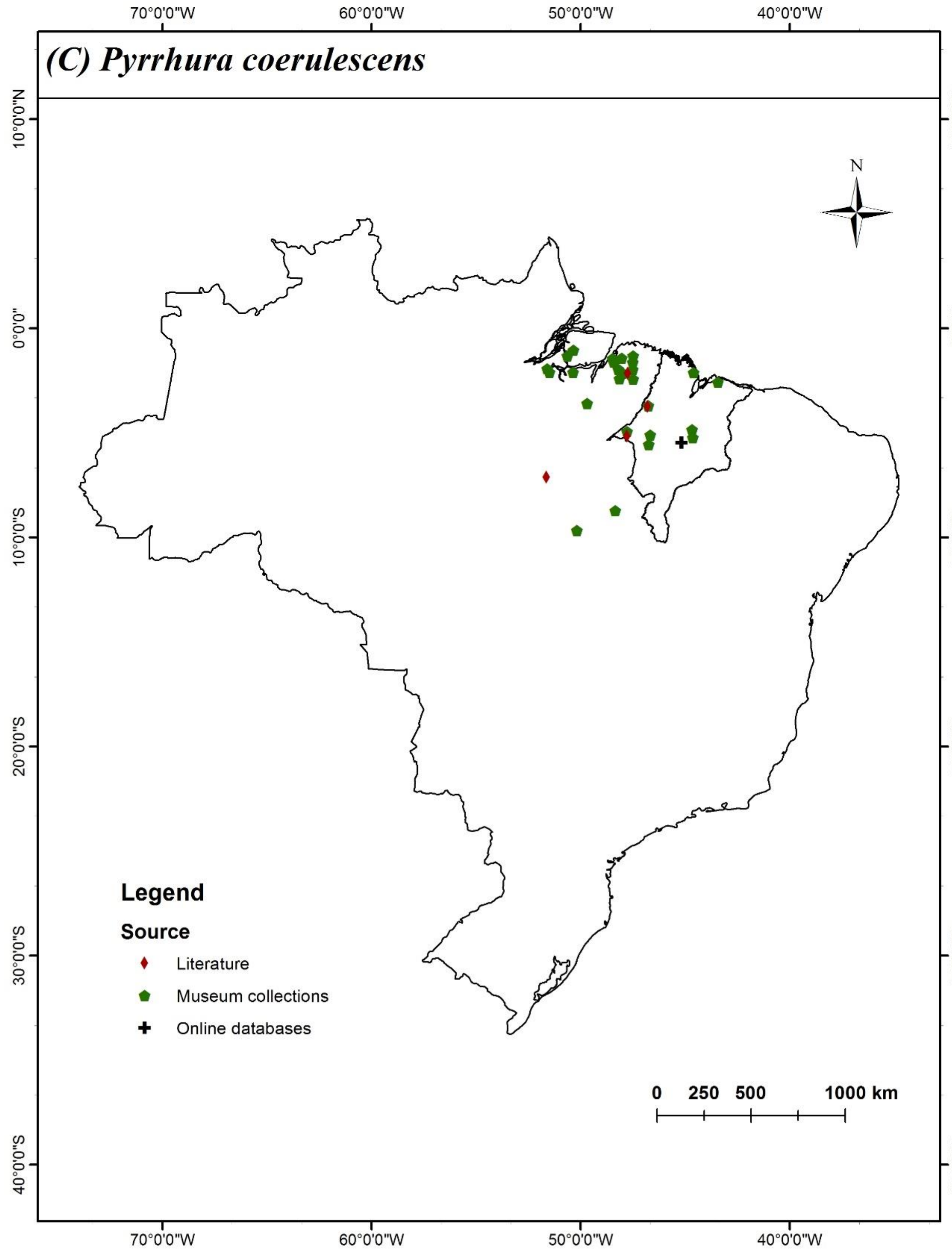
Figure 4. Estimated species richness in relationship to protected areas within Amazon, Cerrado and all study area.

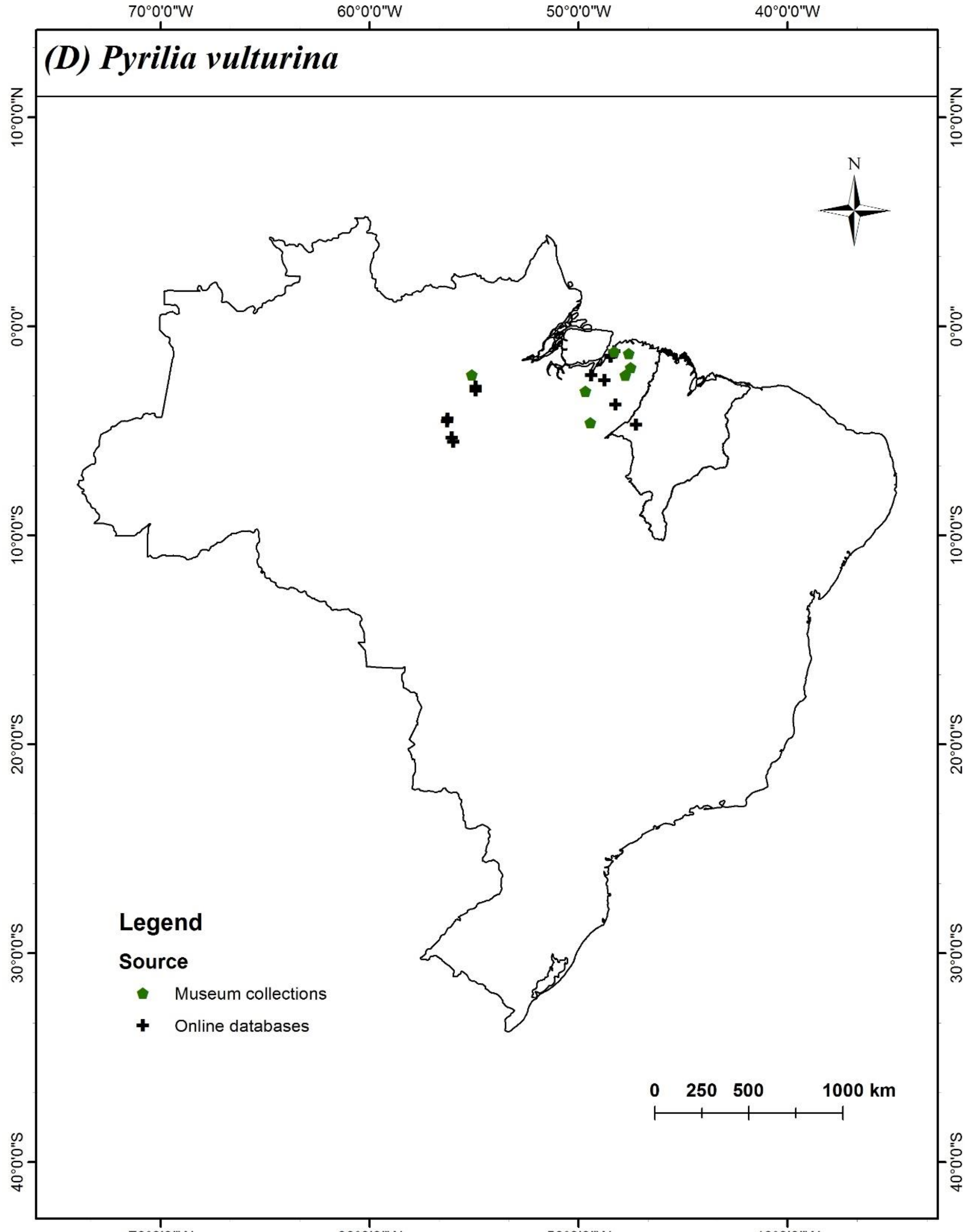
Appendix S1. Maps depicting occurrence records used for each of the species distribution modelling procedures performed.

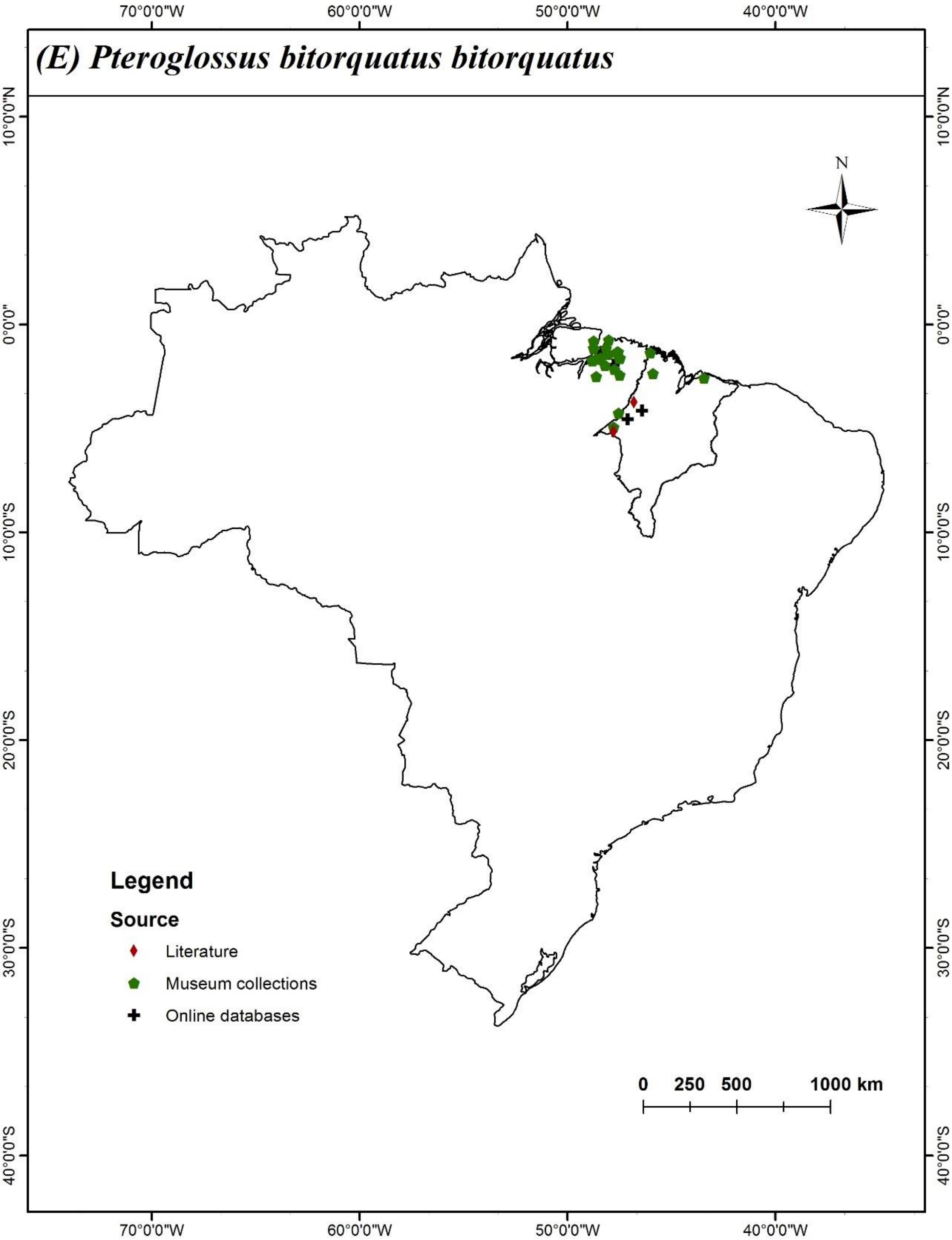


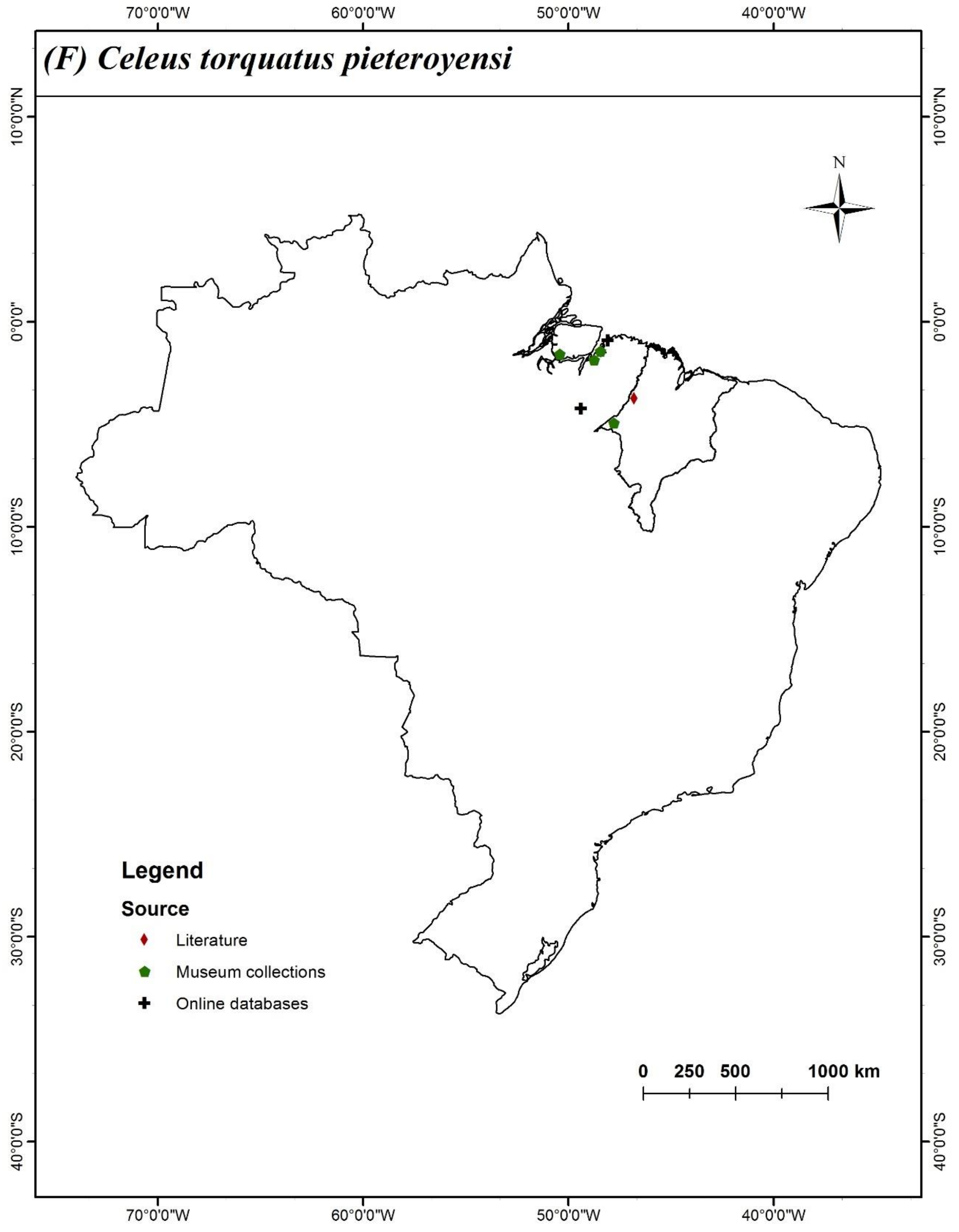


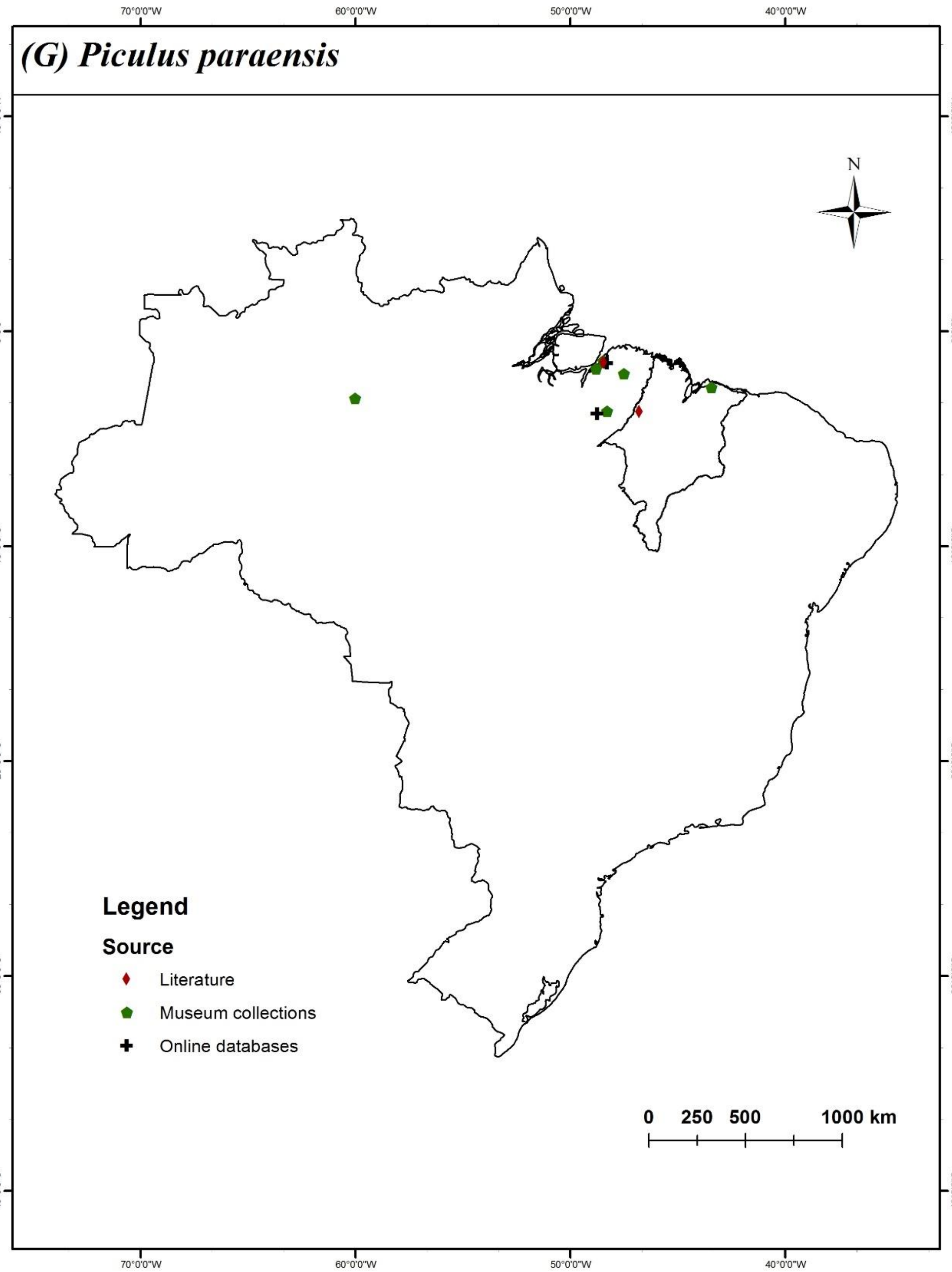
(B) Guaruba guarouba
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collections
Online databases
0 250 500 1000 km


(C) Pyrrhura coerulescens
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collections
Online databases
0 250 500 1000 km


(D) Pyrilia vulturina
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Museum collections
Online databases
0 250 500 1000 km


(E) Pteroglossus bitorquatus bitorquatus
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collections
Online databases
0 250 500 1000 km


(F) Celeus torquatus pieteroyensi
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collections
Online databases
0 250 500 1000 km


(G) Piculus paraensis
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
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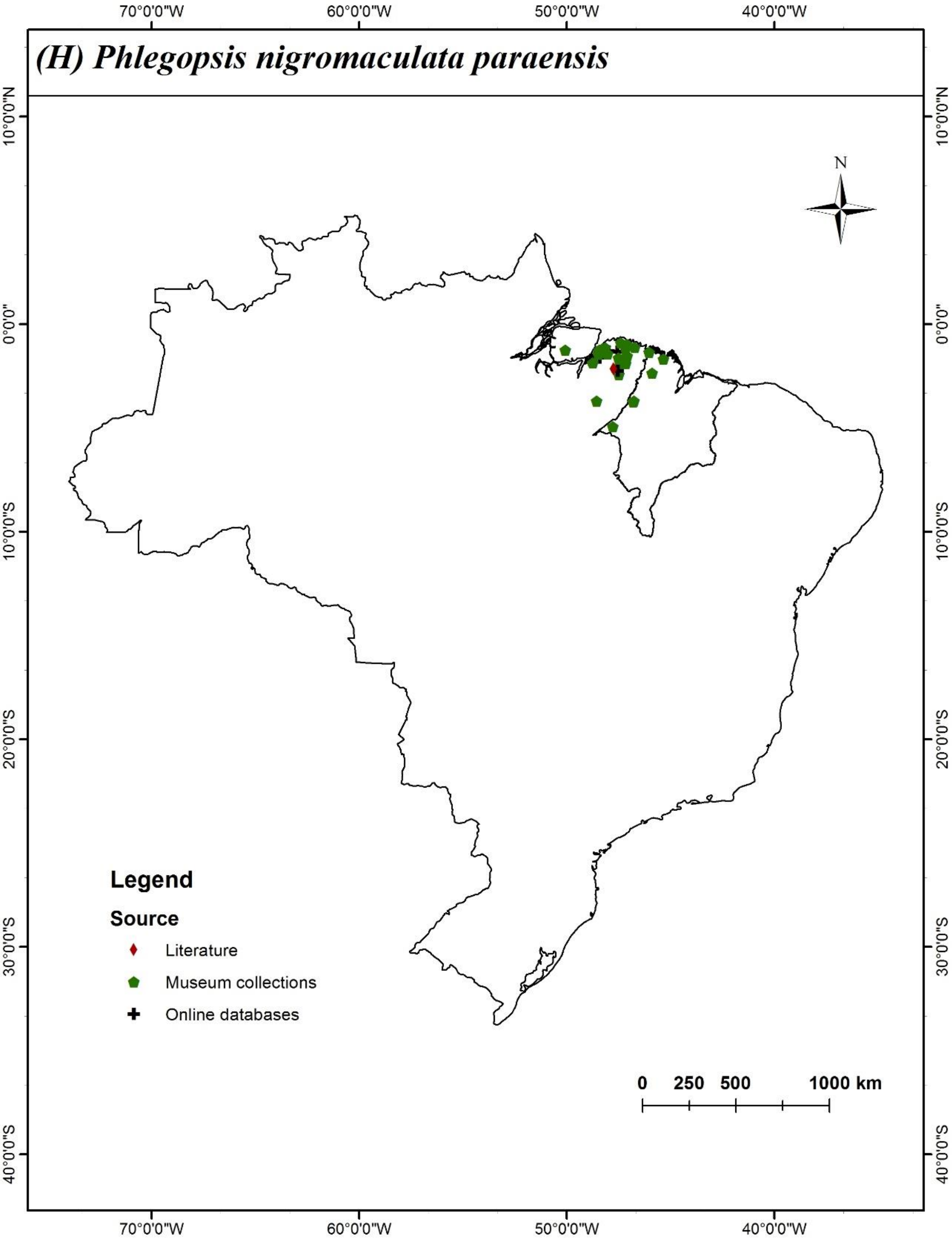
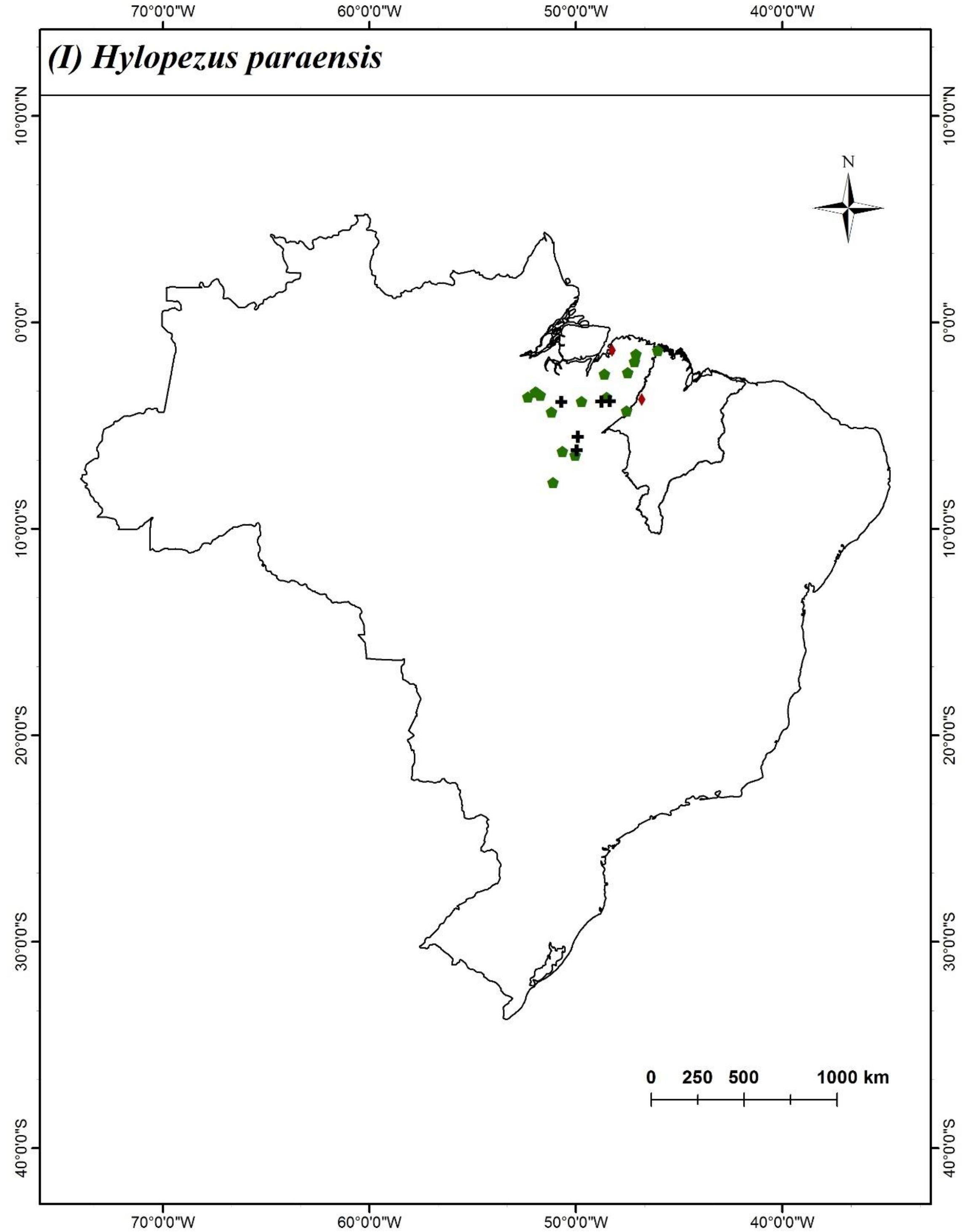
Source
Literature
Museum collections
Online databases
0 250 500 1000 km


70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
(H) Phlegopsis nigromaculata paraensis
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collections
Online databases
0 250 500 1000 km


(I) Hylopezus paraensis
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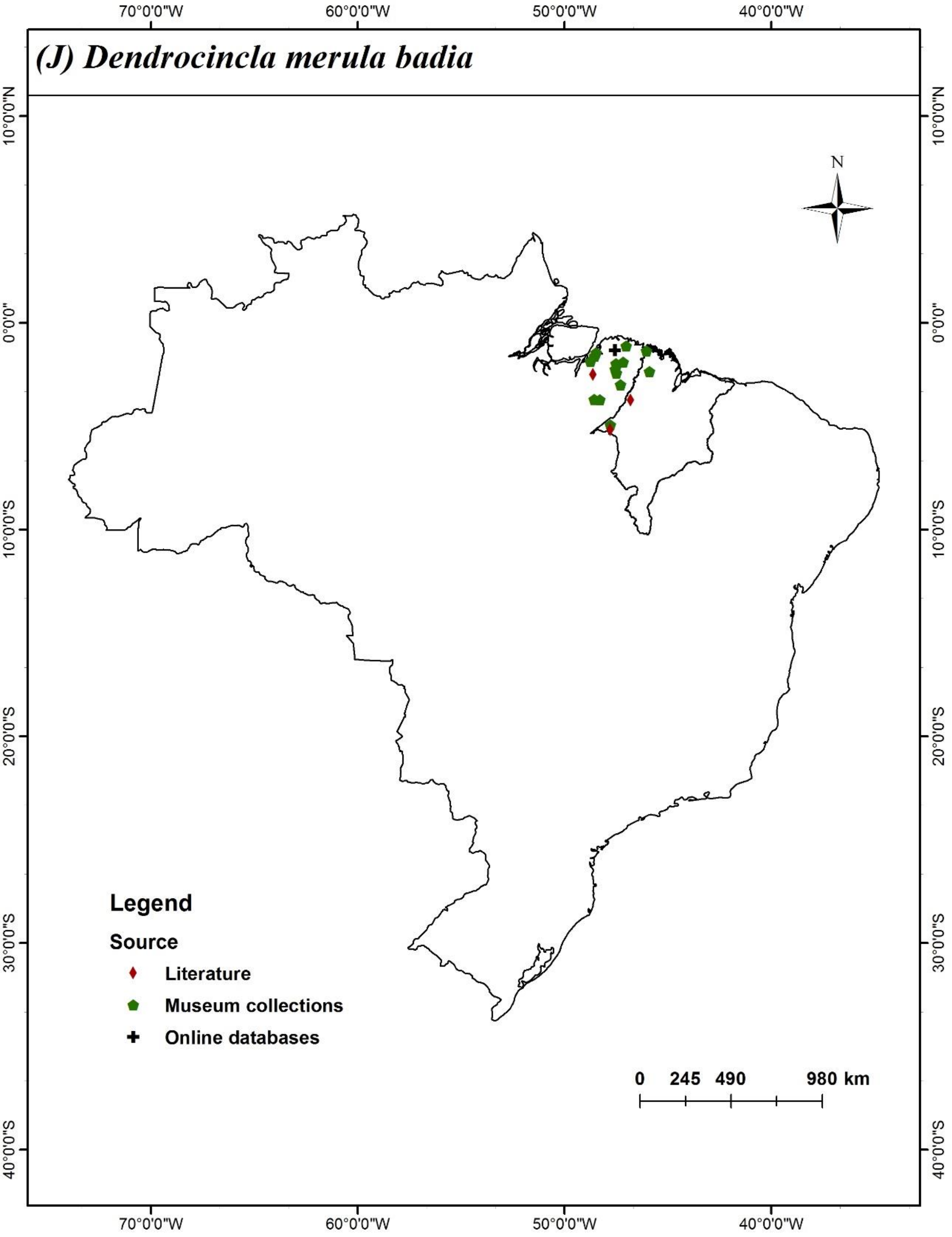
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
0 250 500 1000 km



(J) Dendrocincla merula badia
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
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Museum collections
Online databases
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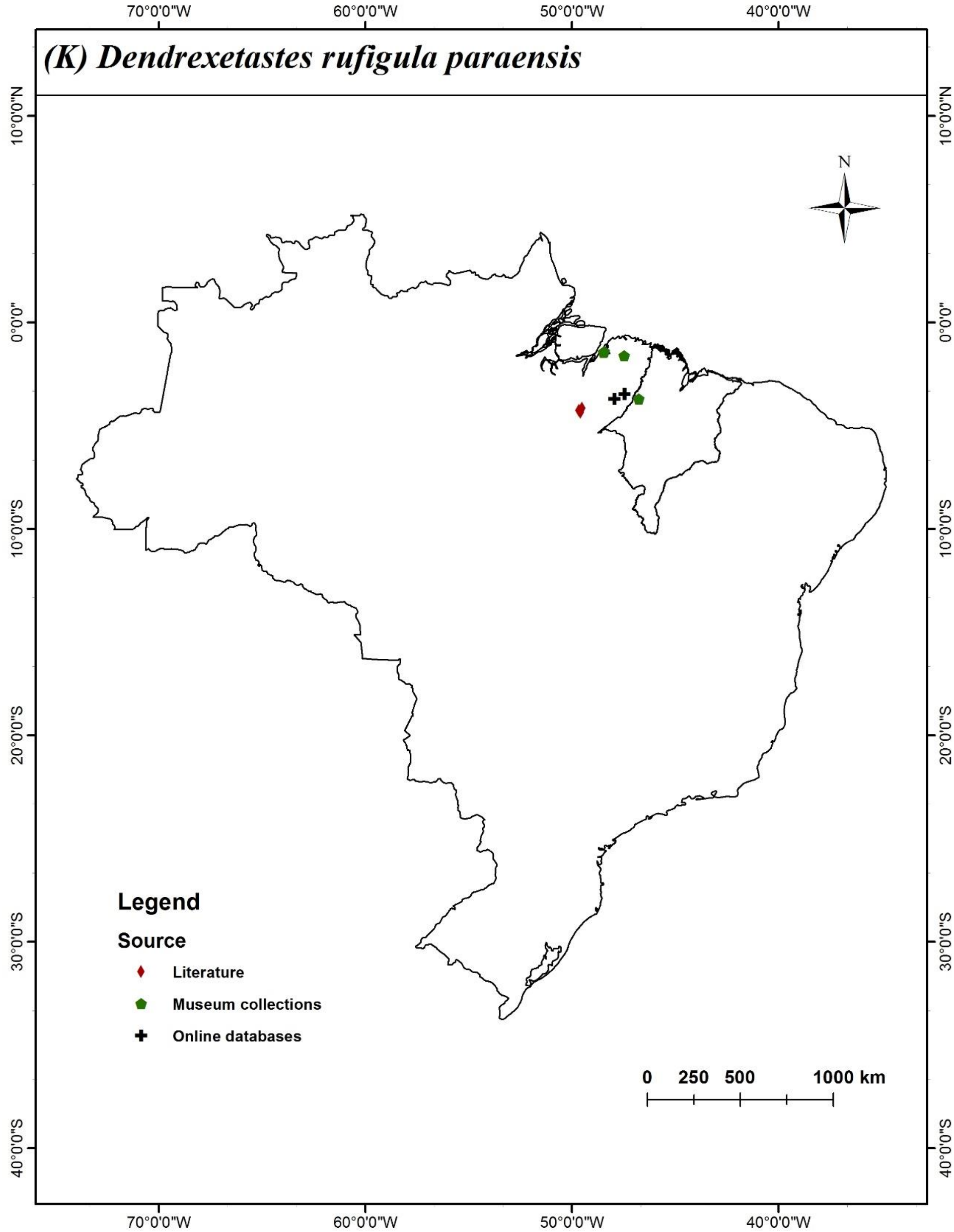

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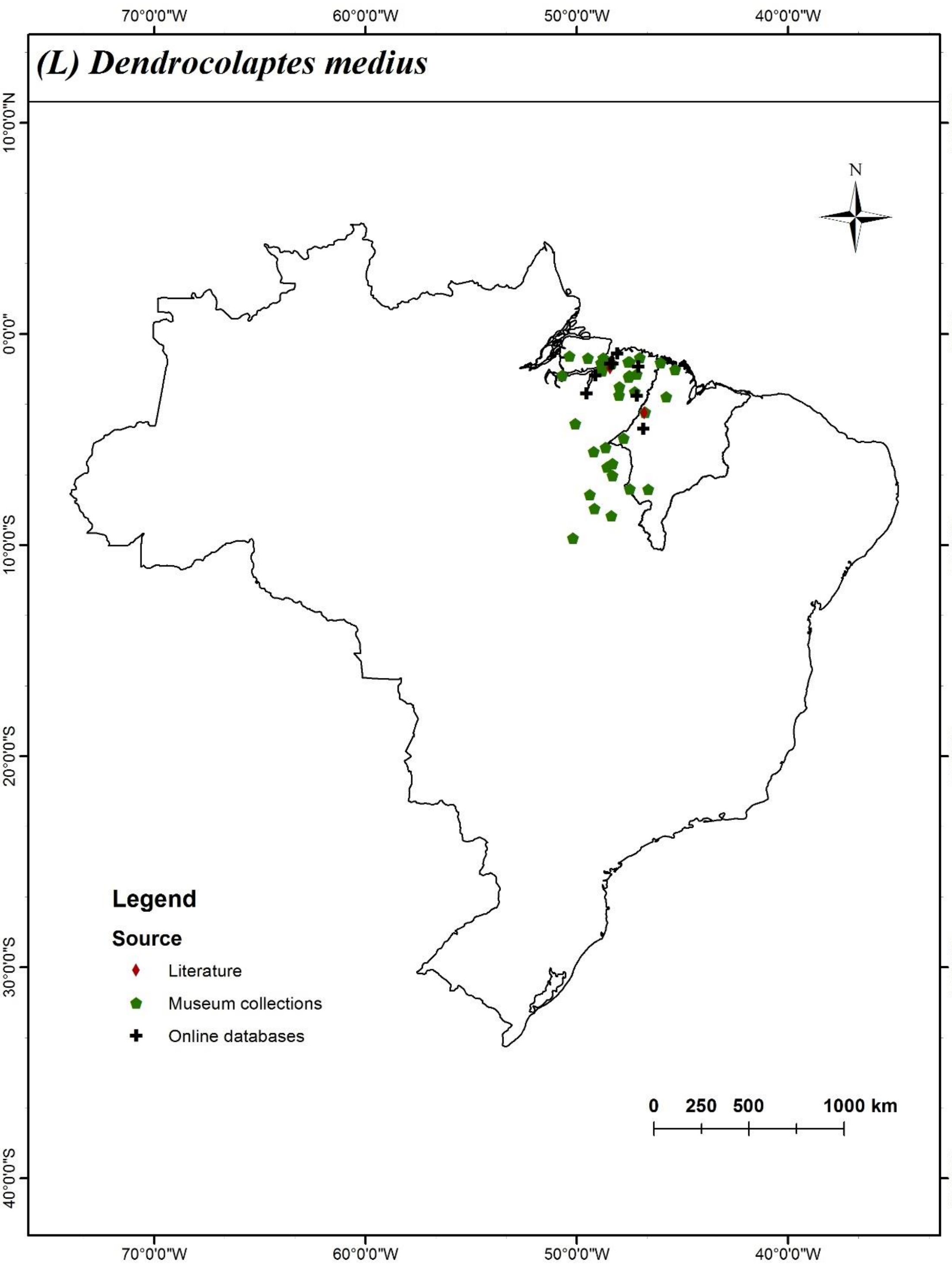
(L) Dendrocolaptes medius
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
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Source
Literature
Museum collections
Online databases
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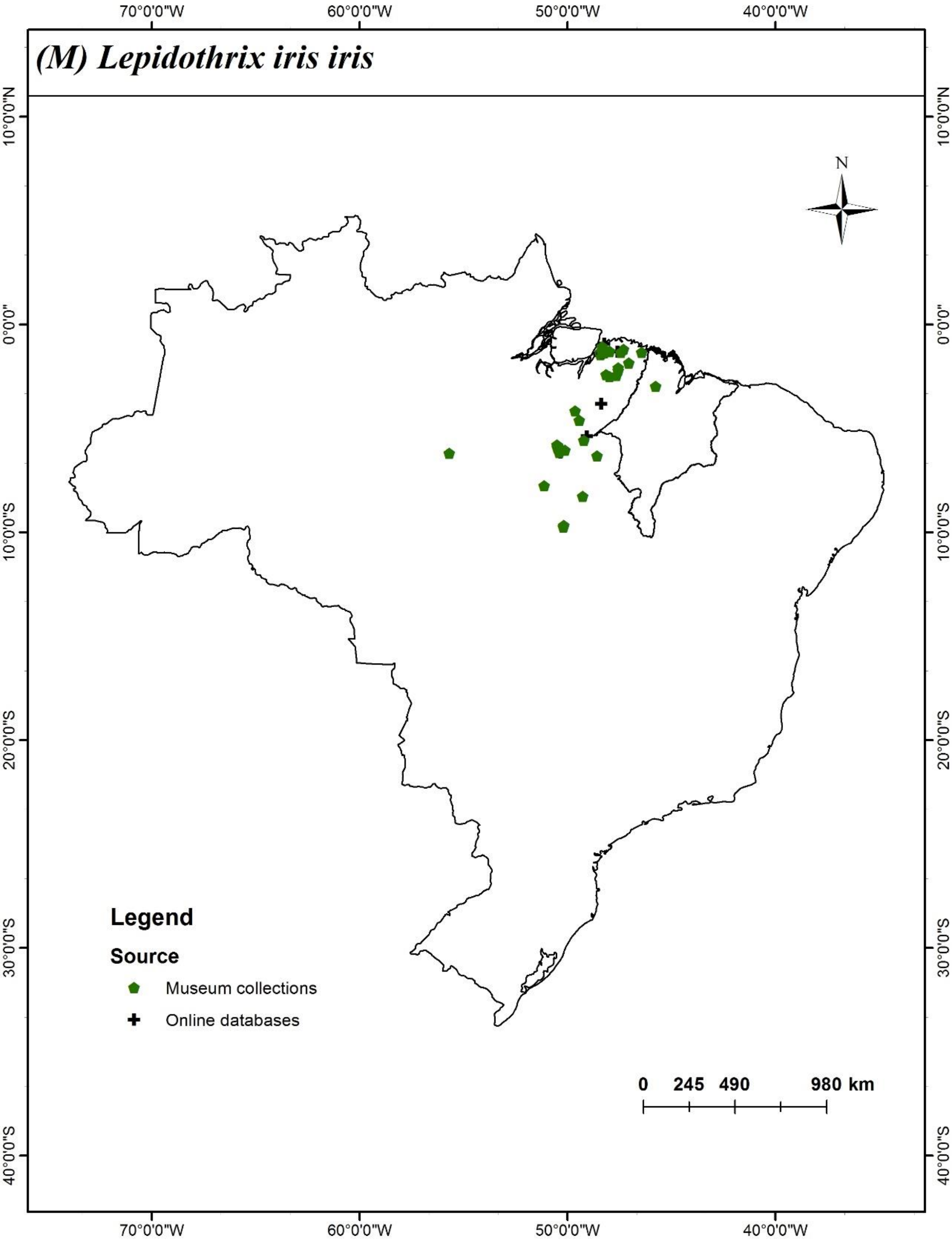
(M) Lepidothrix iris iris
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Museum collections
Online databases
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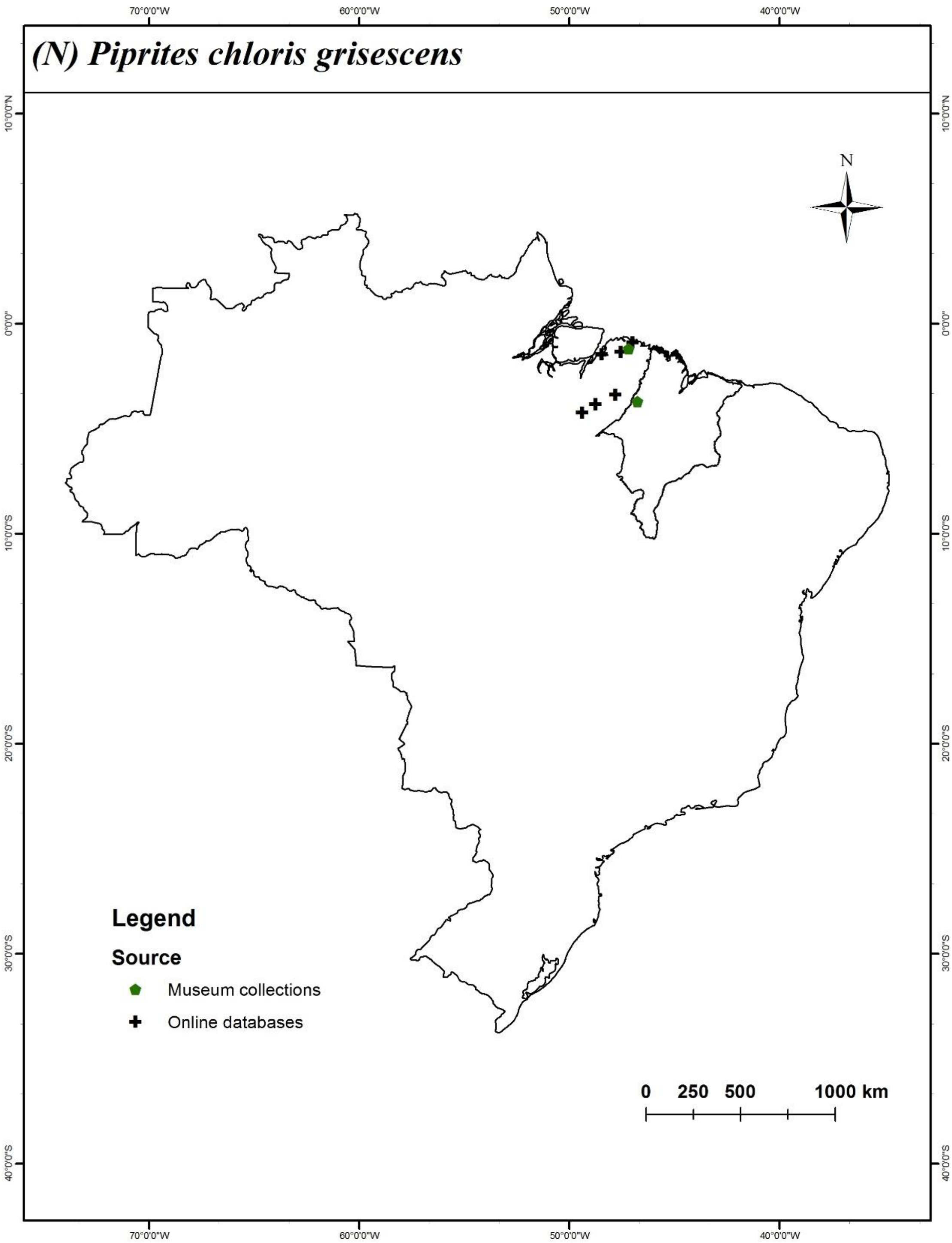
(N) Piprites chloris grisescens
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60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
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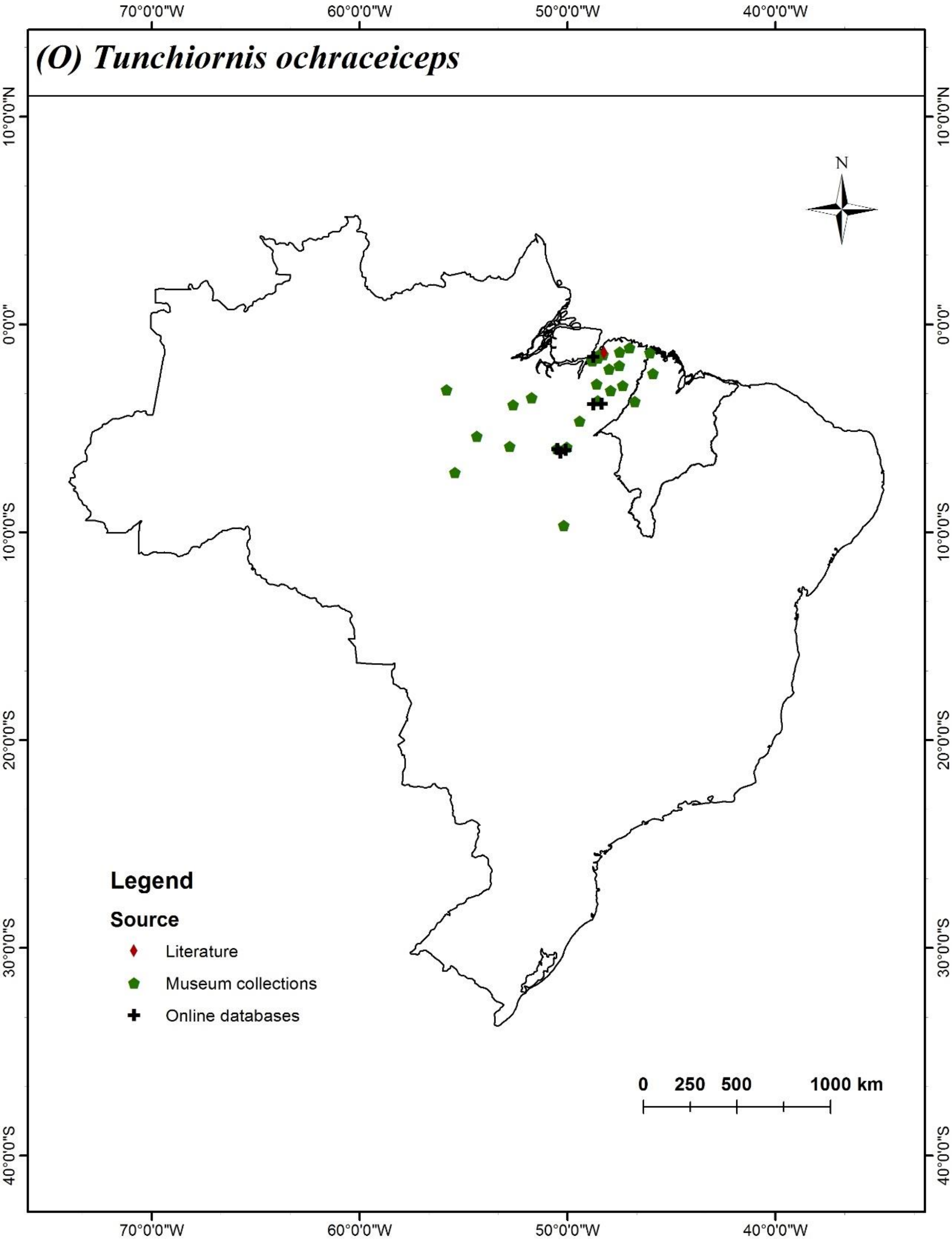
Museum collections
Online databases
0 250 500 1000 km


(O) Tunchiornis ochraceiceps
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60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
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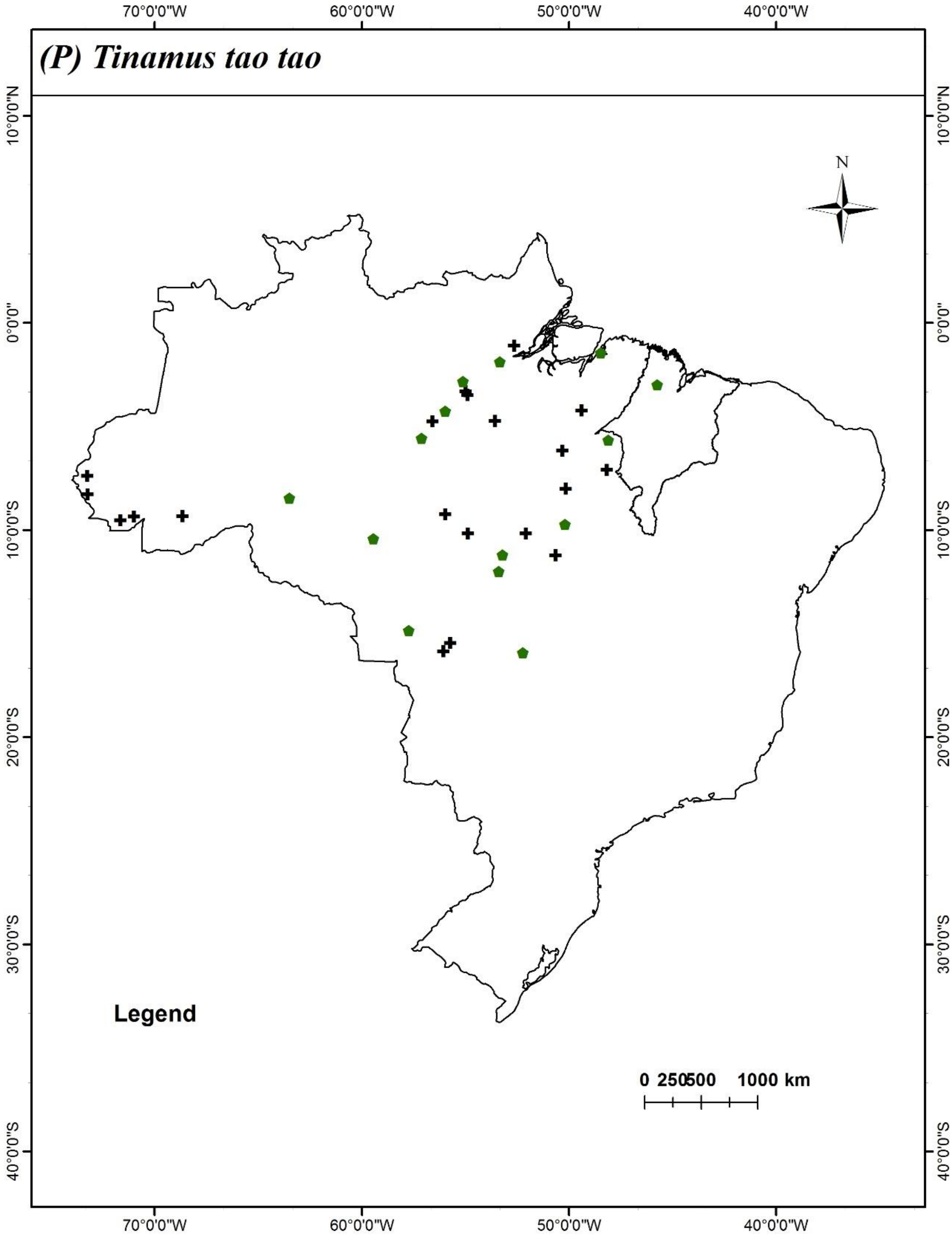
(P) Tinamus tao tao
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60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
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10°0'0"S
20°0'0"S
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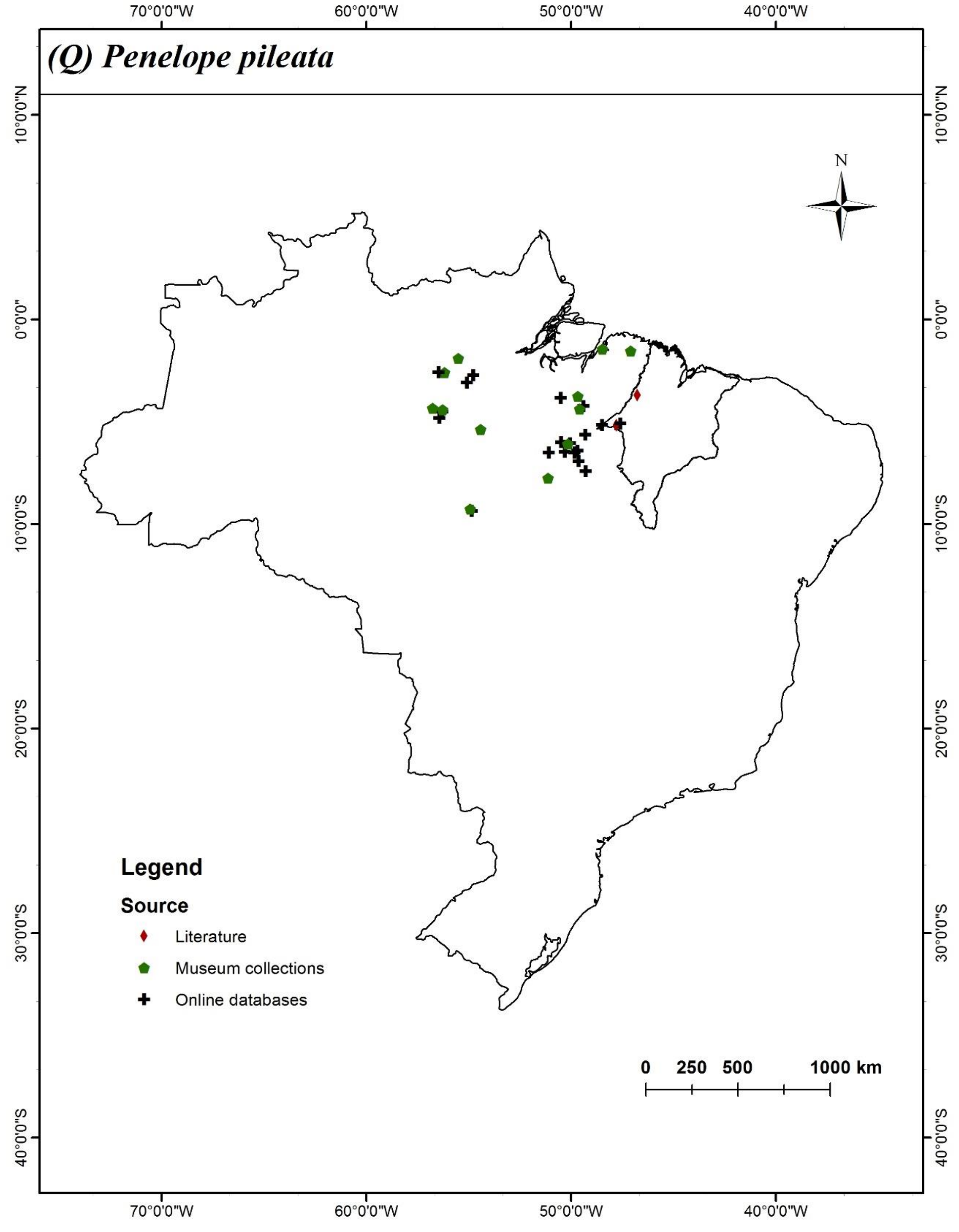
(Q) Penelope pileata
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40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
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N
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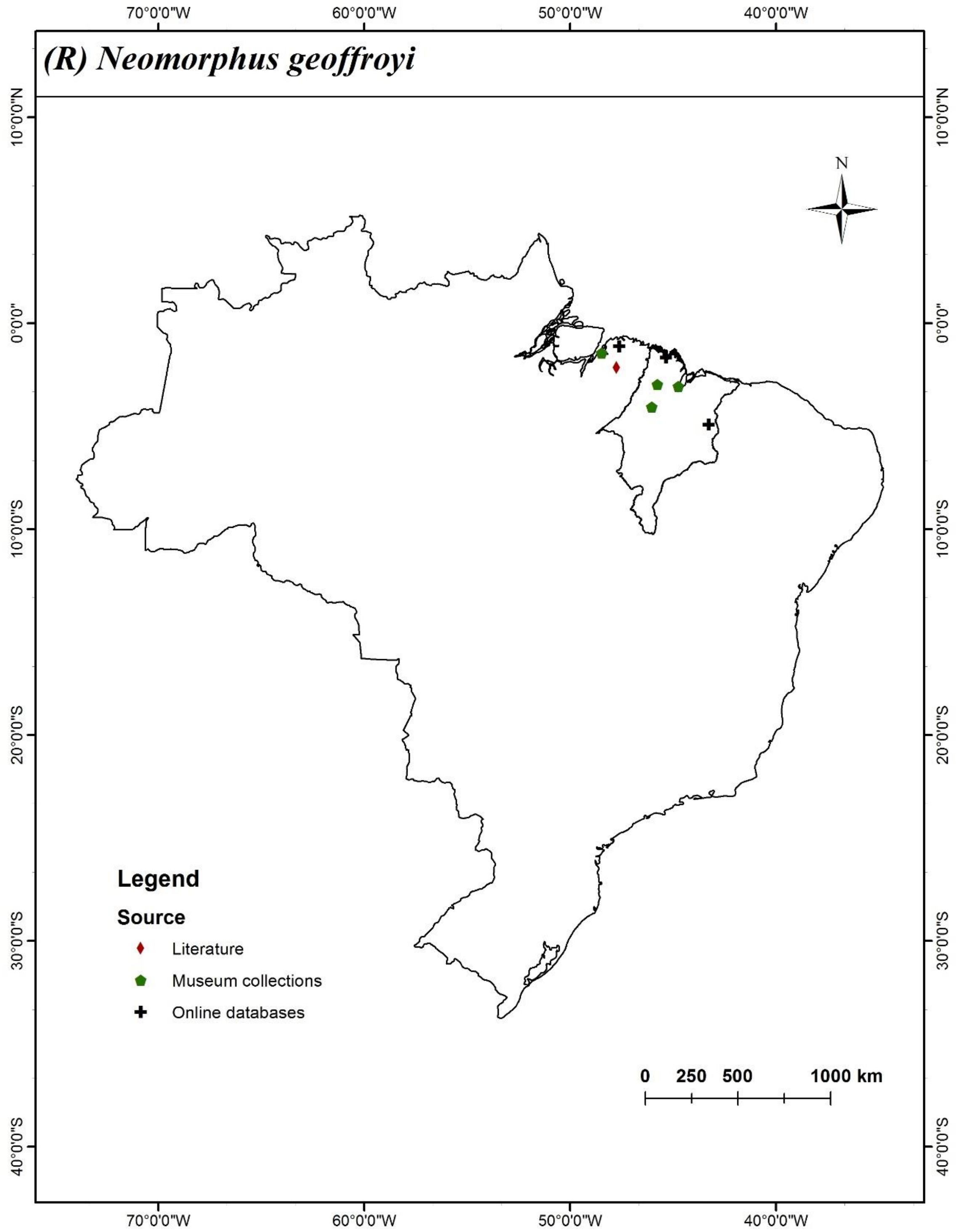
Source
Literature
Museum collections
Online databases
0 250 500 1000 km


(R) Neomorphus geoffroyi
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10°0'0"S
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Museum collections
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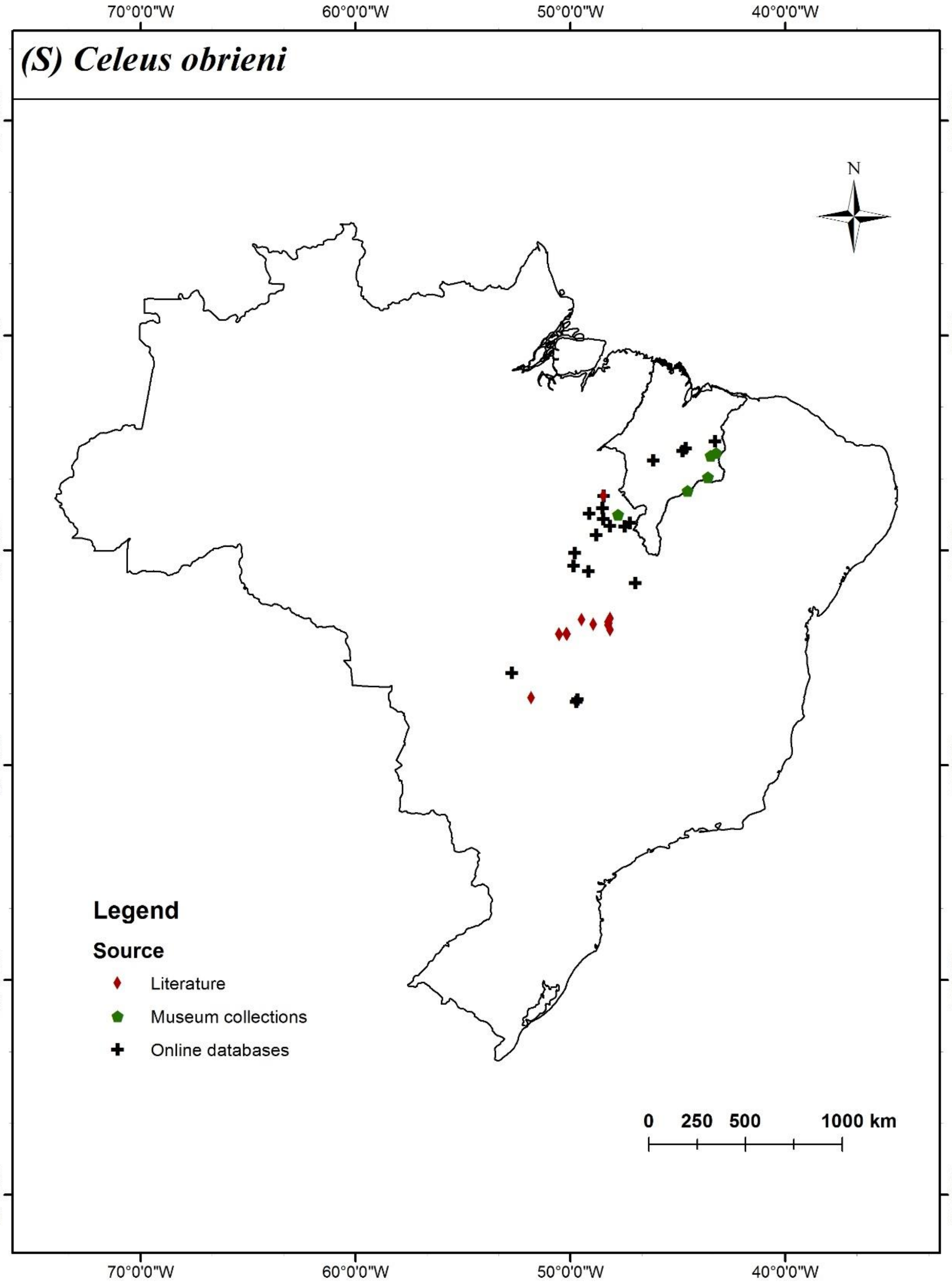

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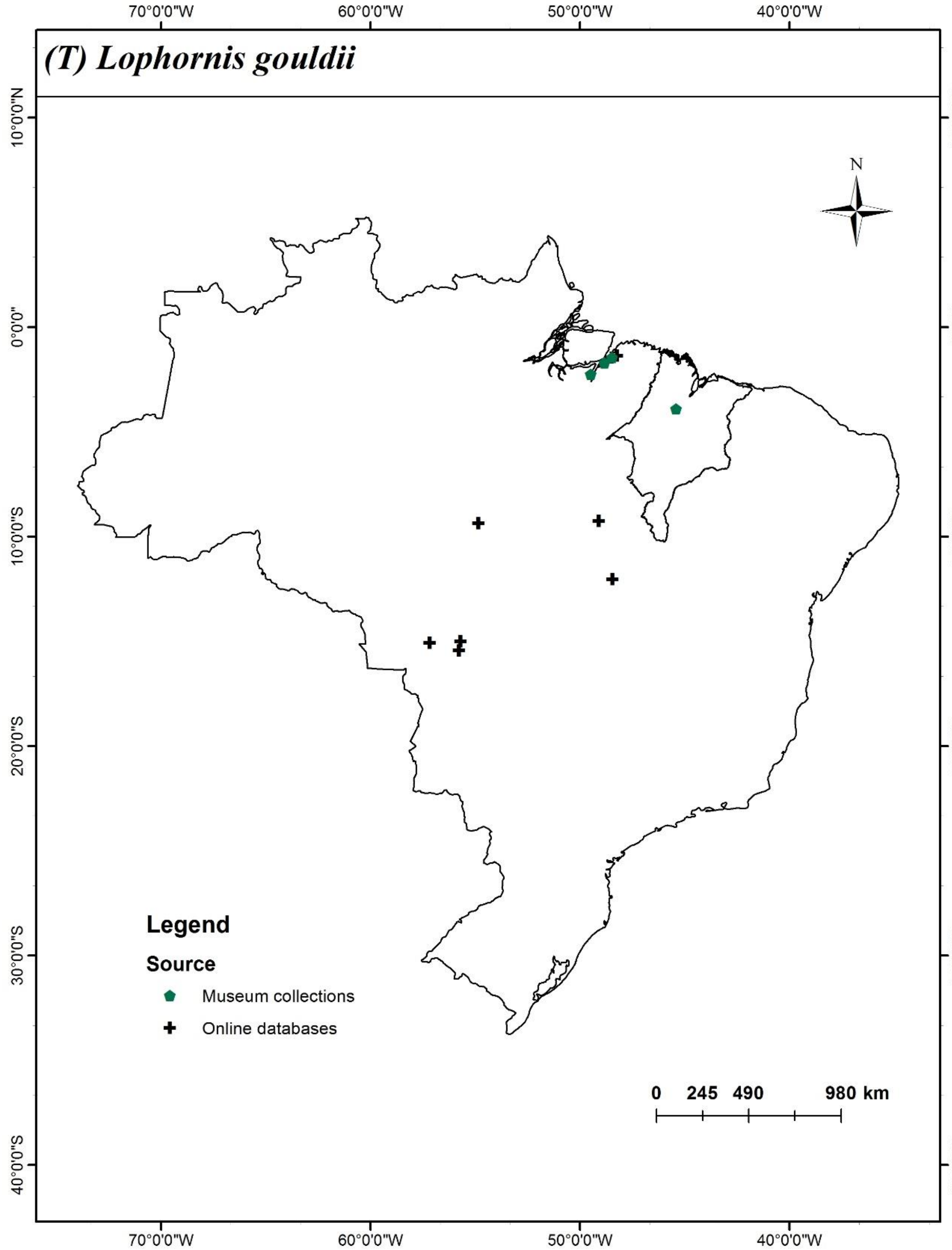
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
(T) Lophornis gouldii
10°0'0"N
0°0'0"
10°0'0"S
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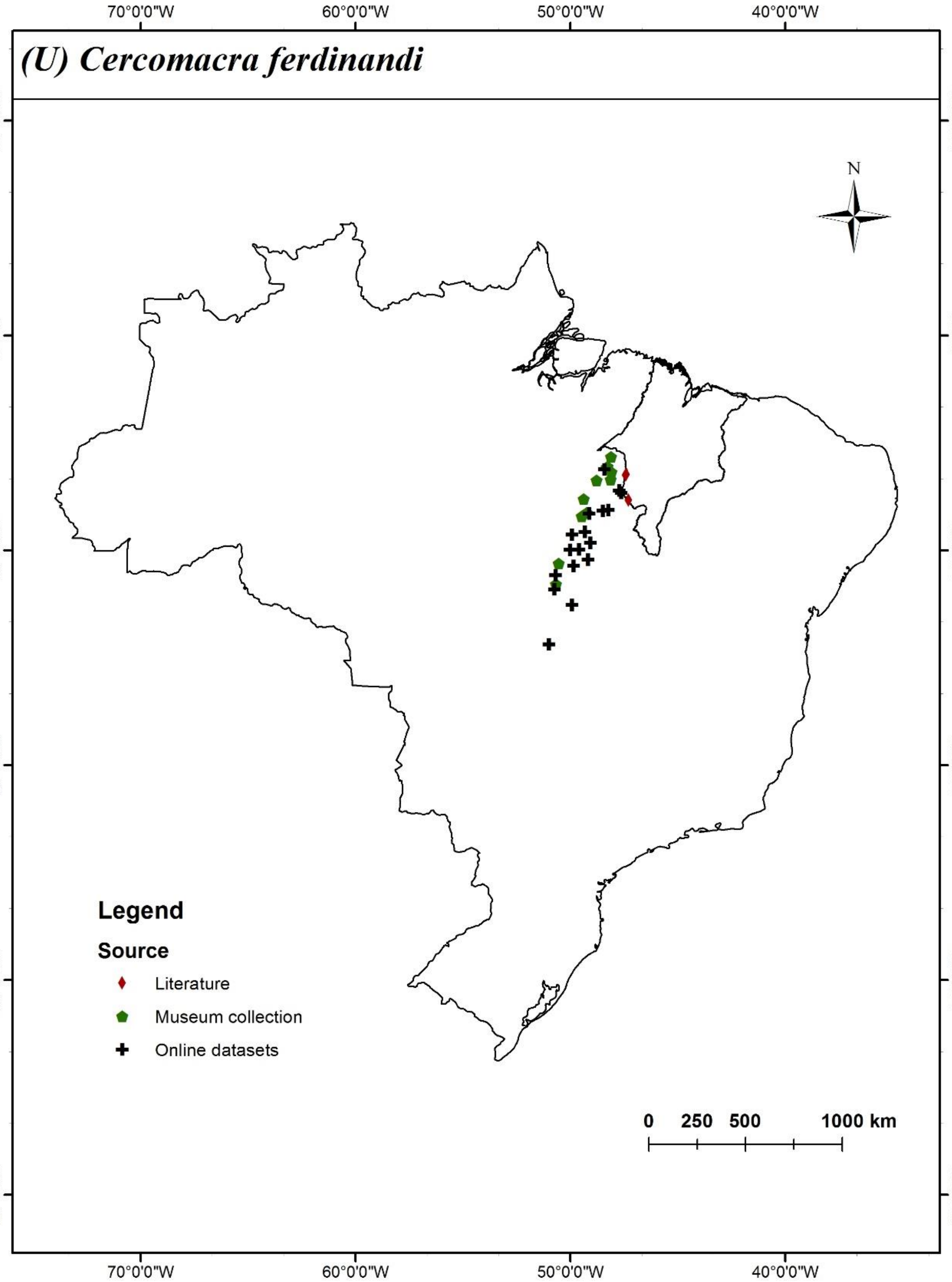
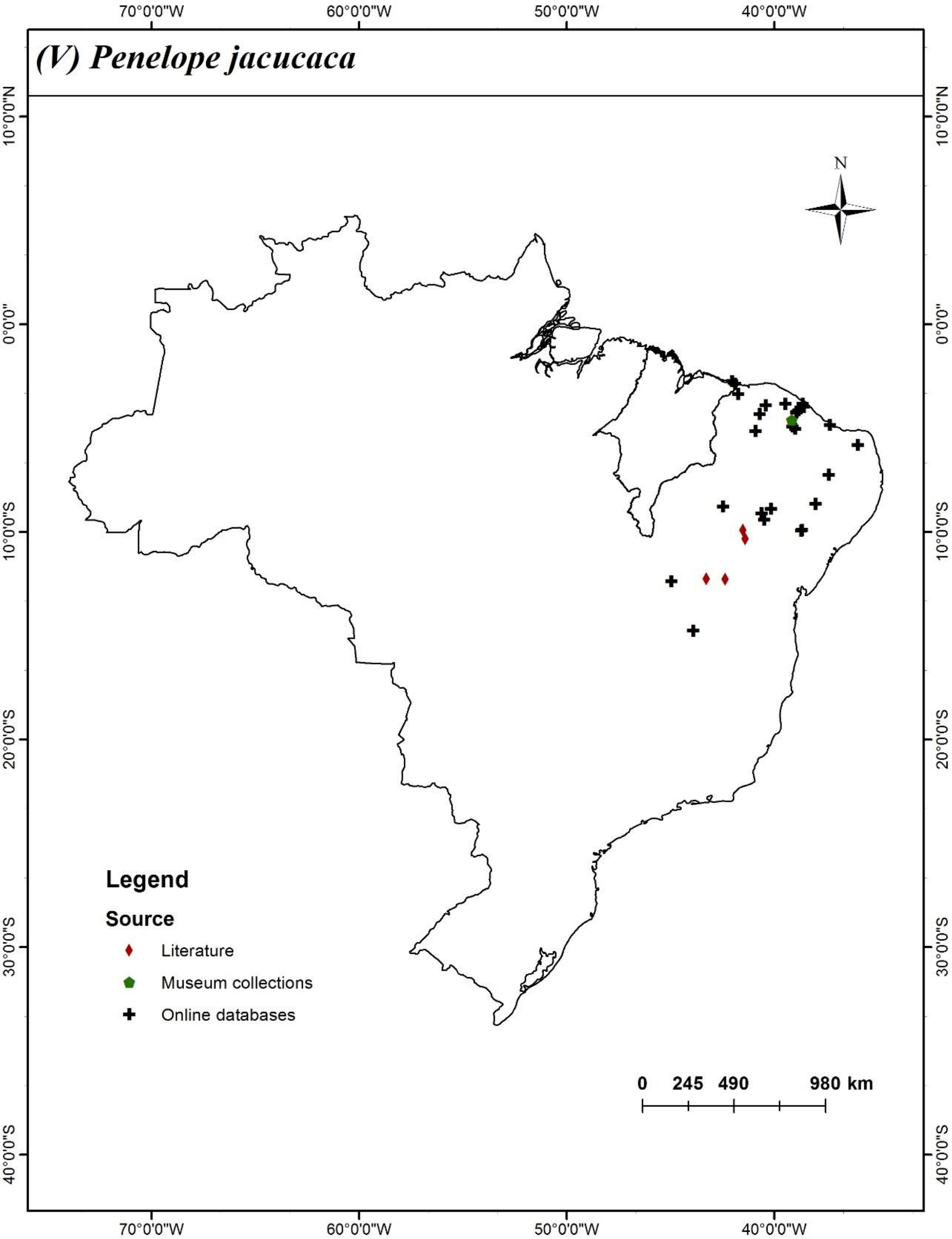
30°0'0"S
40°0'0"S
N
Legend
Source
Museum collections
Online databases
0 245 490 980 km


(U) Cercomacra ferdinandi
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collection
Online datasets
0 250 500 1000 km


(V) Penelope jacucaca
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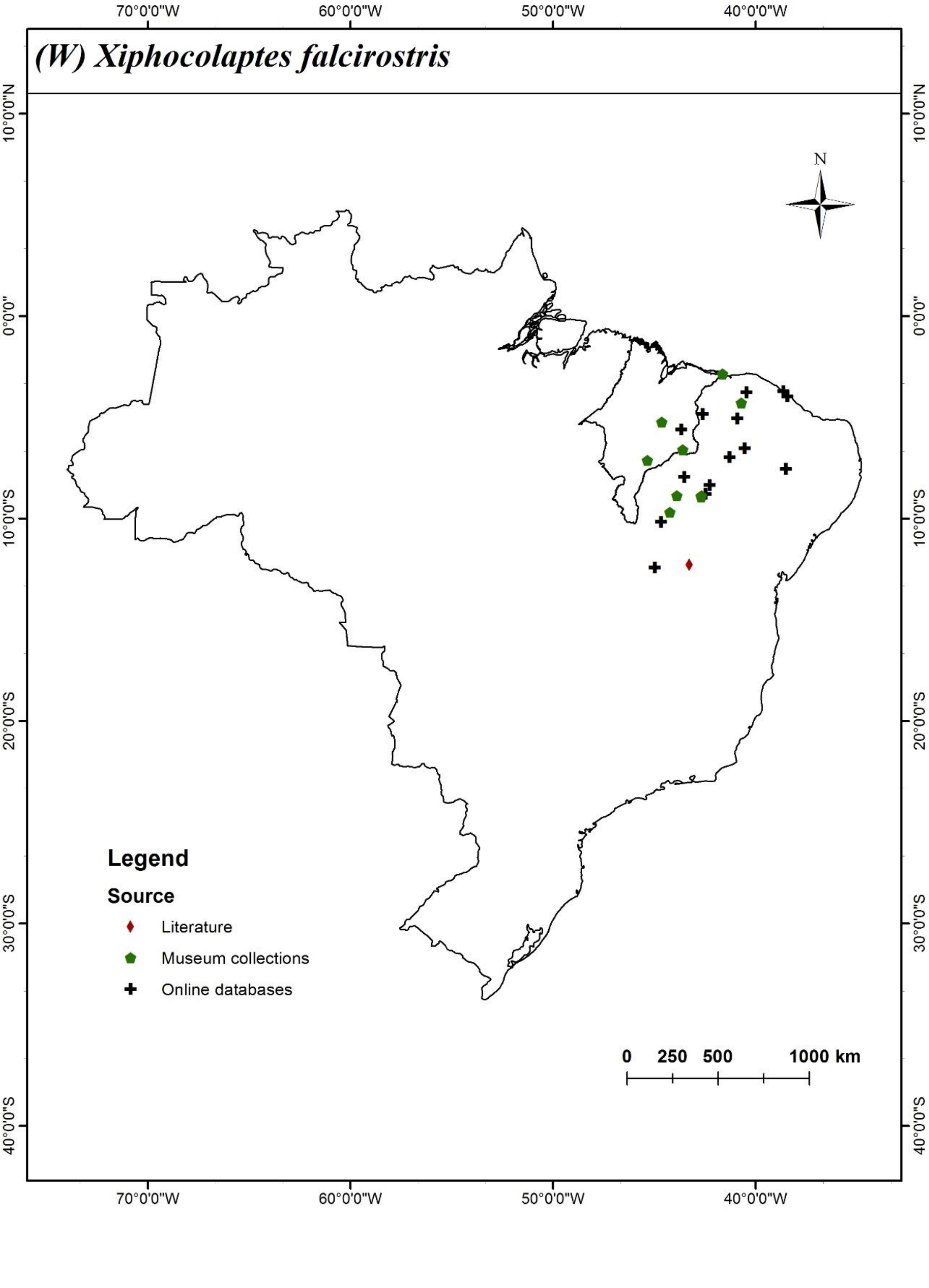
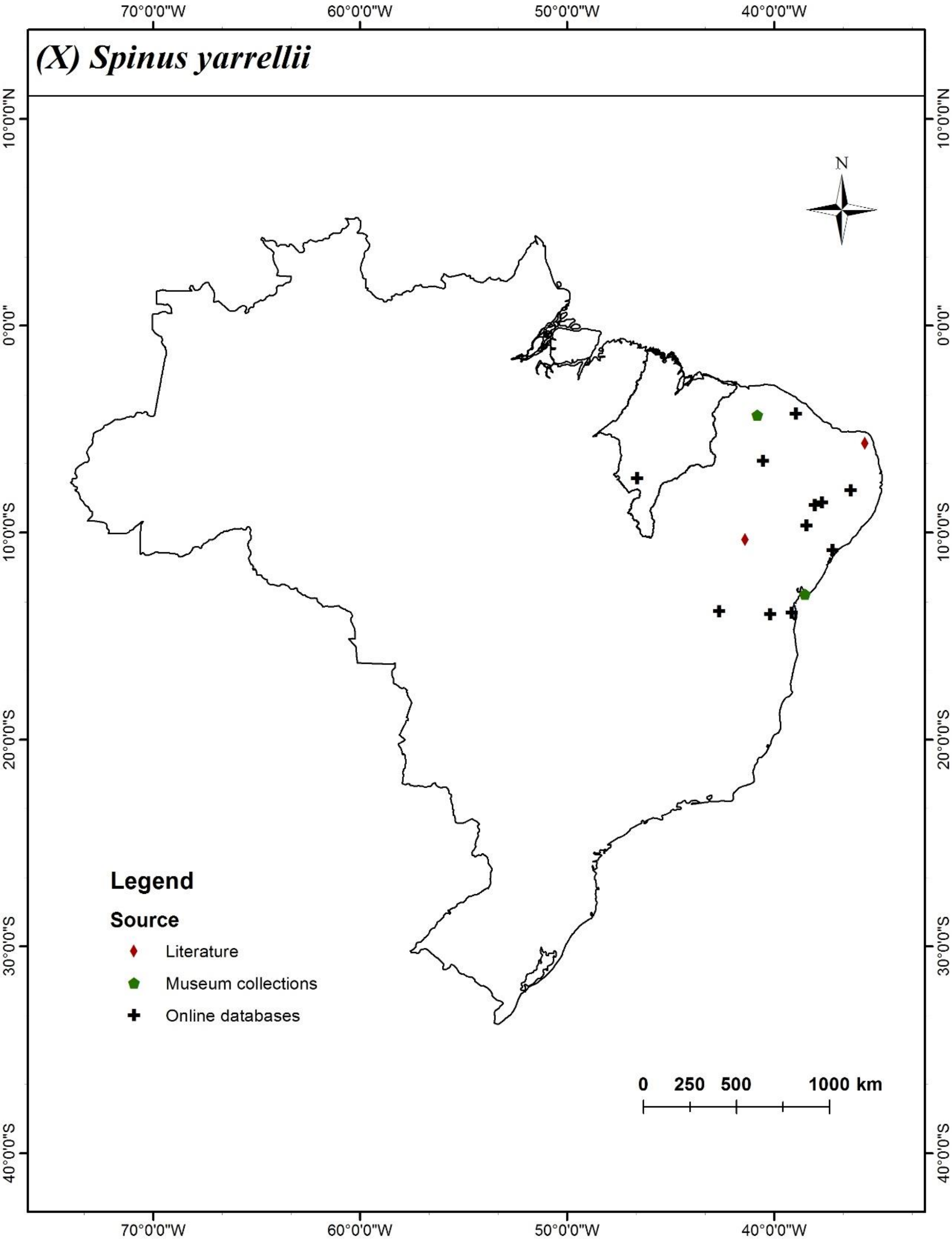
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collections
Online databases
0 245 490 980 km


(W) Xiphocolaptes falcirostris
70°0'0"W
60°0'0"W
50°0'0"W
40°0'0"W
10°0'0"N
0°0'0"
10°0'0"S
20°0'0"S
30°0'0"S
40°0'0"S
N
Legend
Source
Literature
Museum collections
Online databases
0 250 500 1000 km

3313

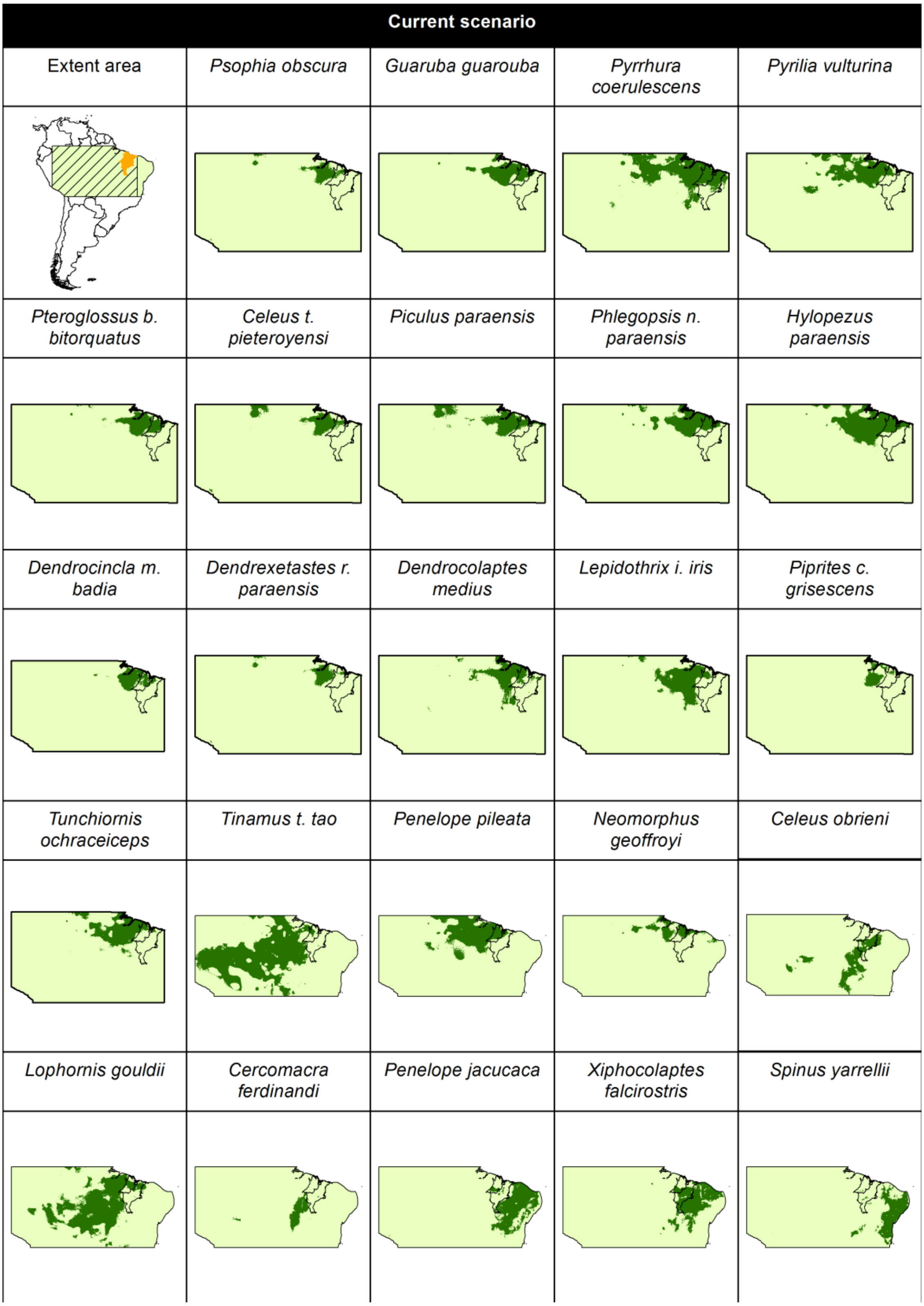
3314



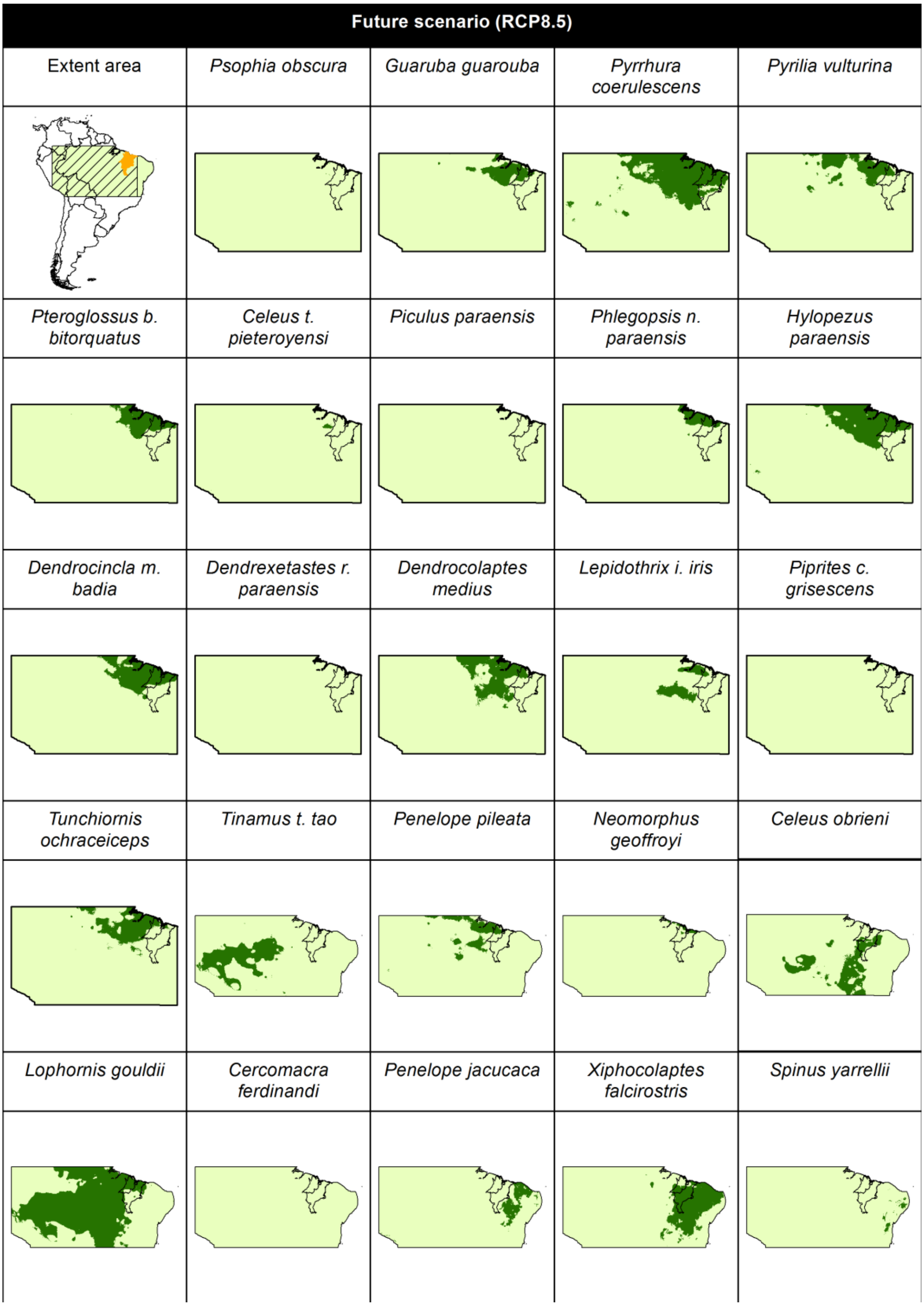
3315

3316

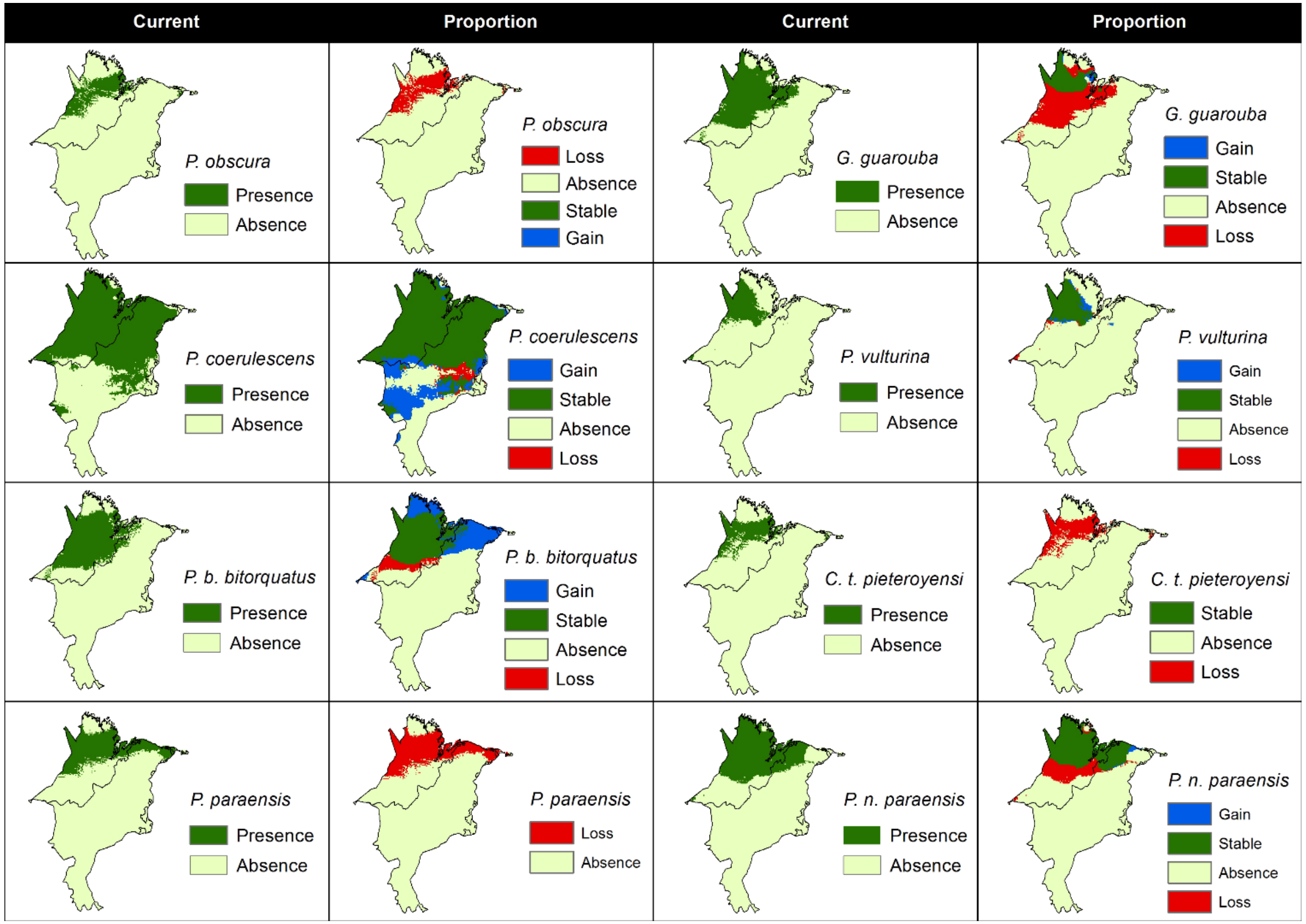
Appendix S2. First map depicts the extent area and the study area (yellow), and all the other maps represent the 24 SDMs estimated for current scenario.

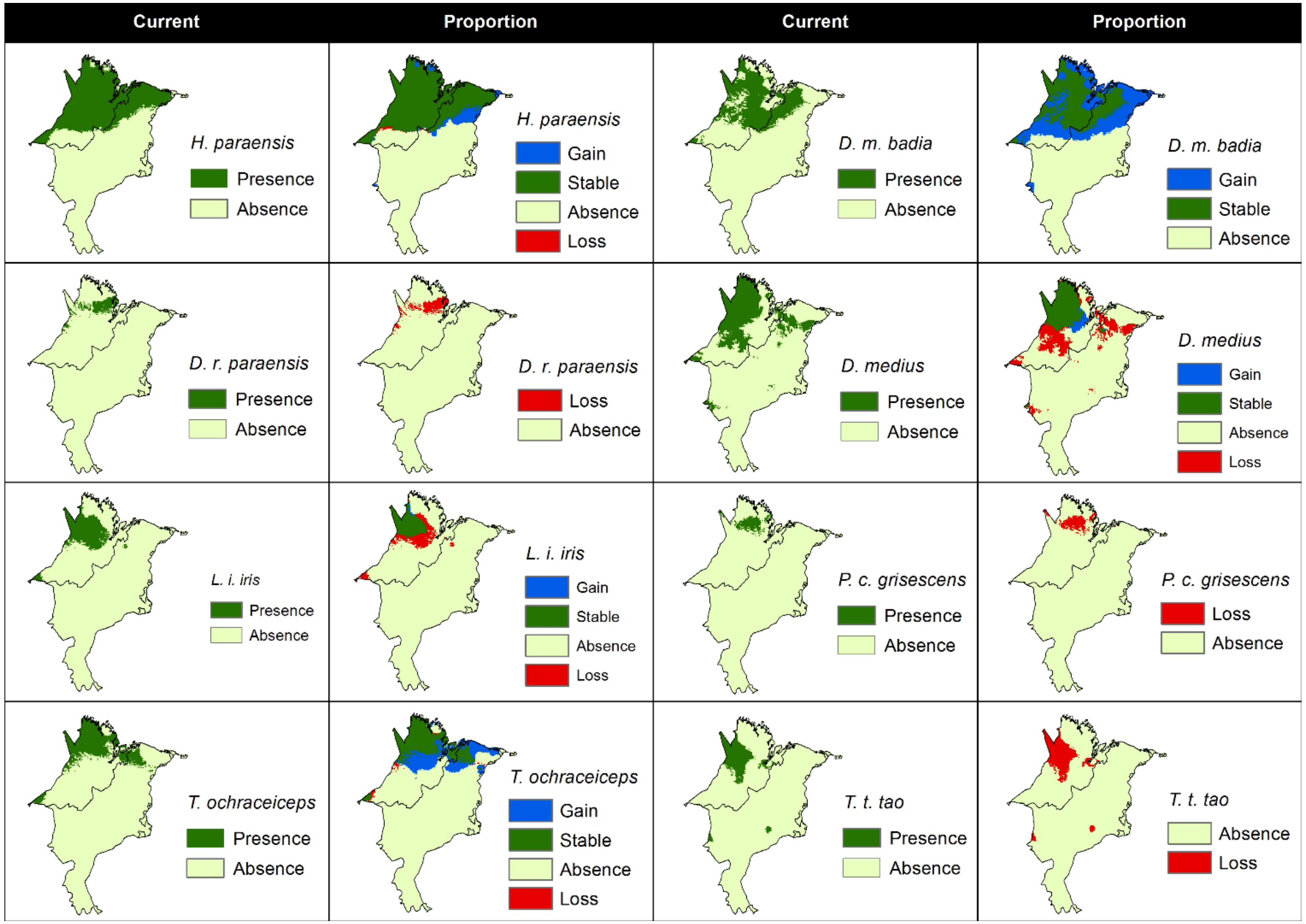


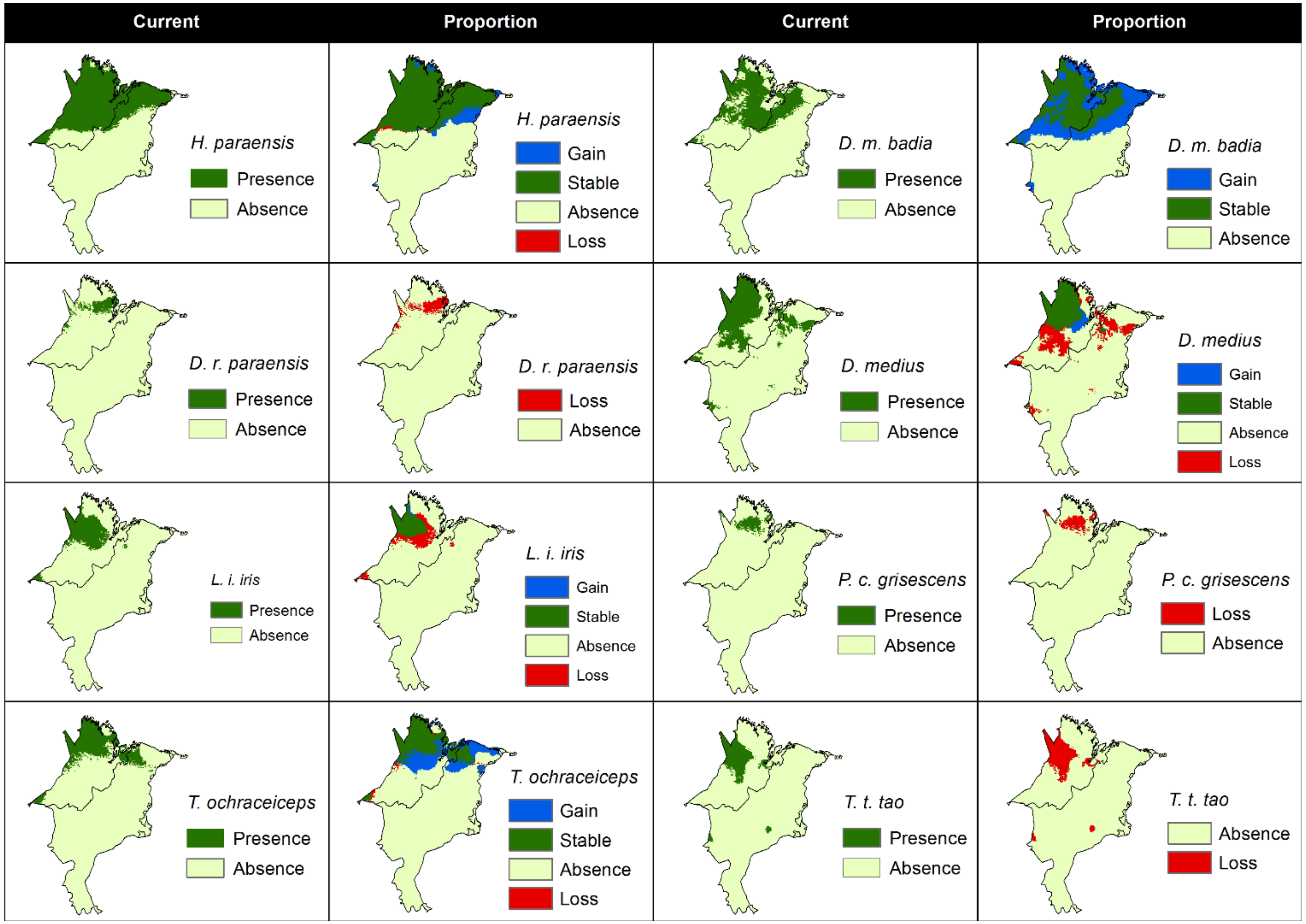
Appendix S3. Appendix S2. First map depicts the extent area and the study area (yellow), and all the other maps represent the 24 SDMs estimated for RCP8.5 scenario.



Appendix S4. Maps showing the current distribution and the proportion of stable, gain and loss cells for RCP8.5 scenario for each modeled taxon.




Current
Proportion
Current
Proportion
H. paraensis
Presence
Absence
H. paraensis
Gain
Stable
Absence
Loss
D. m. badia
Presence
Absence
D. m. badia
Gain
Stable
Absence
D. r. paraensis
Presence
Absence
D. r. paraensis
Loss
Absence
D. medius
Presence
Absence
D. medius
Gain
Stable
Absence
Loss
L. i. iris
Presence
Absence
L. i. iris
Gain
Stable
Absence
Loss
P. c. grisescens
Presence
Absence
P. c. grisescens
Loss
Absence
T. ochraceiceps
Presence
Absence
T. ochraceiceps
Gain
Stable
Absence
Loss
T. t. tao
Presence
Absence
T. t. tao
Absence
Loss


Current
Proportion
Current
Proportion
H. paraensis
Presence
Absence
H. paraensis
Gain
Stable
Absence
Loss
D. m. badia
Presence
Absence
D. m. badia
Gain
Stable
Absence
D. r. paraensis
Presence
Absence
D. r. paraensis
Loss
Absence
D. medius
Presence
Absence
D. medius
Gain
Stable
Absence
Loss
L. i. iris
Presence
Absence
L. i. iris
Gain
Stable
Absence
Loss
P. c. grisescens
Presence
Absence
P. c. grisescens
Loss
Absence
T. ochraceiceps
Presence
Absence
T. ochraceiceps
Gain
Stable
Absence
Loss
T. t. tao
Presence
Absence
T. t. tao
Absence
Loss

Appendix S5. Resistance values of different classes of land use for the Amazon biome for each target species.

Biome	Class	Annual Crops	Non-observed area	Urban area	Forest	Mosaic of Uses	Herbaceous Pasture	Shrubby Pasture	Reforestation	Regeneration with Pasture	Mining	Secondary Vegetation	Others	Deforestation (2014)	Hydrography	Non-forest	Pasture with exposed soil
Amazon	1	80	80	100	1	60	90	90	50	80	70	70	10	90	1	80	100
	2	60	80	100	1	40	60	70	50	20	50	40	10	80	1	5	100
	3	60	80	100	1	40	60	70	50	20	50	40	10	80	1	5	100
	4	60	80	100	1	40	60	70	50	20	50	40	10	80	1	5	100
	5	60	80	100	1	40	90	80	50	20	50	40	10	80	1	5	100
	6	80	80	100	1	40	90	80	50	20	50	40	10	90	1	5	100
	7	80	80	100	1	40	100	80	50	20	50	40	10	90	1	5	100
	8	90	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	9	100	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	10	100	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	11	100	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	12	100	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	13	100	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	14	90	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	15	80	80	100	1	40	80	70	50	20	50	40	10	80	1	5	100
	16	60	80	100	1	40	80	70	50	20	50	60	10	90	1	5	100
	17	60	80	100	1	40	80	70	50	20	50	40	10	90	1	5	100

Biome	Class	Annual Crops	Non-observed area	Urban area	Forest	Mosaic of Uses	Herbaceous Pasture	Shrubby Pasture	Reforestation	Regeneration with Pasture	Mining	Secondary Vegetation	Others	Deforestation (2014)	Hydrography	Non-forest	Pasture with exposed soil
	18	90	80	100	1	40	100	100	50	20	50	60	10	100	1	5	100
	19	60	80	100	1	40	80	60	50	20	50	40	10	80	1	5	100
	20	60	80	100	5	40	80	60	50	20	50	20	10	90	1	0	100
	21	60	80	100	5	40	80	60	50	20	50	20	10	90	1	0	100
	22	60	80	100	50	40	80	60	50	20	50	40	10	90	1	0	100
	23	50	80	100	40	40	80	60	50	20	50	20	10	90	1	0	100
	24	50	80	100	80	40	60	60	50	20	50	20	10	90	1	0	100

Codes for target species: 1 - Psophia obscura; 2 - Guaruba guarouba; 3 - Pyrrhura coerulescens; 4 - Pyrilia vulturina; 5 - Pteroglossus b. bitorquatus; 6 - Celeus t. pieteroyensi; 7 - Piculus paraensis; 8 - Phlegopsis n. paraensis; 9 - Hylopezus paraensis; 10 - Dendrocincla m. badia; 11 - Dendrexetastes r. paraensis; 12 - Dendrocolaptes medius; 13 - Lepidothrix i. iris; 14 - Piprites c. grisescens; 15 - Tunchiornis ochraceiceps; 16 - Tinamus t. tao; 17 - Penelope pileata; 18 - Neomorphus geoffroyi; 19 - Celeus obrieni; 20 - Lophornis gouldii; 21 - Cercomacra ferdinandi; 22 - Penelope jacucaca; 23 - Xiphocolaptes falcirostris; 24 - Spinus yarrellii.

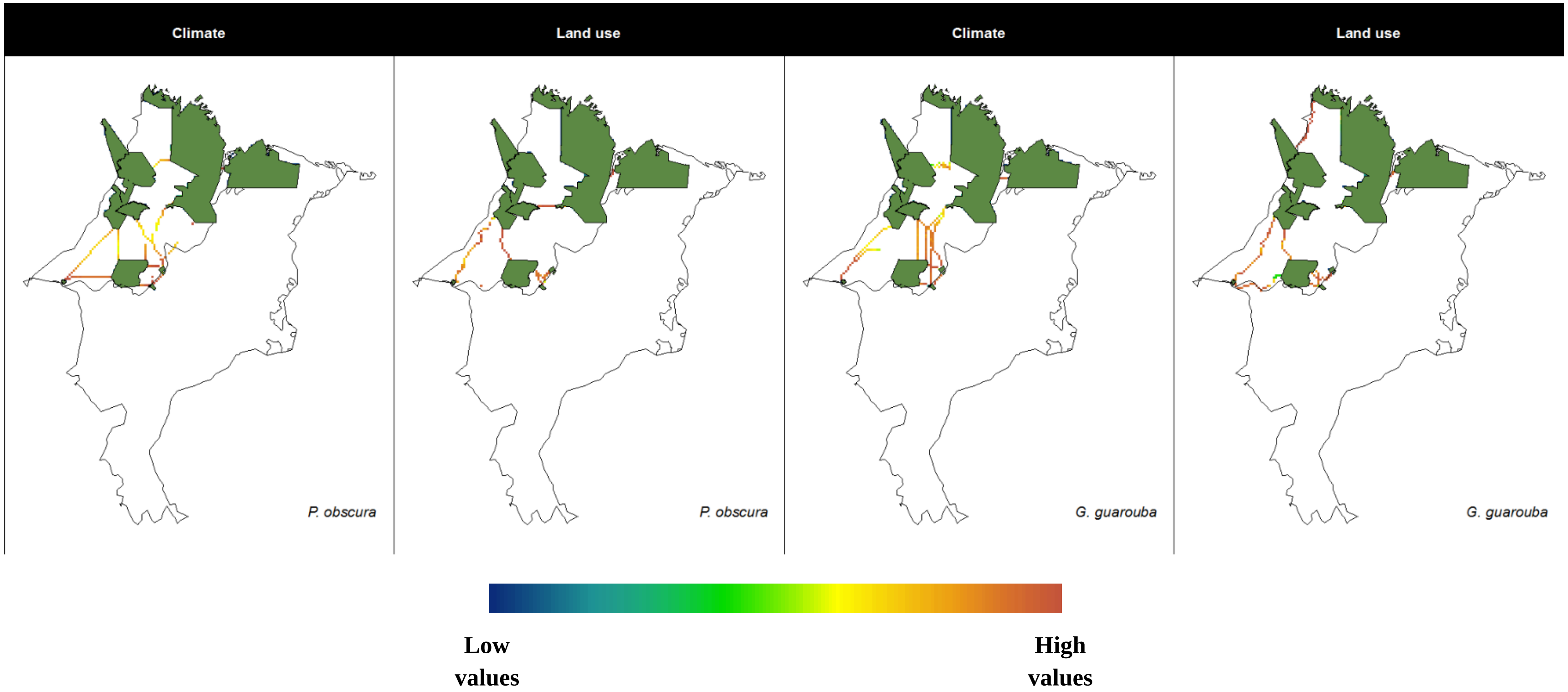
Class description according to INPE (2014): Annual Crops - Extensive areas with predominance of annual crops, specially grains, highly technological such as certified seeds, enriched soil, chemicals, fertilizers, mechanization among other resources; Non-observed area - Population concentration forming small inhabited places, villages and cities that present differentiated infrastructure from the rural areas with street design and higher density of dwellings such as houses, buildings and other public spaces; Deforestation (2014) - Areas recently deforested covered by soil, shrubs, herbage and felled trees with no defined land use at this stage, defined as areas that were mapped by PRODES project as deforested in 2014; Mining - Areas of mineral extraction with the presence of bare soil and deforestation in the proximity of water bodies; Mosaic of uses - Characterized by land cover units that, due to the spatial resolution of the satellite images, cannot be broken down further into specific components. For example, this classification might include family agriculture practiced in conjunction with the traditional cattle raising; Others - Areas not encompassed by other categories such as rocky or mountain outcrops, river shores and sand banks, among others; Pasture with exposed soil - Pasture areas, exhibiting signs of severe degradation, containing at least 50% bare soil; Herbaceous Pasture - Pasture in productive process with predominance of herbage and coverage between 90 and 100% by different species of grass; Shrubby Pasture - Areas of pasture in productive process with predominance of herbage and coverage by species of grass between 50% and 80% associated to the presence of shrubby vegetation with *coverage between 20% and 50%; Regeneration with Pasture - Areas that were clear-cut, later developed as pasture and are at the ginning of a regenerative process containing shrubs and early successional vegetation; Reforestation; Secondary Vegetation - Areas that were clear-cut and are at an advanced stage of regeneration with trees and shrubs. Includes areas that were used for forestry (silviculture) or permanent agriculture with use of native or exotic species; Forest; Non-forest – natural areas; Hydrography.*

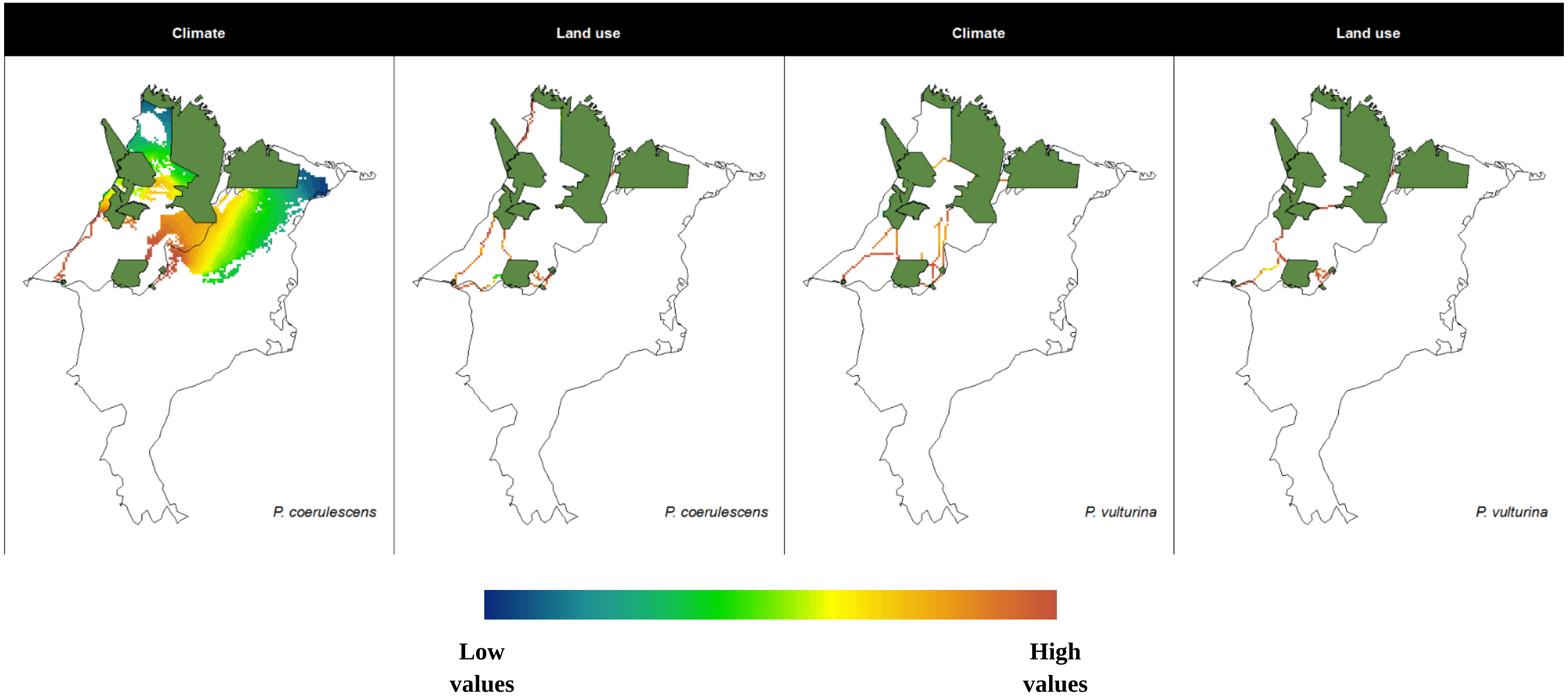
Appendix S6. Resistance values of different classes of land use in Cerrado biome for each target species.

Biome	Class	Annual crops	Non-observed area	Urban area	Non-forest	Mosaic of uses	Pasture	Silviculture	Mining	Secondary vegetation	Others	Hydrography	Perennial crops	Natural
Cerrado	1	80	80	100	80	60	90	50	70	80	10	1	80	80
	2	60	80	100	60	40	70	50	50	60	10	1	60	60
	3	60	80	100	50	40	70	50	50	50	10	1	60	50
	4	60	80	100	60	40	70	50	50	60	10	1	60	60
	5	60	80	100	60	40	90	50	50	60	10	1	60	60
	6	80	80	100	50	40	90	50	50	50	10	1	80	50
	7	80	80	100	50	40	100	50	50	50	10	1	80	50
	8	90	80	100	80	40	100	50	50	80	10	1	90	80
	9	100	80	100	80	40	100	50	50	80	10	1	100	80
	10	100	80	100	60	40	100	50	50	60	10	1	100	60
	11	100	80	100	60	40	100	50	50	60	10	1	100	60
	12	100	80	100	60	40	100	50	50	60	10	1	100	60
	13	100	80	100	80	40	100	50	50	80	10	1	100	80
	14	90	80	100	80	40	100	50	50	80	10	1	90	80
	15	80	80	100	80	40	80	50	50	80	10	1	80	80
	16	60	80	100	1	40	80	50	50	1	10	1	60	1
	17	60	80	100	1	40	80	50	50	1	10	1	60	1
	18	90	80	100	1	40	100	50	50	1	10	1	90	1
	19	60	80	100	1	40	80	50	50	1	10	1	60	1
	20	60	80	100	1	40	80	50	50	1	10	1	60	1
	21	60	80	100	1	40	80	50	50	1	10	1	60	1
	22	60	80	100	1	40	80	50	50	1	10	1	60	1
	23	50	80	100	1	40	80	50	50	1	10	1	50	1
	24	50	80	100	1	40	60	50	50	1	10	1	50	1

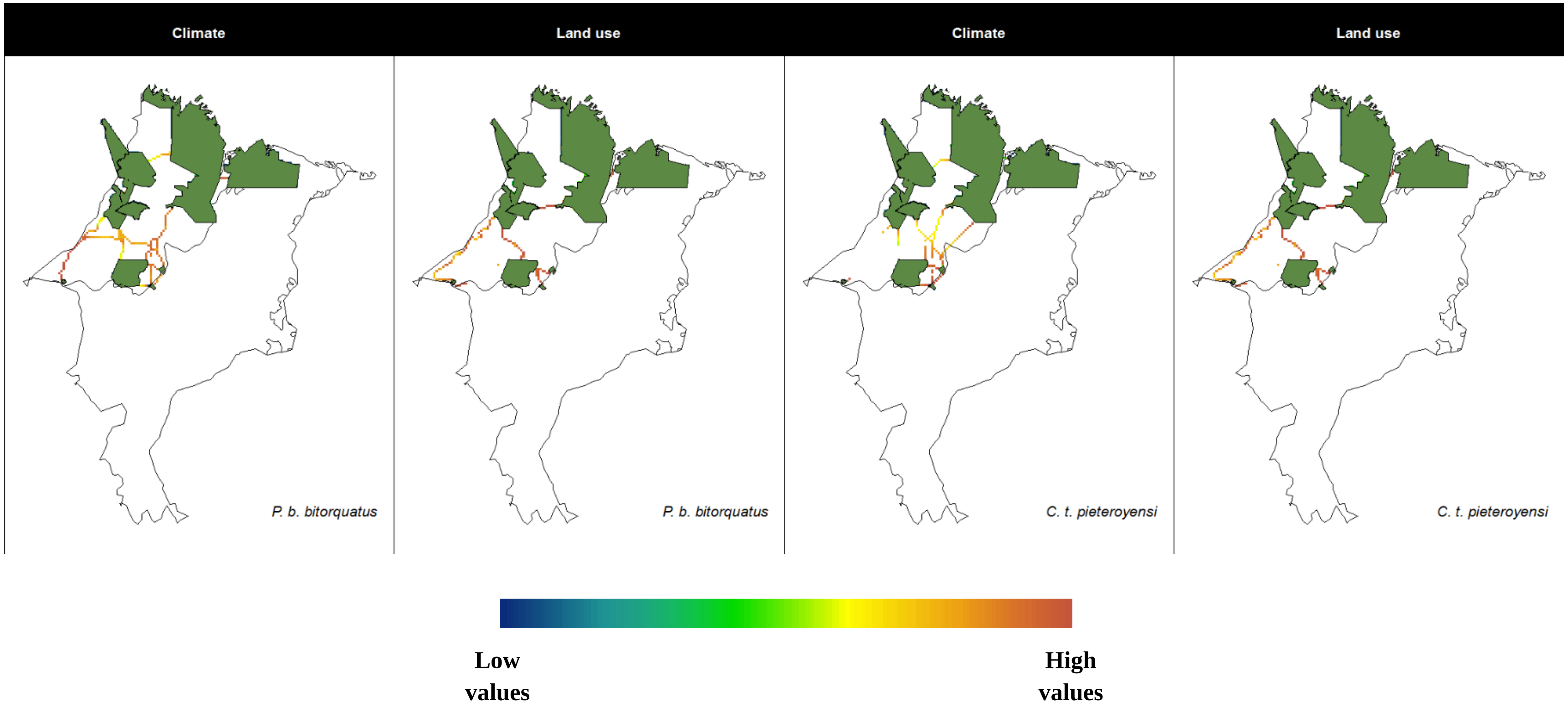
Codes for each target species: 1 - Psophia obscura; 2 - Guaruba guarouba; 3 - Pyrrhura coerulescens; 4 - Pyrilia vulturina; 5 - Pteroglossus b. bitorquatus; 6 - Celeus t. pieteroyensi; 7 - Piculus paraensis; 8 - Phlegopsis n. paraensis; 9 - Hylopezus paraensis; 10 - Dendrocincla m. badia; 11 - Dendrexetastes r. paraensis; 12 - Dendrocolaptes medius; 13 - Lepidothrix i. iris; 14 - Piprites c. grisescens; 15 - Tunchiornis ochraceiceps; 16 - Tinamus t. tao; 17 - Penelope pileata; 18 - Neomorphus geoffroyi; 19 - Celeus obrieni; 20 - Lophornis gouldii; 21 - Cercomacra ferdinandi; 22 - Penelope jacucaca; 23 - Xiphocolaptes falcirostris; 24 - Spinus yarrellii. Class description according to INPE (2013): Annual Crops - Extensive areas with *predominance of annual crops, specially grains, highly technological such as certified seeds, enriched soil, chemicals, fertilizers, mechanization among other resources; Non-observed area - burning; Non-forest - Natural vegetation composed by different phyto-physiognomies; Mosaic of uses - Characterized by land cover units that, due to the spatial resolution of the satellite images, cannot be broken down further into specific components. For example, this classification might include family agriculture practiced in conjunction with the traditional cattle raising; Pasture; Silviculture; Mining - Areas of mineral extraction with the presence of bare soil and deforestation in the proximity of water bodies; Secondary vegetation - natural; Others - Areas not encompassed by other categories such as rocky or mountain outcrops, river shores and sand banks, among*

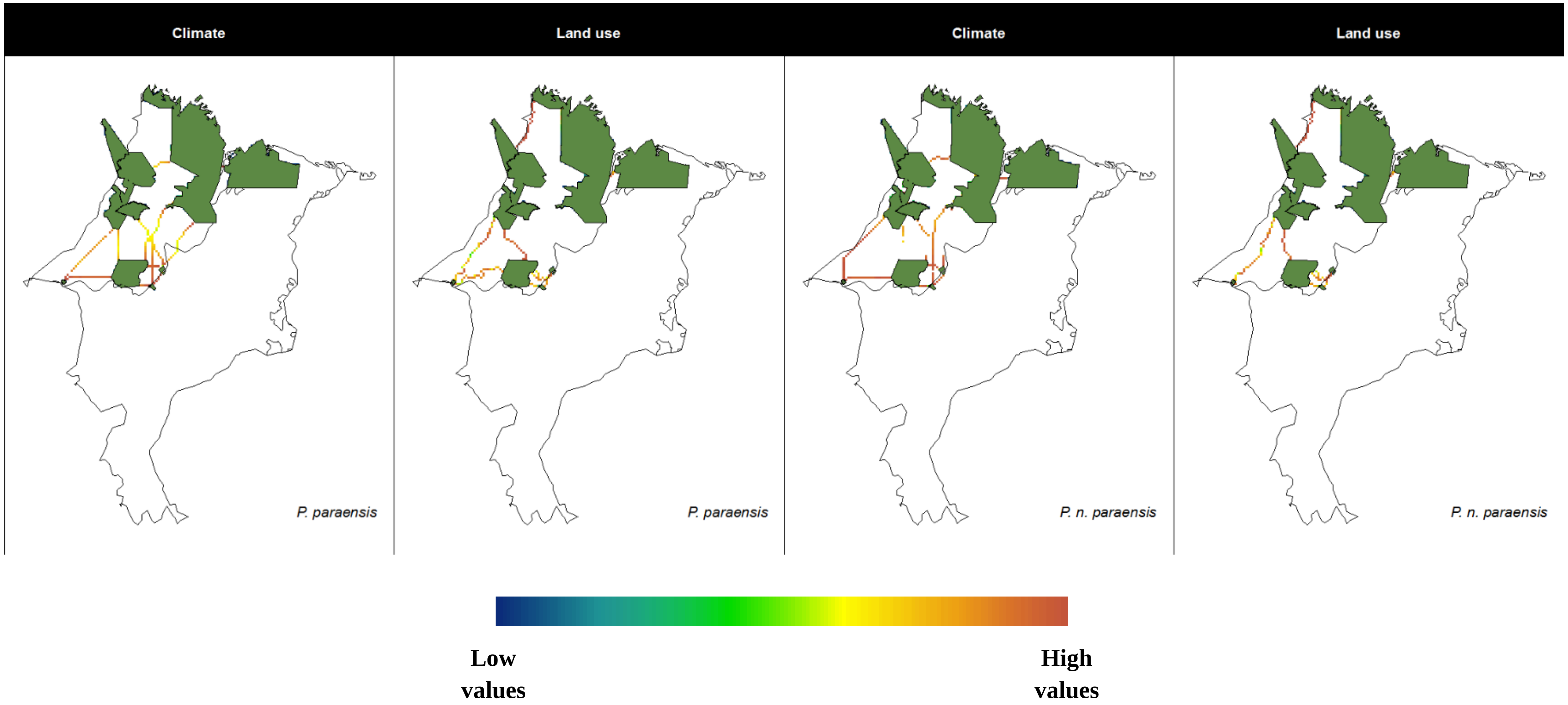
Appendix S7. Maps showing the possible dispersal corridors within the study area for each target taxa.





Climate
Land use
Climate
Land use
P. coerulescens
P. coerulescens
P. vulturina
P. vulturina
Low values
High values


Climate
Land use
Climate
Land use
P. b. bitorquatus
P. b. bitorquatus
C. t. pieteroyensi
C. t. pieteroyensi
Low values
High values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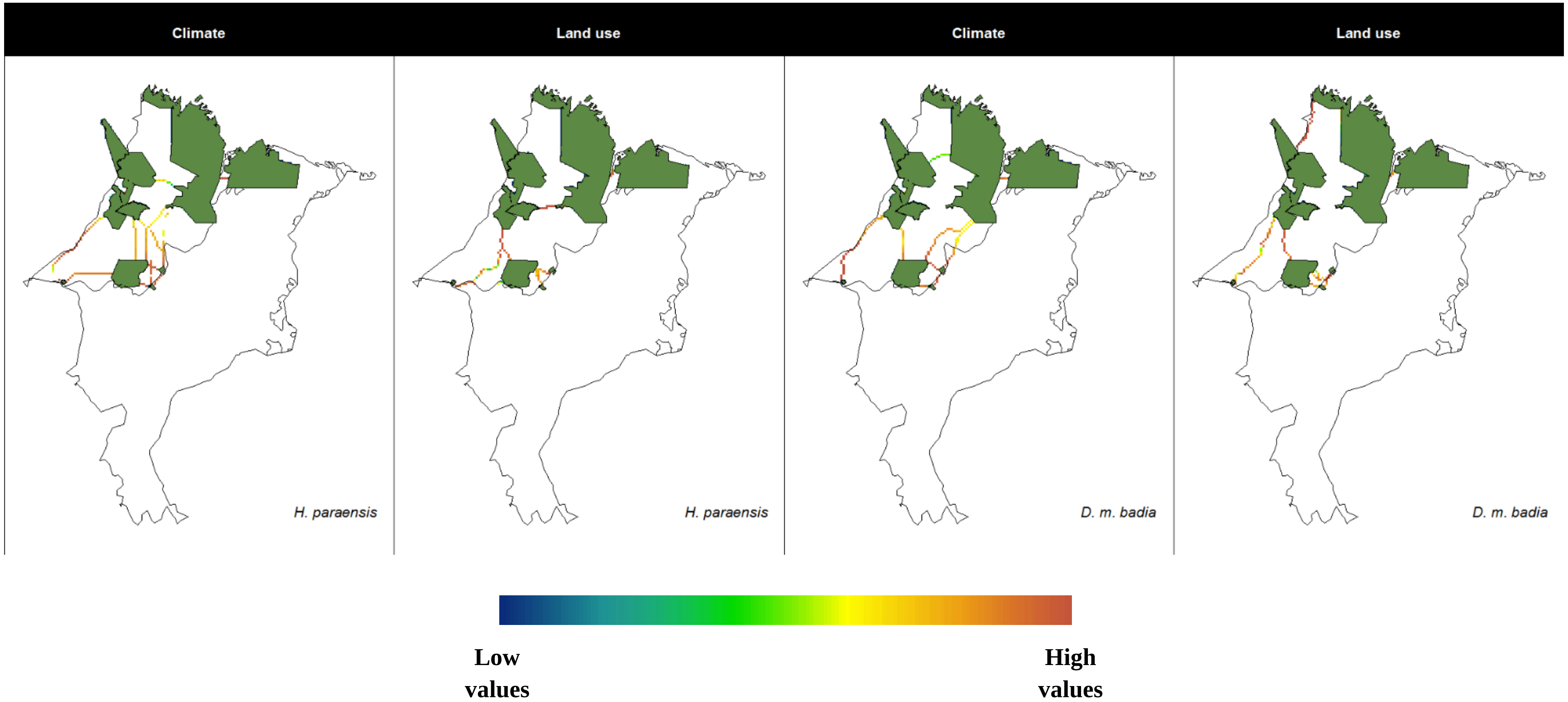
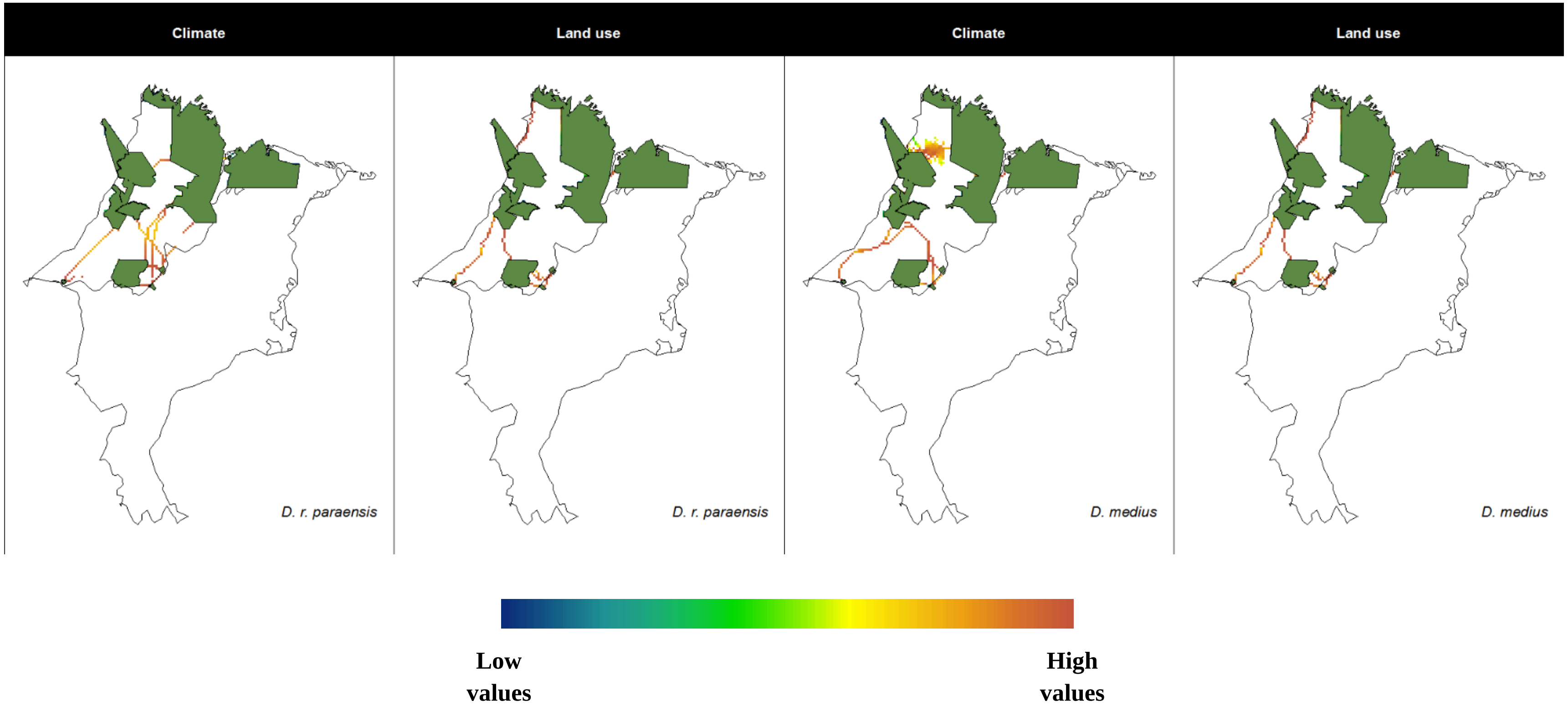
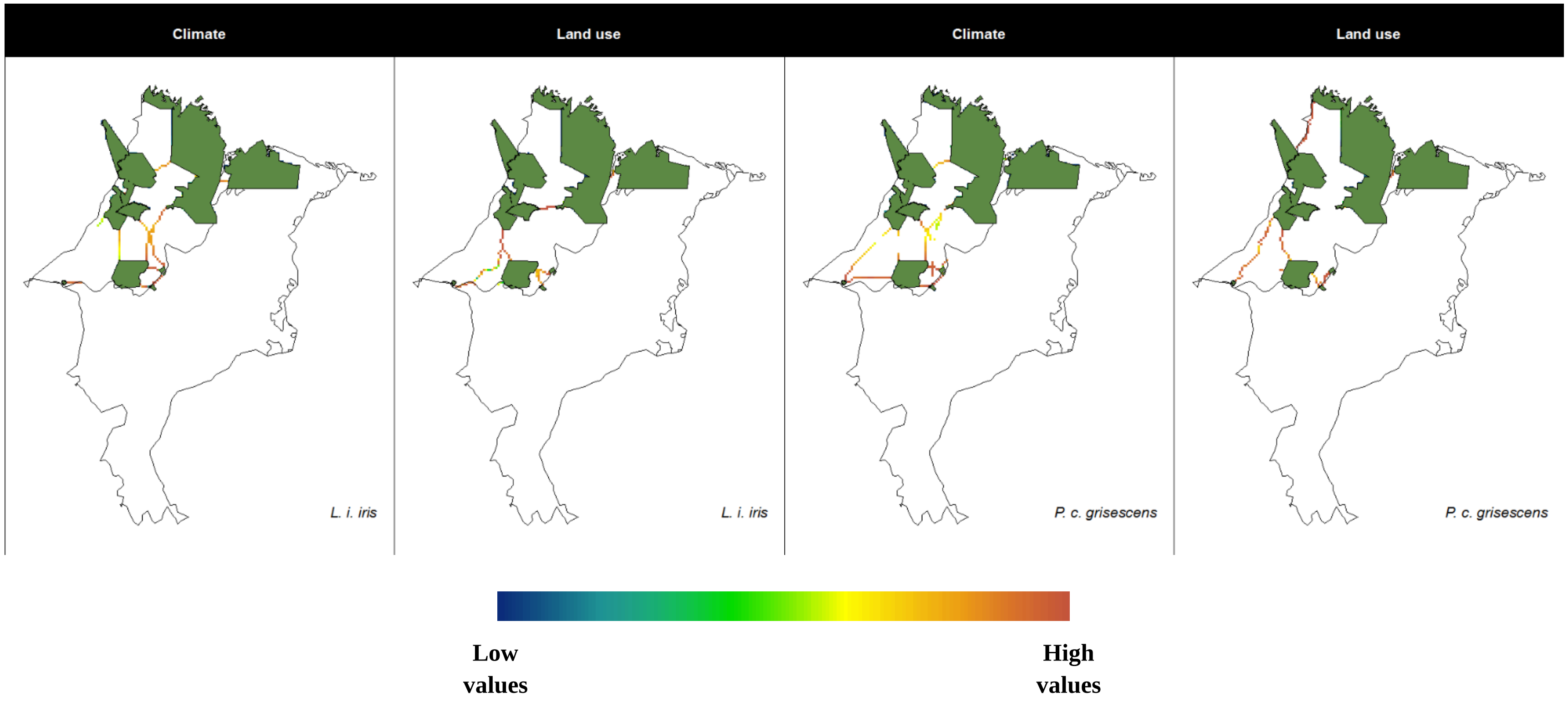
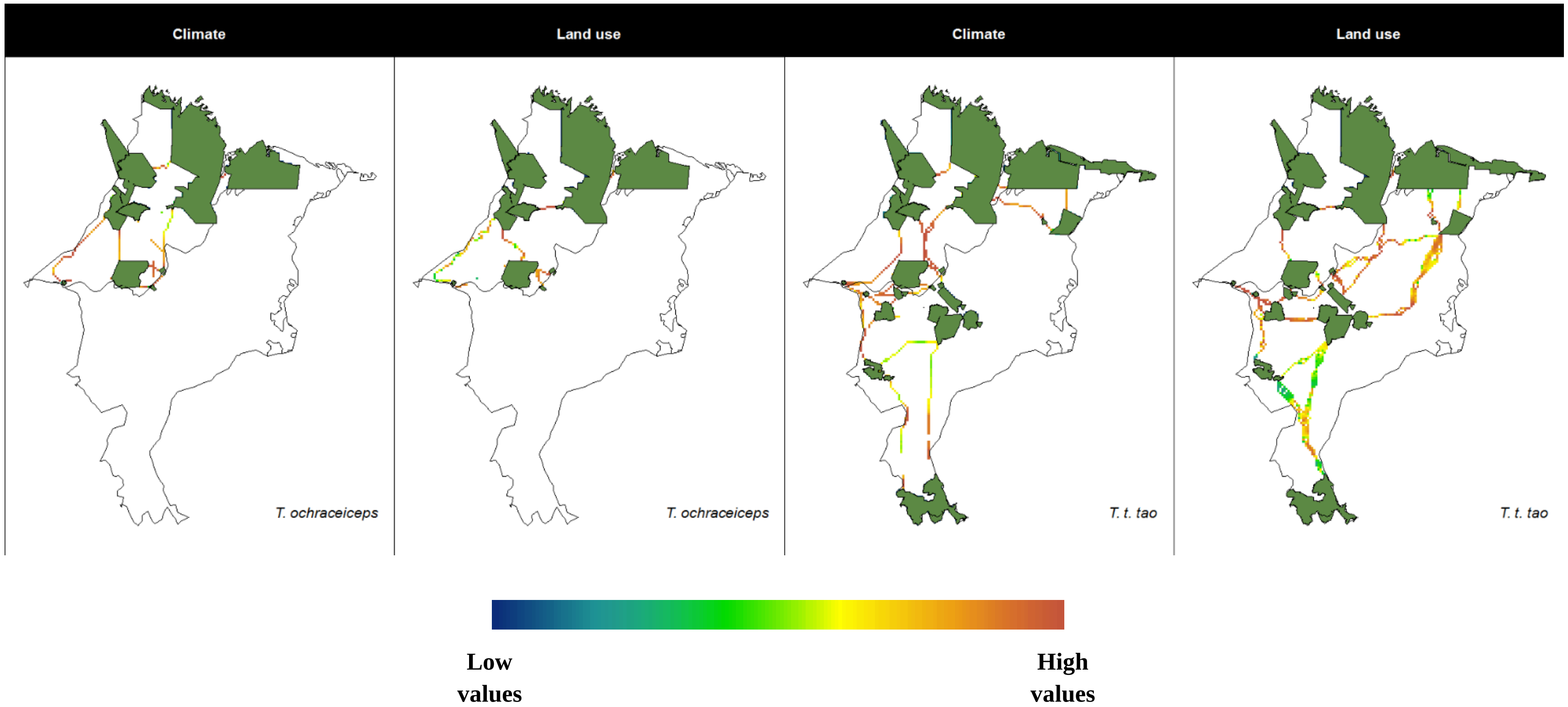
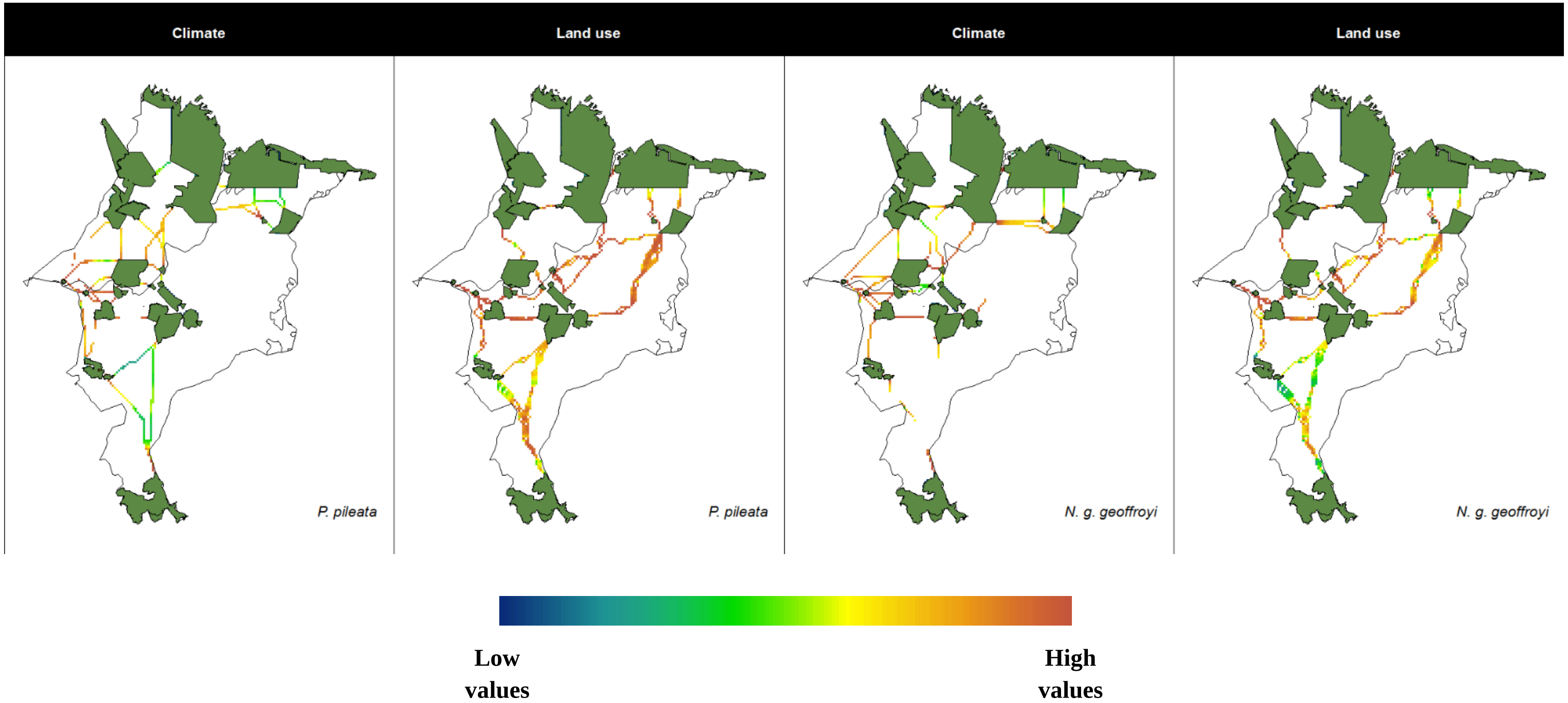
Land use
Climate
Land use
P. paraensis
P. paraensis
P. n. paraensis
P. n. paraensis
Low values
High values


Climate
Land use
Climate
Land use
H. paraensis
H. paraensis
D. m. badia
D. m. badia
Low values
High values

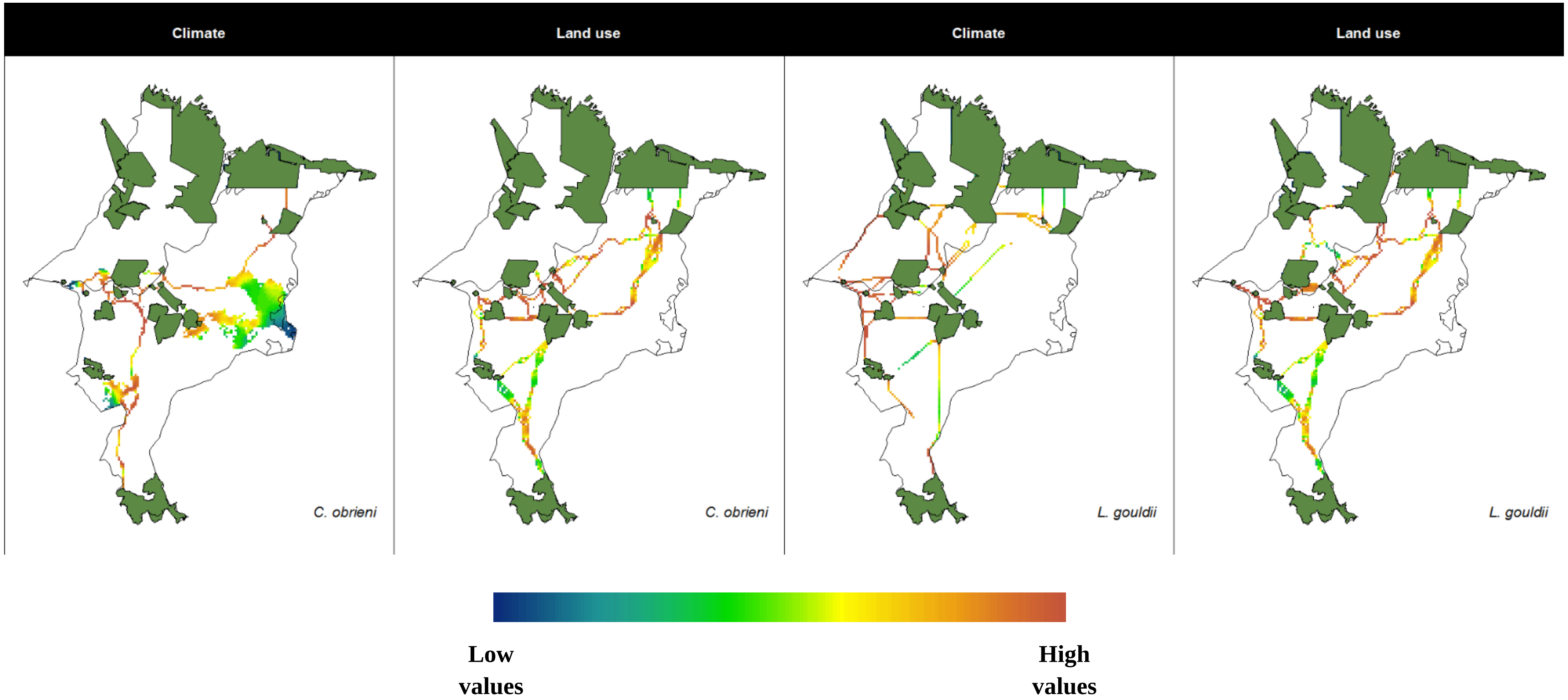

Climate
Land use
Climate
Land use
D. r. paraensis
D. r. paraensis
D. medius
D. medius
Low values
High values

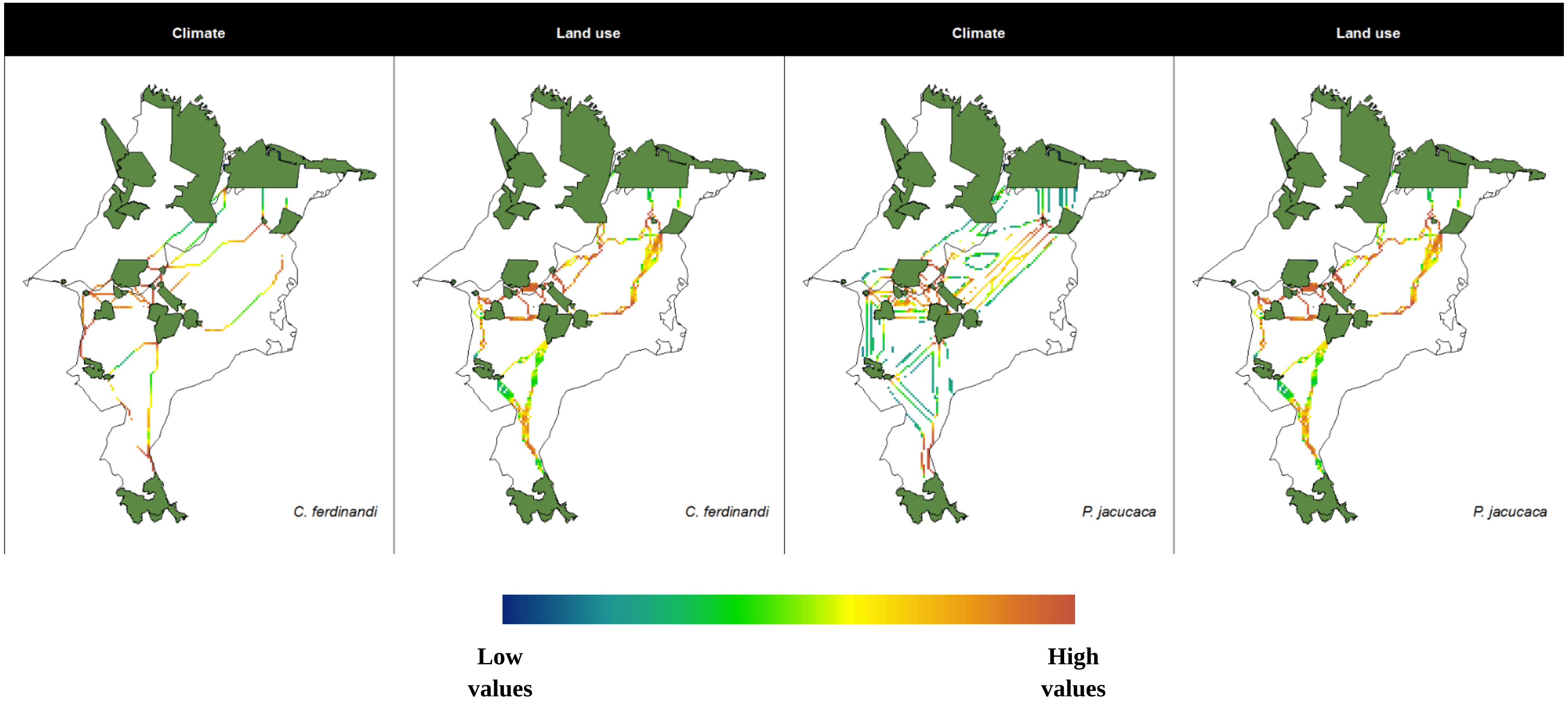

Climate
Land use
Climate
Land use
L. i. iris
L. i. iris
P. c. grisescens
P. c. grisescens
Low values
High values

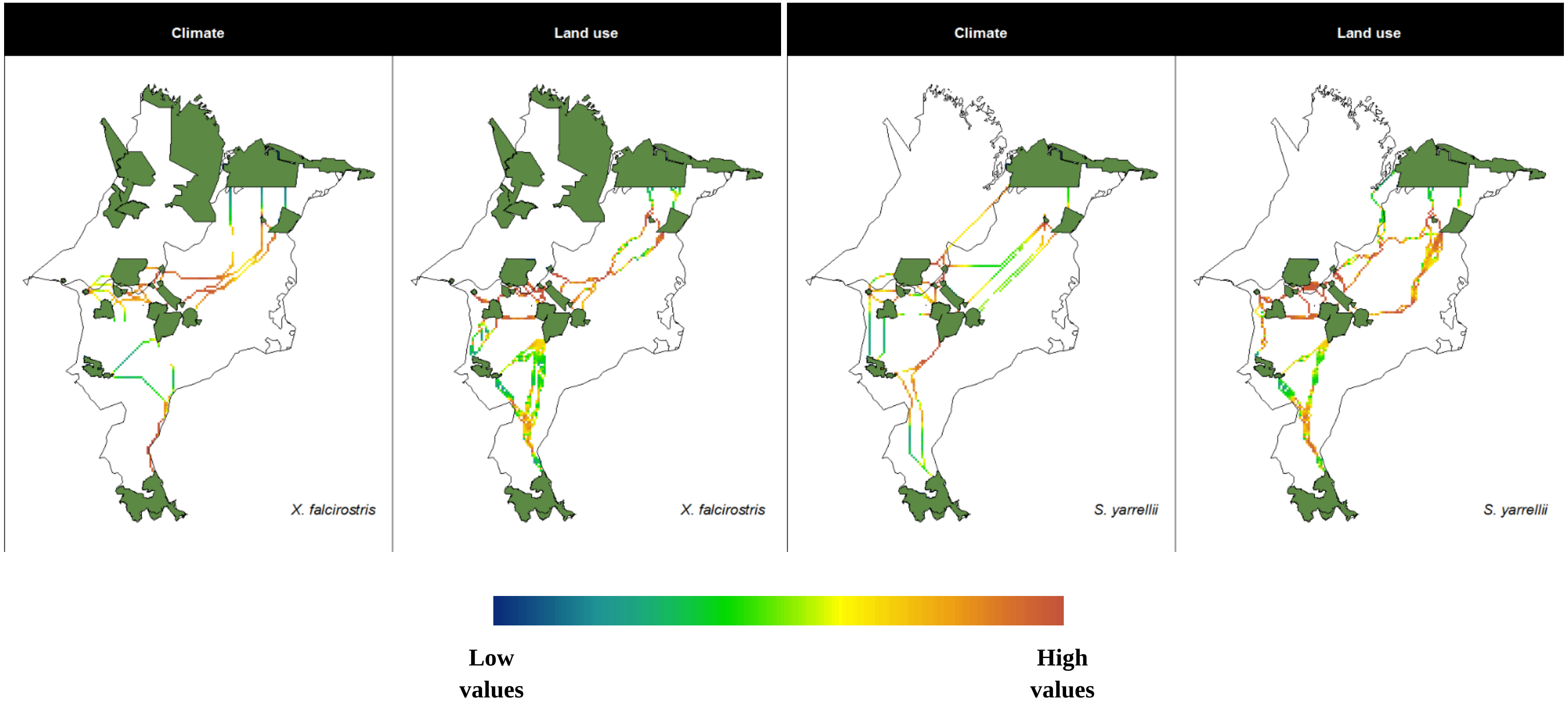

Climate
Land use
Climate
Land use
T. ochraceiceps
T. ochraceiceps
T. t. tao
T. t. tao
Low values
High values



Climate
Land use
Climate
Land use
P. pileata
P. pileata
N. g. geoffroyi
N. g. geoffroyi
Low values
High values


Climate
Land use
Climate
Land use
C. obrieni
C. obrieni
L. gouldii
L. gouldii
Low values
High values


Climate
Land use
Climate
Land use
C. ferdinandi
C. ferdinandi
P. jacucaca
P. jacucaca
Low values
High values


Climate
Land use
Climate
Land use
X. falcirostris
X. falcirostris
S. yarrellii
S. yarrellii
Low values
High values

CONCLUSÕES GERAIS

No primeiro capítulo foi apresentada uma lista de aves do estado do Maranhão, a qual compreendeu 731 espécies distribuídas em 88 famílias e 30 ordens. Este estudo adicionou 95 novos registros para o Estado. Destas, 46 espécies são endêmicas do Brasil, 35 representam endemismos da floresta amazônica, 25 são endêmicas da área de Endemismo de Belém, 11 são endêmicas do Cerrado e 10 são endemismos da Caatinga. Das espécies nativas e residentes, 31 táxons são considerados ameaçados pela Lista oficial de espécies ameaçadas do Brasil e 41 são considerados ameaçados pela lista internacional IUCN Red List. Esses resultados confirmam a relevância biológica desta região ecotonal do norte do Brasil. Por fim, considerando a degradação ambiental intensiva e o elevado número de espécies endêmicas e ameaçadas observadas no Maranhão, reforçamos aqui a necessidade de políticas públicas e conscientização civil para engajar ações de conservação e outras atividades de apoio à manutenção de toda essa diversidade.

No segundo capítulo, testamos a eficácia do atual sistema de Áreas Protegidas (APs), na proteção de 24 espécies ameaçadas e endêmicas de aves usando modelos de distribuição potencial (MDP). De acordo com os resultados, as áreas protegidas na Amazônia Oriental são grandes e, pelo menos em parte, bem conectadas, mantendo alta biodiversidade. No entanto, a falta de conhecimento biológico geral e a alta taxa de desmatamento, degradação de habitats e principalmente pressões econômicas fazem com que estudos como este só sejam úteis se acompanhados por um aumento da conscientização pública, política governamental adequada e planejamento de conservação adequado. Especialmente no Cerrado, onde a maioria das APs são mal alocadas, o debate científico sobre ações de conservação tem sido bastante intenso e controverso, enquanto a degradação do habitat aumentou. No entanto, nossos resultados validam ainda mais os relatórios governamentais sobre a implementação de novas APs (para ambos os biomas) e incentivam a colocação desses resultados em prática.

No terceiro capítulo, utilizamos modelos de distribuição potencial (MDP) para testar a eficácia de um sistema de APs, dentro de um ecótono no norte do Brasil, na proteção de 24 espécies ameaçadas de aves no cenário climático atual e futuro (RCP8.5). Usamos também modelos de corredores de dispersão para descrever áreas prioritárias para conservação. Nossos resultados indicam que vários táxons de aves ameaçadas estão e estarão potencialmente protegidos, ou seja, ocorrem dentro das áreas APs. No entanto, a quantidade de APs é e será insuficiente para manter as espécies no ecótono. Além disso, a maioria dos táxons provavelmente apresentará declínios drásticos em seus intervalos de distribuição e até mesmo a extinção global, no futuro próximo. Destacamos a localização de um sistema potencialmente eficaz de corredores de dispersão que conecta APs no ecótono e por fim, reforçamos a necessidade de implementar políticas públicas e conscientizar o público para manter e mitigar os efeitos antrópicos nas áreas protegidas, corredores e áreas adjacentes, com o objetivo de conservar a riqueza e a diversidade dessas espécies já ameaçadas.

ANEXOS

Anexo 1 - Normas da *Revista Brasileira de Ornitologia*, a qual será encaminhado o Capítulo I desta Tese.

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Scientific names must be shown in italic, and authors are encouraged to follow the latest systematic sequence, spelling and taxon authors of the Brazilian (Piacentini et al. 2015. Rev. Bras. Ornitol. 23: 91–298) or South American (www.museum.lsu.edu/~Remsen/SACCBaseline.html) bird lists, when pertinent and at their discretion. When using one of each of those sources, please be explicit about which one is being used, following it consistently throughout the manuscript. Common names should also follow those recommended by Brazilian or South American lists). Common names should be capitalized (e.g., Kaempfer's Woodpecker, Common Tern).

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Originals must be submitted by the online submission system at http://www.museu-goeldi.br/rbo and as a single Microsoft Word file (tables and figures must be at the end of the manuscript). Upon manuscript acceptance, high quality image files (extensions JPG, TIF, PSD, PDF, AI, EPS, WMF or XLS; minimum resolution of 300 dpi) of the original figures will be requested. The title must be concise and clearly define the topic of the manuscript. Generic expressions such as “contribution to the knowledge...” or “notes on...” must be avoided. The name of each author must be written in full, followed by the full mailing address, identified by superscript numerals, and author for correspondence, in the case of multiple authors.

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– Title of the manuscript and author names, in lowercase – not capitals – and in bold, followed by addresses of all authors. Titles longer than 100 characters with spaces should be accompanied by a running-head, or short title, no longer than 100 characters in total, also provided in the first page of the manuscript.

– ABSTRACT/KEY-WORDS (with title and up to 300 words; five to eight key-words related to the main topics of the manuscript and not already mentioned in the title must be provided in alphabetical order and separated by comma). For short communications an abstract of up to 150 words is required, in addition to key-words.

– INTRODUCTION (starting on a new page).

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– RESULTS (only the results, succinctly).

– DISCUSSION (avoid repetition of results and speculations, keeping Discussion as short as possible).

– ACKNOWLEDGEMENTS

– REFERENCES (check and follow format carefully).

– Tables

– Figure Legends

– Figures

For Short communications, only the subheadings ABSTRACT, KEY-WORDS, ACKNOWLEDGEMENTS, and REFERENCES are required.

Each Table should be on a separate page, numbered in Arabic numerals, with its own heading.

Figure legends, occupying one or more pages following the tables, should be numbered successively, also in Arabic numerals. Figures will follow, one to each page, and clearly numbered in agreement with the legends. Figures should be pooled as composition (Fig. 1A, B, C) always as possible.

As necessary, subsections may be identified and labeled as such, lower case, in bold, central. If another subheading is necessary, please use in italics, left-justified. All pages should be numbered.

The following abbreviations should be used: h (hour), min (minute), s (second), km (kilometer), m (meter), cm (centimeter), mm (millimeter), ha (hectare), kg (kilogram), g (gram), mg (milligram), all of them in lowercase (not capitals) and with no "periods" ("."). Use the following statistical notations: P, n, t, r, F, G, U, df (degrees of freedom), $\chi 2$, ns (non-significant), CV (coefficient of variation), SD (standard deviation), SE (standard error). With the exception of temperature and percentage symbols (e.g., 15°C, 45%), leave a space between the number and the unit or symbol (e.g., n = 12, P < 0.05, 25 min), also in figures and tables.

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Articles

Fargione J., Hill J., Tilman, D., Polasky S. & Hawthornez P. 2008. Land clearing and the biofuel carbon debt. Science 319: 1235–1238.

Santos M.P.D. & Vasconcelos M.F. 2007. Range extension for Kaempfer's Woodpecker Celeus obrieni in Brazil, with the first male specimen. Bulletin of the British Ornithologists' Club 127: 249–252.

Worthington A.H. 1989. Adaptations for avian frugivory: assimilation efficiency and gut transit time of Manacus vitellinus and Pipra mentalis. Oecologia 80: 381–389.

Books and Monographs

Sick H. 1985. Ornitologia brasileira, uma introdução, v. 1. Brasilia: Editora Universidade de Brasilia.

Book Chapters

Thiollay J.M. 1994. Family Accipitridae (hawks and eagles), p. 52–205. In: del Hoyo J., Elliott A. & Sargatal J. (eds.). Handbook of birds of the world, v. 2 (New World vultures to guineafowl). Barcelona: Lynx Editions.

Theses and Dissertations

Novaes F.C. 1970. Estudo ecológico das aves em uma área de vegetação secundária no Baixo Amazonas, Estado do Pará. Ph.D. Thesis. Rio Claro: Faculdade de Filosofia, Ciencias e Letras de Rio Claro.

Cavalcanti L.M.P. 2014. Sazonalidade na estação reprodutiva de aves de uma área de Caatinga e sua relação com a precipitação. Bachelor's Monograph. Mossoró: Universidade Federal Rural do Semiárido.

Web-based References

IUCN. 1987. A posição da IUCN sobre a migração de organismos vivos: introduções, reintroduções e reforços. http://iucn.org/themes/ssc/pubs/policy/index.htm (access on 25 August 2005).

Dornas T. 2009a. [XC95575, Celeus obrieni]. http://www.xeno-canto.org/95575 (access on 25 February 2012).

Pinheiro R.T. 2009. [WA589090, Celeus obrieni Short, 1973]. http://www.wikiaves.com/589090 (access on 05 March 2012).

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Illustrations and tables. The illustrations (photographs, drawings, graphics and maps), which will be called figures, must be numbered with Arabic numerals in the order in which they are cited and will be inserted into the text. Upon manuscript acceptance, high quality image files (extensions JPG, TIF, PSD, CDR, AI, EPS, WMF or XLS; minimum resolution of 300 dpi) of the original figures will be requested. Tables and figures will receive independent numbering. In the text, mentioning figures and tables must follow the pattern: "(Fig. 2)" or "... in Fig. 2." Table headings must provide a complete title, and be self-explanatory, without needing to refer to the text. All figure legends must be grouped in numerical order on a separate sheet from the figures.

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Manuscripts submitted to the Revista Brasileira de Ornitologia must not have been published previously or be under consideration for publication, in whole or in part, in another journal or book. Manuscripts may be written only in American English and must be typed in Microsoft Word, using Times New Roman 12, spacing 1.5 and left justified, throughout the MS, including references and tables. Authors for whom English is not their native language are strongly recommended to have their manuscript professionally edited before submission to improve the English. Two of these independent suppliers of editing services in Brazil can be found through maryandriani@yahoo.com or the web site www.idstudio.art.br. All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

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figures and tables are placed within the text, not at the end of the document as attachments.

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Anexo 2 - Normas da revista *Plos One*, na qual foi publicado o Capítulo II desta Tese.

Disponível em: http://journals.plos.org/plosone/s/submission-guidelines#loc-style-and-format

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Devaraju P, Gulati R, Antony PT, Mithun CB, Negi VS. Susceptibility to SLE in South Indian Tamils may be influenced by genetic selection pressure on TLR2 and TLR9 genes. Mol Immunol. 2014 Nov 22. pii: S0161-5890(14)00313-7. doi: 10.1016/j.molimm.2014.11.005.

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Online articles

Huynen MMTE, Martens P, Hilderlink HBM. The health impacts of globalisation: a conceptual framework. Global Health. 2005;1: 14. Available from: http://www.globalizationandhealth.com/content/1/1/14

Books

Bates B. Bargaining for life: A social history of tuberculosis. 1st ed. Philadelphia: University of Pennsylvania Press; 1992.

Book chapters Hansen B. New York City epidemics and history for the public. In: Harden VA, Risse GB, editors. AIDS and the historian. Bethesda: National Institutes of Health; 1991. pp. 21-28.

Deposited articles (preprints, e-prints, or arXiv) Krick T, Shub DA, Verstraete N, Ferreiro DU, Alonso LG, Shub M, et al. Amino acid metabolism conflicts with protein diversity; 1991. Preprint. Available from: arXiv:1403.3301v1. Cited 17 March 2014.

Published media (print or online newspapers and magazine articles) Fountain H. For Already Vulnerable Penguins, Study Finds Climate Change Is Another Danger. The New York Times. 29 Jan 2014. Available from: http://www.nytimes.com/2014/01/30/science/earth/climate-change-taking-toll-on-penguins-study-finds.html Cited 17 March 2014.

New media (blogs, web sites, or other written works) Allen L. Announcing PLOS Blogs. 2010 Sep 1 [cited 17 March 2014]. In: PLOS Blogs [Internet]. San Francisco: PLOS 2006 - . [about 2 screens]. Available from: http://blogs.plos.org/plos/2010/09/announcing-plos-blogs/.

Masters' theses or doctoral dissertations Wells A. Exploring the development of the independent, electronic, scholarly journal. M.Sc. Thesis, The University of Sheffield. 1999. Available from: http://cumincad.scix.net/cgi-bin/works/Show?2e09

Databases and repositories (Figshare, arXiv) Roberts SB. QPX Genome Browser Feature Tracks; 2013 [cited 2013 Oct 5]. Database: figshare [Internet]. Available from: http://figshare.com/articles/QPX_Genome_Browser_Feature_Tracks/701214

Multimedia (videos, movies, or TV shows) Hitchcock A, producer and director. Rear Window [Film]; 1954. Los Angeles: MGM.

Supporting Information

Authors can submit essential supporting files and multimedia files along with their manuscripts. All supporting information will be subject to peer review. All file types can be submitted, but files must be smaller than 10 MB in size.

Authors may use almost any description as the item name for a supporting information file as long as it contains an “S” and number. For example, “S1 Appendix” and “S2 Appendix,” “S1 Table” and “S2 Table,” and so forth.

Supporting information files are published exactly as provided, and are not copyedited.

Supporting information captions

List supporting information captions at the end of the manuscript file. Do not submit captions in a separate file.

The file number and name are required in a caption, and we highly recommend including a one-line title as well. You may also include a legend in your caption, but it is not required.

Example caption

S1 Text. Title is strongly recommended. Legend is optional.

In-text citations

We recommend that you cite supporting information in the manuscript text, but this is not a requirement. If you cite supporting information in the text, citations do not need to be in numerical order.

Read the supporting information guidelines for more details about submitting supporting information and multimedia files.

Figures and Tables

Figures

Do not include figures in the main manuscript file. Each figure must be prepared and submitted as an individual file.

Cite figures in ascending numeric order upon first appearance in the manuscript file.

Read the guidelines for figures.

Figure captions

Figure captions must be inserted in the text of the manuscript, immediately following the paragraph in which the figure is first cited (read order). Do not include captions as part of the figure files themselves or submit them in a separate document.

At a minimum, include the following in your figure captions:

A figure label with Arabic numerals, and “Figure” abbreviated to “Fig” (e.g. Fig 1, Fig 2, Fig 3, etc). Match the label of your figure with the name of the file uploaded at submission (e.g. a figure citation of “Fig 1” must refer to a figure file named “Fig1.tif”).

A concise, descriptive title

The caption may also include a legend as needed.

Read more about figure captions.

Tables

Cite tables in ascending numeric order upon first appearance in the manuscript file.

Place each table in your manuscript file directly after the paragraph in which it is first cited (read order). Do not submit your tables in separate files.

Tables require a label (e.g., “Table 1”) and brief descriptive title to be placed above the table. Place legends, footnotes, and other text below the table.

Read the guidelines for tables.

Data reporting

All data and related metadata underlying the findings reported in a submitted manuscript should be deposited in an appropriate public repository, unless already provided as part of the submitted article.

Read our policy on data availability.

Repositories may be either subject-specific (where these exist) and accept specific types of structured data, or generalist repositories that accept multiple data types. We recommend that authors select repositories appropriate to their field. Repositories may be subject-specific (e.g., GenBank for sequences and PDB for structures), general, or institutional, as long as DOIs or accession numbers are provided and the data are at least as open as CC BY. Authors are encouraged to select repositories that meet accepted criteria as trustworthy digital repositories, such as criteria of the Centre for Research Libraries or Data Seal of Approval. Large, international databases are more likely to persist than small, local ones.

See our list of recommended repositories.

To support data sharing and author compliance of the PLOS data policy, we have integrated our submission process with a select set of data repositories. The list is neither representative nor exhaustive of the suitable repositories available to authors. Current repository integration partners include Dryad and FlowRepository. Please contact data@plos.org to make recommendations for further partnerships.

Instructions for PLOS submissions with data deposited in an integration partner repository:

Deposit data in the integrated repository of choice.

Once deposition is final and complete, the repository will provide you with a dataset DOI (provisional) and private URL for reviewers to gain access to the data.

Enter the given data DOI into the full Data Availability Statement, which is requested in the Additional Information section of the PLOS submission form. Then provide the URL passcode in the Attach Files section.

If you have any questions, please email us.

Accession numbers

All appropriate data sets, images, and information should be deposited in an appropriate public repository. See our list of recommended repositories.

Accession numbers (and version numbers, if appropriate) should be provided in the Data Availability Statement. Accession numbers or a citation to the DOI should also be provided when the data set is mentioned within the manuscript.

In some cases authors may not be able to obtain accession numbers of DOIs until the manuscript is accepted; in these cases, the authors must provide these numbers at acceptance. In all other cases, these numbers must be provided at submission.

Identifiers

As much as possible, please provide accession numbers or identifiers for all entities such as genes, proteins, mutants, diseases, etc., for which there is an entry in a public database, for example:

Ensembl

Entrez Gene

FlyBase

InterPro

Mouse Genome Database (MGD)

Online Mendelian Inheritance in Man (OMIM)

PubChem

Identifiers should be provided in parentheses after the entity on first use.

Striking image

You can choose to upload a “Striking Image” that we may use to represent your article online in places like the journal homepage or in search results.

The striking image must be derived from a figure or supporting information file from the submission, i.e., a cropped portion of an image or the entire image. Striking images should ideally be high resolution, eye-catching, single panel images, and should ideally avoid containing added details such as text, scale bars, and arrows.

If no striking image is uploaded, we will designate a figure from the submission as the striking image.

Striking images should not contain potentially identifying images of people. Read our policy on identifying information.

The PLOS licenses and copyright policy also applies to striking images.

Additional Information Requested at Submission

Financial Disclosure Statement

This information should describe sources of funding that have supported the work. It is important to gather these details prior to submission because your financial disclosure statement cannot be changed after initial submission without journal approval. If your manuscript is published, your statement will appear in the Funding section of the article.

Enter this statement in the Financial Disclosure section of the submission form. Do not include it in your manuscript file.

The statement should include:

Specific grant numbers

Initials of authors who received each award

Full names of commercial companies that funded the study or authors

Initials of authors who received salary or other funding from commercial companies

URLs to sponsors' websites

Also state whether any sponsors or funders (other than the named authors) played any role in:

Study design

Data collection and analysis

Decision to publish

Preparation of the manuscript

If they had no role in the research, include this sentence: “The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.”

If the study was unfunded, include this sentence as the Financial Disclosure statement: “The author(s) received no specific funding for this work."

Read our policy on disclosure of funding sources.

Competing Interests

This information should not be in your manuscript file; you will provide it via our submission system.

All potential competing interests must be declared in full. If the submission is related to any patents, patent applications, or products in development or for market, these details, including patent numbers and titles, must be disclosed in full.

Read our policy on competing interests.

Manuscripts disputing published work

For manuscripts disputing previously published work, it is PLOS ONE policy to invite a signed review by the disputed author during the peer review process. This procedure is aimed at ensuring a thorough, transparent, and productive review process.

If the disputed author chooses to submit a review, it must be returned in a timely fashion and contain a full declaration of all competing interests. The Academic Editor will consider any such reviews in light of the competing interest.

Authors submitting manuscripts disputing previous work should explain the relationship between the manuscripts in their cover letter, and will be required to confirm that they accept the conditions of this review policy before the manuscript is considered further.

Related manuscripts

Upon submission, authors must confirm that the manuscript, or any related manuscript, is not currently under consideration or accepted elsewhere. If related work has been submitted to PLOS ONE or elsewhere, authors must include a copy with the submitted article. Reviewers will be asked to comment on the overlap between related submissions.

We strongly discourage the unnecessary division of related work into separate manuscripts, and we will not consider manuscripts that are divided into “parts.” Each submission to PLOS ONE must be written as an independent unit and should not rely on any work that has not already been accepted for publication. If related manuscripts are submitted to PLOS ONE, the authors may be advised to combine them into a single manuscript at the editor's discretion.

Read our policies on related manuscripts.

Preprints

PLOS encourages authors to post preprints as a way to accelerate the dissemination of research and supports authors who wish to share their work early and receive feedback before formal peer review. Deposition of manuscripts with preprint servers does not impact consideration of the manuscript at any PLOS journal.

Authors posting on bioRxiv may concurrently submit directly to PLOS journals through bioRxiv’s direct transfer to journal service.

Authors submitting manuscripts in the life sciences to PLOS ONE may opt-in to post their work on bioRxiv during the PLOS ONE initial submission process.

Read more about preprints.

Learn how to post a preprint to bioRxiv during PLOS ONE initial submission.

Guidelines for Specific Study Types

Human subjects research

All research involving human participants must have been approved by the authors’ Institutional Review Board (IRB) or by equivalent ethics committee(s), and must have been conducted according to the principles expressed in the Declaration of Helsinki. Authors should be able to submit, upon request, a statement from the IRB or ethics committee indicating approval of the research. We reserve the right to reject work that we believe has not been conducted to a high ethical standard, even when formal approval has been obtained.

Subjects must have been properly instructed and have indicated that they consent to participate by signing the appropriate informed consent paperwork. Authors may be asked to submit a blank, sample copy of a subject consent form. If consent was verbal instead of written, or if consent could not be obtained, the authors must explain the reason in the manuscript, and the use of verbal consent or the lack of consent must have been approved by the IRB or ethics committee.

All efforts should be made to protect patient privacy and anonymity. Identifying information, including photos, should not be included in the manuscript unless the information is crucial and the individual has provided written consent by completing the Consent Form for Publication in a PLOS Journal (PDF). Download additional translations of the form from the Downloads and Translations page. More information about patient privacy, anonymity, and informed consent can be found in the International Committee of Medical Journal Editors (ICMJE) Privacy and Confidentiality guidelines.

Manuscripts should conform to the following reporting guidelines:

Studies of diagnostic accuracy: STARD

Observational studies: STROBE

Microarray experiments: MIAME

Other types of health-related research: Consult the EQUATOR web site for appropriate reporting guidelines

Methods sections of papers on research using human subjects or samples must include ethics statements that specify:

The name of the approving institutional review board or equivalent committee(s). If approval was not obtained, the authors must provide a detailed statement explaining why it was not needed

Whether informed consent was written or oral. If informed consent was oral, it must be stated in the manuscript:

Why written consent could not be obtained

That the Institutional Review Board (IRB) approved use of oral consent

How oral consent was documented

For studies involving humans categorized by race/ethnicity, age, disease/disabilities, religion, sex/gender, sexual orientation, or other socially constructed groupings, authors should:

Explicitly describe their methods of categorizing human populations

Define categories in as much detail as the study protocol allows

Justify their choices of definitions and categories, including for example whether any rules of human categorization were required by their funding agency

Explain whether (and if so, how) they controlled for confounding variables such as socioeconomic status, nutrition, environmental exposures, or similar factors in their analysis

In addition, outmoded terms and potentially stigmatizing labels should be changed to more current, acceptable terminology. Examples: “Caucasian” should be changed to “white” or “of [Western] European descent” (as appropriate); “cancer victims” should be changed to “patients with cancer.”

For papers that include identifying, or potentially identifying, information, authors must download the Consent Form for Publication in a PLOS Journal, which the individual, parent, or guardian must sign once they have read the paper and been informed about the terms of PLOS open-access license. The signed consent form should not be submitted with the manuscript, but authors should securely file it in the individual's case notes and the methods section of the manuscript should explicitly state that consent authorization for publication is on file, using wording like:

The individual in this manuscript has given written informed consent (as outlined in PLOS consent form) to publish these case details.

For more information about PLOS ONE policies regarding human subjects research, see the Publication Criteria and Editorial Policies.

Clinical trials

Clinical trials are subject to all policies regarding human research. PLOS ONE follows the World Health Organization's (WHO) definition of a clinical trial:

A clinical trial is any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes [...] Interventions include but are not restricted to drugs, cells and other biological products, surgical procedures, radiologic procedures, devices, behavioural treatments, process-of-care changes, preventive care, etc.

All clinical trials must be registered in one of the publicly-accessible registries approved by the WHO or ICMJE (International Committee of Medical Journal Editors). Authors must provide the trial registration number. Prior disclosure of results on a clinical trial registry site will not affect consideration for publication. We reserve the right to inform authors' institutions or ethics committees, and to reject the manuscript, if we become aware of unregistered trials.

PLOS ONE supports prospective trial registration (i.e. before participant recruitment has begun) as recommended by the ICMJE's clinical trial registration policy. Where trials were not publicly registered before participant recruitment began, authors must:

Register all related clinical trials and confirm they have done so in the Methods section

Explain in the Methods the reason for failing to register before participant recruitment

Clinical trials must be reported according to the relevant reporting guidelines, i.e. CONSORT for randomized controlled trials, TREND for non-randomized trials, and other specialized guidelines as appropriate. The intervention should be described according to the requirements of the TIDieR checklist and guide. Submissions must also include the study protocol as supporting information, which will be published with the manuscript if accepted.

Authors of manuscripts describing the results of clinical trials must adhere to the CONSORT reporting guidelines appropriate to their trial design, available on the CONSORT Statement web site. Before the paper can enter peer review, authors must:

Provide the registry name and number in the methods section of the manuscript

Provide a copy of the trial protocol as approved by the ethics committee and a completed CONSORT checklist as supporting information (which will be published alongside the paper, if accepted). This should be named S1 CONSORT Checklist.

Include the CONSORT flow diagram as the manuscript's "Fig 1"

Any deviation from the trial protocol must be explained in the paper. Authors must explicitly discuss informed consent in their paper, and we reserve the right to ask for a copy of the patient consent form.

The methods section must include the name of the registry, the registry number, and the URL of your trial in the registry database for each location in which the trial is registered.

Animal research

All research involving vertebrates or cephalopods must have approval from the authors' Institutional Animal Care and Use Committee (IACUC) or equivalent ethics committee(s), and must have been conducted according to applicable national and international guidelines. Approval must be received prior to beginning research.

Manuscripts reporting animal research must state in the Methods section:

The full name of the relevant ethics committee that approved the work, and the associated permit number(s).

Where ethical approval is not required, the manuscript should include a clear statement of this and the reason why. Provide any relevant regulations under which the study is exempt from the requirement for approval.

Relevant details of steps taken to ameliorate animal suffering.

Example ethics statement

This study was carried out in strict accordance with the recommendations in the Guide for the Care and Use of Laboratory Animals of the National Institutes of Health. The protocol was approved by the Committee on the Ethics of Animal Experiments of the University of

Minnesota (Protocol Number: 27-2956). All surgery was performed under sodium pentobarbital anesthesia, and all efforts were made to minimize suffering.

Authors should always state the organism(s) studied in the Abstract. Where the study may be confused as pertaining to clinical research, authors should also state the animal model in the title.

To maximize reproducibility and potential for re-use of data, we encourage authors to follow the Animal Research: Reporting of In Vivo Experiments (ARRIVE) guidelines for all submissions describing laboratory-based animal research and to upload a completed ARRIVE Guidelines Checklist to be published as supporting information.

Non-human primates

Manuscripts describing research involving non-human primates must report details of husbandry and animal welfare in accordance with the recommendations of the Weatherall report, The use of non-human primates in research (PDF), including:

Information about housing, feeding, and environmental enrichment.

Steps taken to minimize suffering, including use of anesthesia and method of sacrifice, if appropriate.

Random source animals

Manuscripts describing studies that use random source (e.g. Class B dealer-sourced in the USA), shelter, or stray animals will be subject to additional scrutiny and may be rejected if sufficient ethical and scientific justification for the study design is lacking.

Unacceptable euthanasia methods and anesthetic agents

Manuscripts reporting use of a euthanasia method(s) classified as unacceptable by the American Veterinary Medical Association or use of an anesthesia method(s) that is widely prohibited (e.g., chloral hydrate, ether, chloroform) must include at the time of initial submission, scientific justification for use in the specific study design, as well as confirmation of approval for specific use from their animal research ethics committee. These manuscripts may be subject to additional ethics considerations prior to publication.

Humane endpoints

Manuscripts reporting studies in which death of a regulated animal (vertebrate, cephalopod) is a likely outcome or a planned experimental endpoint, must comprehensively report details of study design, rationale for the approach, and methodology, including consideration of humane endpoints. This applies to research that involves, for instance, assessment of survival, toxicity, longevity, terminal disease, or high rates of incidental mortality.

Definition of a humane endpoint

A humane endpoint is a predefined experimental endpoint at which animals are euthanized when they display early markers associated with death or poor prognosis of quality of life, or specific signs of severe suffering or distress. Humane endpoints are used as an alternative to allowing such conditions to continue or progress to death following the experimental intervention (“death as an endpoint”), or only euthanizing animals at the end of an experiment. Before a study begins, researchers define the practical observations or measurements that will be used during the study to recognize a humane endpoint, based on anticipated clinical, physiological, and behavioral signs. Please see the NC3Rs guidelines for more information. Additional discussion of humane endpoints can be found in this article: Nuno H. Franco, Margarida Correia-Neves, I. Anna S. Olsson (2012) How “Humane” Is Your Endpoint? — Refining the Science-Driven Approach for Termination of Animal Studies of Chronic Infection. PLoS Pathog 8(1): e1002399 doi.org/10.1371/journal.ppat.1002399.

Full details of humane endpoints use must be reported for a study to be reproducible and for the results to be accurately interpreted.

For studies in which death of an animal is an outcome or a planned experimental endpoint, authors should include the following information in the Methods section of the manuscript:

The specific criteria (i.e. humane endpoints) used to determine when animals should be euthanized.

The duration of the experiment.

The numbers of animals used, euthanized, and found dead (if any); the cause of death for all animals.

How frequently animal health and behavior were monitored.

All animal welfare considerations taken, including efforts to minimize suffering and distress, use of analgesics or anaesthetics, or special housing conditions.

If humane endpoints were not used, the manuscript should report:

A scientific justification for the study design, including the reasons why humane endpoints could not be used, and discussion of alternatives that were considered.

Whether the institutional animal ethics committee specifically reviewed and approved the anticipated mortality in the study design.

Observational and field studies

Methods sections for submissions reporting on any type of field study must include ethics statements that specify:

Permits and approvals obtained for the work, including the full name of the authority that approved the study; if none were required, authors should explain why

Whether the land accessed is privately owned or protected

Whether any protected species were sampled

Full details of animal husbandry, experimentation, and care/welfare, where relevant

Paleontology and archaeology research

Manuscripts reporting paleontology and archaeology research must include descriptions of methods and specimens in sufficient detail to allow the work to be reproduced. Data sets supporting statistical and phylogenetic analyses should be provided, preferably in a format that allows easy re-use. Read the policy.

Specimen numbers and complete repository information, including museum name and geographic location, are required for publication. Locality information should be provided in the manuscript as legally allowable, or a statement should be included giving details of the availability of such information to qualified researchers.

If permits were required for any aspect of the work, details should be given of all permits that were obtained, including the full name of the issuing authority. This should be accompanied by the following statement:

All necessary permits were obtained for the described study, which complied with all relevant regulations.

If no permits were required, please include the following statement:

No permits were required for the described study, which complied with all relevant regulations.

Manuscripts describing paleontology and archaeology research are subject to the following policies:

Sharing of data and materials. Any specimen that is erected as a new species, described, or figured must be deposited in an accessible, permanent repository (i.e., public museum or similar institution). If study conclusions depend on specimens that do not fit these criteria, the article will be rejected under PLOS ONE's data availability criterion.

Ethics. PLOS ONE will not publish research on specimens that were obtained without necessary permission or were illegally exported.

Systematic reviews and meta-analyses

A systematic review paper, as defined by The Cochrane Collaboration, is a review of a clearly formulated question that uses explicit, systematic methods to identify, select, and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review. These reviews differ substantially from narrative-based reviews or synthesis articles. Statistical methods (meta-analysis) may or may not be used to analyze and summarize the results of the included studies.

Reports of systematic reviews and meta-analyses must include a completed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist and flow diagram to accompany the main text. Blank templates are available here:

Checklist: PDF or Word document

Flow diagram: PDF or Word document

Authors must also state in their "Methods" section whether a protocol exists for their systematic review, and if so, provide a copy of the protocol as supporting information and provide the registry number in the abstract.

If your article is a systematic review or a meta-analysis you should:

State this in your cover letter

Select "Research Article" as your article type when submitting

Include the PRISMA flow diagram as Fig 1 (required where applicable)

Include the PRISMA checklist as supporting information

Meta-analysis of genetic association studies

Manuscripts reporting a meta-analysis of genetic association studies must report results of value to the field and should be reported according to the guidelines presented in Systematic Reviews of Genetic Association Studies by Sagoo et al.

On submission, authors will be asked to justify the rationale for the meta-analysis and how it contributes to the base of scientific knowledge in the light of previously published results. Authors will also be asked to complete a checklist (DOCX) outlining information about the justification for the study and the methodology employed. Meta-analyses that replicate published studies will be rejected if the authors do not provide adequate justification.

Personal data from third-party sources

For all studies using personal data from internet-based and other third-party sources (e.g., social media, blogs, other internet sources, mobile phone companies), data must be collected and used according to company/website Terms and Conditions, with appropriate permissions. All data sources must be acknowledged clearly in the Materials and Methods section.

Read our policy on data availability.

In the Ethics Statement, authors should declare any potential risks to individuals or individual privacy, or affirm that in their assessment, the study posed no such risks. In addition, the following Ethics and Data Protection requirements must be met.

For interventional studies, which impact participants' experiences or data, the study design must have been prospectively approved by an Ethics Committee, and informed consent is required. The Ethics Committee may waive the requirement for approval and/or consent.

For observational studies in which personal experiences and accounts are not manipulated, consultation with an Ethics or Data Protection Committee is recommended. Additional requirements apply in the following circumstances:

If information used could threaten personal privacy or damage the reputation of individuals whose data are used, an Ethics Committee should be consulted and informed consent obtained or specifically addressed.

If authors accessed any personal identifying information, an Ethics or Data Protection Committee should oversee data anonymization. If data were anonymized and/or aggregated before access and analysis, informed consent is generally not required.

Note that Terms of Use contracts do not qualify as informed consent, even if they address the use of personal data for research.

See our reporting guidelines for human subjects research.

Cell lines

Authors reporting research using cell lines should state when and where they obtained the cells, giving the date and the name of the researcher, cell line repository, or commercial source (company) who provided the cells, as appropriate.

Authors must also include the following information for each cell line:

For de novo (new) cell lines, including those given to the researchers as a gift, authors must follow our policies for human subjects research or animal research, as appropriate. The ethics statement must include:

Details of institutional review board or ethics committee approval; AND

For human cells, confirmation of written informed consent from the donor, guardian, or next of kin

For established cell lines, the Methods section should include:

A reference to the published article that first described the cell line; AND/OR

The cell line repository or company the cell line was obtained from, the catalogue number, and whether the cell line was obtained directly from the repository/company or from another laboratory

Authors should check established cell lines using the ICLAC Database of Cross-contaminated or Misidentified Cell Lines to confirm they are not misidentified or contaminated. Cell line authentication is recommended – e.g., by karyotyping, isozyme analysis, or short tandem repeats (STR) analysis – and may be required during peer review or after publication.

Blots and gels

Manuscripts reporting results from blots (including Western blots) and electrophoretic gels should follow these guidelines:

In accordance with our policy on image manipulation, the image should not be adjusted in any way that could affect the scientific information displayed, e.g. by modifying the background or contrast.

All blots and gels that support results reported in the manuscript should be provided.

Original uncropped and unadjusted blots and gels, including molecular size markers, should be provided in either the figures or the supplementary files.

Lanes should not be overcropped around the bands; the image should show most or all of the blot or gel. Any non-specific bands should be shown and an explanation of their nature should be given.

The image should include all relevant controls, and controls should be run on the same blot or gel as the samples.

A figure panel should not include composite images of bands originating from different blots or gels. If the figure shows non-adjacent bands from the same blot or gel, this should be clearly denoted by vertical black lines and the figure legend should provide details of how the figure was made.

Antibodies

Manuscripts reporting experiments using antibodies should include the following information:

The name of each antibody, a description of whether it is monoclonal or polyclonal, and the host species.

The commercial supplier or source laboratory.

The catalogue or clone number and, if known, the batch number.

The antigen(s) used to raise the antibody.

For established antibodies, a stable public identifier from the Antibody Registry.

The manuscript should also report the following experimental details:

The final antibody concentration or dilution.

A reference to the validation study if the antibody was previously validated. If not, provide details of how the authors validated the antibody for the applications and species used.

We encourage authors to consider adding information on new validations to a publicly available database such as Antibodypedia or CiteAb.

Small and macromolecule crystal data

Manuscripts reporting new and unpublished three-dimensional structures must include sufficient supporting data and detailed descriptions of the methodologies used to allow the reproduction and validation of the structures. All novel structures must have been deposited in a community endorsed database prior to submission (please see our list of recommended repositories).

Small molecule single crystal data

Authors reporting X-Ray crystallographic structures of small organic, metal-organic, and inorganic molecules must deposit their data with the Cambridge Crystallographic Data Centre (CCDC), the Inorganic Crystal Structure Database (ICSD), or similar community databases providing a recognized validation functionality. Authors are also required to include the relevant structure reference numbers within the main text (e.g. the CCDC ID number), as well as the crystallographic information files (.cif format) as Supplementary Information, along with the checkCIF validation reports that can be obtained via the International Union of Crystallography (IUCr).

Macromolecular structures

Authors reporting novel macromolecular structures must have deposited their data prior to submission with the Worldwide Protein Data Bank (wwPDB), the Biological Magnetic Resonance Data Bank (BMRB), the Electron Microscopy Data Bank (EMDB), or other community databases providing a recognized validation functionality. Authors must include the structure reference numbers within the main text and submit as Supplementary Information the official validation reports from these databases.

Methods, software, databases, and tools

PLOS ONE will consider submissions that present new methods, software, or databases as the primary focus of the manuscript if they meet the following criteria:

Utility

The tool must be of use to the community and must present a proven advantage over existing alternatives, where applicable. Recapitulation of existing methods, software, or databases is not useful and will not be considered for publication. Combining data and/or functionalities from other sources may be acceptable, but simpler instances (i.e. presenting a subset of an already existing database) may not be considered. For software, databases, and online tools, the long-term utility should also be discussed, as relevant. This discussion may include maintenance, the potential for future growth, and the stability of the hosting, as applicable.

Validation

Submissions presenting methods, software, databases, or tools must demonstrate that the new tool achieves its intended purpose. If similar options already exist, the submitted manuscript must demonstrate that the new tool is an improvement over existing options in some way. This requirement may be met by including a proof-of-principle experiment or analysis; if this is not possible, a discussion of the possible applications and some preliminary analysis may be sufficient.

Availability

If the manuscript's primary purpose is the description of new software or a new software package, this software must be open source, deposited in an appropriate archive, and conform to the Open Source Definition. If the manuscript mainly describes a databse, this database must be open-access and hosted somewhere publicly accessible, and any software used to generate a database should also be open source. If relevant, databases should be open for appropriate deposition of additional data. Dependency on commercial software such as Mathematica and MATLAB does not preclude a paper from consideration, although complete open source solutions are preferred. In these cases, authors should provide a direct link to the deposited software or the database hosting site from within the paper.

Software submissions

Manuscripts whose primary purpose is the description of new software must provide full details of the algorithms designed. Describe any dependencies on commercial products or operating system. Include details of the supplied test data and explain how to install and run the software. A brief description of enhancements made in the major releases of the software may also be given. Authors should provide a direct link to the deposited software from within the paper.

Database submissions

For descriptions of databases, provide details about how the data were curated, as well as plans for long-term database maintenance, growth, and stability. Authors should provide a direct link to the database hosting site from within the paper.

Read the PLOS policy on sharing materials and software.

New taxon names

Zoological names

When publishing papers that describe a new zoological taxon name, PLOS aims to comply with the requirements of the International Commission on Zoological Nomenclature (ICZN). Effective 1 January 2012, the ICZN considers an online-only publication to be legitimate if it meets the criteria of archiving and is registered in ZooBank, the ICZN's official registry.

For proper registration of a new zoological taxon, we require two specific statements to be included in your manuscript.

In the Results section, the globally unique identifier (GUID), currently in the form of a Life Science Identifier (LSID), should be listed under the new species name, for example:

Anochetus boltoni Fisher sp. nov. urn:lsid:zoobank.org:act:B6C072CF-1CA6-40C7-8396-534E91EF7FBB

You will need to contact Zoobank to obtain a GUID (LSID). Please do this as early as possible to avoid delay of publication upon acceptance of your manuscript. It is your responsibility to provide us with this information so we can include it in the final published paper.

Please also insert the following text into the Methods section, in a sub-section to be called "Nomenclatural Acts":

The electronic edition of this article conforms to the requirements of the amended International Code of Zoological Nomenclature, and hence the new names contained herein are available under that Code from the electronic edition of this article. This published work and the nomenclatural acts it contains have been registered in ZooBank, the online registration system for the ICZN. The ZooBank LSIDs (Life Science Identifiers) can be resolved and the associated information viewed through any standard web browser by appending the LSID to the prefix "http://zoobank.org/". The LSID for this publication is: urn:lsid:zoobank.org:pub: XXXXXXX. The electronic edition of this work was published in a journal with an ISSN, and has been archived and is available from the following digital repositories: PubMed Central, LOCKSS [author to insert any additional repositories].

All PLOS articles are deposited in PubMed Central and LOCKSS. If your institute, or those of your co-authors, has its own repository, we recommend that you also deposit the published online article there and include the name in your article.

Botanical names

When publishing papers that describe a new botanical taxon, PLOS aims to comply with the requirements of the International Code of Nomenclature for algae, fungi, and plants (ICN). The following guidelines for publication in an online-only journal have been agreed such that any scientific botanical name published by us is considered effectively published under the rules of the Code. Please note that these guidelines differ from those for zoological nomenclature, and apply only to seed plants, ferns, and lycophytes.

Effective January 2012, the description or diagnosis of a new taxon can be in either Latin or English. This does not affect the requirements for scientific names, which are still to be Latin.

Also effective January 2012, the electronic PDF represents a published work according to the ICN for algae, fungi, and plants. Therefore the new names contained in the electronic publication of PLOS article are effectively published under that Code from the electronic edition alone, so there is no longer any need to provide printed copies.

Additional information describing recent changes to the Code can be found here.

For proper registration of the new taxon, we require two specific statements to be included in your manuscript.

In the Results section, the globally unique identifier (GUID), currently in the form of a Life Science Identifier (LSID), should be listed under the new species name, for example:

Solanum aspersum S.Knapp, sp. nov. [urn:lsid:ipni.org:names:77103633-1] Type: Colombia. Putumayo: vertiente oriental de la Cordillera, entre Sachamates y San Francisco de Sibundoy, 1600-1750 m, 30 Dec 1940, J. Cuatrecasas 11471 (holotype, COL; isotypes, F [F-1335119], US [US-1799731]).

Journal staff will contact IPNI to obtain the GUID (LSID) after your manuscript is accepted for publication, and this information will then be added to the manuscript during the production phase

In the Methods section, include a sub-section called “Nomenclature” using the following wording:

The electronic version of this article in Portable Document Format (PDF) in a work with an ISSN or ISBN will represent a published work according to the International Code of Nomenclature for algae, fungi, and plants, and hence the new names contained in the electronic publication of a PLOS article are effectively published under that Code from the electronic edition alone, so there is no longer any need to provide printed copies.

In addition, new names contained in this work have been submitted to IPNI, from where they will be made available to the Global Names Index. The IPNI LSIDs can be resolved and the associated information viewed through any standard web browser by appending the LSID contained in this publication to the prefix http://ipni.org/. The online version of this work is archived and available from the following digital repositories: [INSERT NAMES OF DIGITAL REPOSITORIES WHERE ACCEPTED MANUSCRIPT WILL BE SUBMITTED (PubMed Central, LOCKSS etc)].

All PLOS articles are deposited in PubMed Central and LOCKSS. If your institute, or those of your co-authors, has its own repository, we recommend that you also deposit the published online article there and include the name in your article.

Fungal names

When publishing papers that describe a new botanical taxon, PLOS aims to comply with the requirements of the International Code of Nomenclature for algae, fungi, and plants (ICN). The following guidelines for publication in an online-only journal have been agreed such that any scientific botanical name published by us is considered effectively published under the rules of the Code. Please note that these guidelines differ from those for zoological nomenclature.

Effective January 2012, the description or diagnosis of a new taxon can be in either Latin or English. This does not affect the requirements for scientific names, which are still to be Latin.

Also effective January 2012, the electronic PDF represents a published work according to the ICN for algae, fungi, and plants. Therefore the new names contained in the electronic publication of PLOS article are effectively published under that Code from the electronic edition alone, so there is no longer any need to provide printed copies.

Additional information describing recent changes to the Code can be found here.

For proper registration of the new taxon, we require two specific statements to be included in your manuscript.

In the Results section, the globally unique identifier (GUID), currently in the form of a Life Science Identifier (LSID), should be listed under the new species name, for example:

Hymenogaster huthii. Stielow et al. 2010, sp. nov.
[urn:lsid:indexfungorum.org:names:518624]

You will need to contact either Mycobank or Index Fungorum to obtain the GUID (LSID). Please do this as early as possible to avoid delay of publication upon acceptance of your manuscript. It is your responsibility to provide us with this information so we can include it in the final published paper. Effective January 2013, all papers describing new fungal species must reference the identifier issued by a recognized repository in the protologue in order to be considered effectively published.

In the Methods section, include a sub-section called "Nomenclature" using the following wording (this example is for taxon names submitted to MycoBank; please substitute appropriately if you have submitted to Index Fungorum):

The electronic version of this article in Portable Document Format (PDF) in a work with an ISSN or ISBN will represent a published work according to the International Code of Nomenclature for algae, fungi, and plants, and hence the new names contained in the electronic publication of a PLOS article are effectively published under that Code from the electronic edition alone, so there is no longer any need to provide printed copies.

In addition, new names contained in this work have been submitted to MycoBank from where they will be made available to the Global Names Index. The unique MycoBank number can be resolved and the associated information viewed through any standard web browser by appending the MycoBank number contained in this publication to the prefix http://www.mycobank.org/MB/. The online version of this work is archived and available from the following digital repositories: [INSERT NAMES OF DIGITAL REPOSITORIES WHERE ACCEPTED MANUSCRIPT WILL BE SUBMITTED (PubMed Central, LOCKSS etc)].

All PLOS articles are deposited in PubMed Central and LOCKSS. If your institute, or those of your co-authors, has its own repository, we recommend that you also deposit the published online article there and include the name in your article.

Qualitative research

Qualitative research studies use non-quantitative methods to address a defined research question that may not be accessible by quantitative methods, such as people's interpretations, experiences, and perspectives. The analysis methods are explicit, systematic, and reproducible, but the results do not involve numerical values or use statistics. Examples of qualitative data sources include, but are not limited to, interviews, text documents, audio/video recordings, and free-form answers to questionnaires and surveys.

Qualitative research studies should be reported in accordance to the Consolidated criteria for reporting qualitative research (COREQ) checklist. Further reporting guidelines can be found in the Equator Network's Guidelines for reporting qualitative research.

Anexo 3 - Normas da revista *Conservation Biology*, a qual será encaminhado o Capítulo III desta Tese.

Disponível em:
https://mc.manuscriptcentral.com/conbio?NEXT_PAGE=FORMS_AND_INSTRUCTIONS&XIK_CUR_ROLE_ID=xik_WJcT2c79gSHMCEGDGX2KQ&XIK_CUR_USER_ID=xik_MGqt9CP6Sgh4c7acv6Ztbu&XIK_CNFID=xik_7LrG6ugkDG6cfJQ71XfHqVRPb9dY7NkEsuYKk5rknRt5&CURRENT_QUEUE_VALUE=null&PAGE_NAME=LOGIN

Conservation Biology
Style Guide for Authors

Word count

Conservation Biology tries to balance the depth of each article with the number of articles that can be published. Manuscripts must not exceed the following word counts even if reviewers have asked for additional material. The number of words includes all text from the Abstract through Literature Cited; it does not include tables or figure legends or text in the body of tables. The Abstract should not exceed 300 words. Do not include an abstract with Letters, Comments, or Diversity pieces.

Contributed Papers: 6000
Research Notes: 3000
Reviews: 7500
Essays: 6000
Conservation Methods: 6000
Conservation Practice and Policy: 5000
Comments: 2000
Diversity: 2000
Letters: 1000

More information on these categories and the types of papers published in Conservation Biology is available from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1523-1739/homepage/ForAuthors.html.

Number of tables and figures

Include no more than one supporting element (i.e., table or figure) for every four pages of text (from the Abstract through the Literature Cited). If a table or figure has only a few data points, incorporate the data in the text.

Appendices and supporting information

We rarely allow appendices in the print version of the journal. Supplementary materials typically should be provided as online Supporting Information (see below for further information).

Section headings and order of sections

Contributed Papers, Research Notes, and Conservation Methods papers should contain the following sections in the following order: Abstract, Introduction, Methods, Results, Discussion, Supporting Information (paragraph describing online appendices if there are any), Literature Cited, tables, figure-legend page, and figures with legends. Do not combine sections (e.g., Results and Discussion). The Acknowledgments section will be added to the body of the paper after the manuscript has been accepted. Do not number section headings or subheadings. Do not include a Conclusion section (conclusions are part of the Discussion).

Title

Most people will decide whether to read a paper solely on the basis of its title. Indexing and abstracting services and internet search engines also depend heavily on the information conveyed by the title. And, researchers search for particular topics and then read the titles. If your title does not reflect the contents of your paper well or if the meaning of your title is not immediately clear, your paper will not be read. Titles should be clear and concise. Do not use hanging titles (those with a colon, dash, or sometimes a comma), titles that are complete sentences, headline-like titles, interrogative titles, titles that reference colloquialisms or popular culture, or titles that contain jargon that will not be understood by our international and interdisciplinary conservation audience.

The problem with titles that are complete sentences is that they tend to create dogma (e.g., Wind Energy Development Does Not Affect Nesting Ecology of a Grassland Bird). Scientific knowledge is constantly evolving; thus, what is considered true currently may be questioned and proven inaccurate in the future. Interrogatives make poor titles because the entire manuscript can often be summarized with a single word: yes or no (e.g., Will the Exception to Protected-Area Reclassification Protocols Prove the Rule?). Hanging titles are overused and can almost always be shortened to a title that is more effective and eye-catching without being sensational.

Abstract

At the top of the abstract page provide the title of the paper. The Abstract should summarize the Introduction, Methods, Results, and Discussion in that order (i.e., it should be a miniversion of the paper). Key points from each of these sections should be identifiable within the Abstract. Do not include incomplete or uninformative descriptions (e.g., "A new method of analysis is described." or “We discuss how our approach promotes sustainable management of forest systems.”). Do not state conclusions that are not supported by evidence reported in the abstract.

Keywords

Include on the cover page five to eight words or phrases that will be useful for indexing and literature searches. Do not use words in the title as keywords, and avoid general terms such as conservation.

Article Impact Statement

In ≤140 characters (including spaces and punctuation), convey the paper’s practical or policy importance. The statement may be a report of the primary result or theme if the practical or policy importance of the result is obvious. It should not be a reiterated or lengthened title or describe what is presented (e.g., “A method to x is presented.”).

Statement on human or animal subjects

When reporting on studies that involve human participants or animal subjects, supply a statement in methods that specifies the ethical guidelines with which you complied. Include permit numbers, if applicable.

Acknowledgments

Place the acknowledgment paragraph on the cover page of your manuscript. (Reviewers are not provided with a cover page.) Do not spell out first (given) names. Provide the first initial of the first name, even if the initial starts a sentence. Do not use titles (e.g., Dr. or Professor). Refer to authors of the manuscript by their initials only (e.g., “S.T.W. was supported by a grant from the Torrey Foundation.”).

Footnotes

Do not use footnotes in the body of the manuscript.

Citations

Do not cite work or data that have not been published or are not available. Include such work or data as online Supporting Information and cite it as such in the text. If the data are available in a publically accessible database, you may cite that database. Include databases in Literature Cited.

In-text citations

In the body of the paper, order citations from oldest to newest and use author-year format.

In most cases, enclose citations in text in parentheses. “Populations in sagebrush have higher reproductive success than populations in cheatgrass (Bird & Tree 2000).” is better than “According to Bird and Tree (2000), populations in sagebrush . . . .”

Use an ampersand (&) between author surnames when the citation is parenthetical: (Bird & Sanchez 2010).

When a citation is not parenthetical, use and: “Our results are consistent with the predictions of Wolf and Rhymer (2011).”

For citations with more than two authors, use et al.: (Hatchwell et al. 1996). Do not italicize et al.

List parenthetical citations chronologically (from oldest to most recent) and separate entries with a semicolon: (Zorenstein et al. 1991; Waddell & Fretwell 2001).

Separate the years with commas when citing multiple papers by the same author: (Cox et al. 1991, 1992; Chapman 2001).

"In press" means the cited paper has been accepted officially for publication. Provide the year of publication in the text (Bird 2015), and in Literature Cited provide the volume number and substitute "in press" for page numbers or DOI (Bird IM. 2015. Nesting success in arid lands. Conservation Biology 29: in press.).

Cite databases in text with an author-year format.

Software: capitalize the first letter only if the name of the program is a word (e.g., Partition, ArcInfo). If the name of the program is not a word, use all capital letters (e.g., SAS).

Do not use trademark symbols.

Ensure that all references cited in text are listed in Literature Cited and vice versa.

Do not use "in. lit." citations. Provide the original citations.

Unpublished information

To further transparency and reproducibility, avoid citations of unpublished data and phrases such as data not shown. Provide data in online Supporting Information (cite as Supporting Information in text) or in a publically accessible database (cite in text and in Literature Cited).

Literature Cited section

Provide the full names of all journal titles. Do not italicize titles.

If there are more than 10 authors, use et al. (Howard G, et al.) instead of listing the names of all authors.

Personal communications should not be included in Literature Cited.

Proceedings and abstracts from conferences may be cited only if they have a publisher and the location of the publisher (or the organization from which the document may be obtained) can be provided.

Example Citations

Journal articles:
Christensen ND, Eu J, Hebbble W. 2003. Ecology of cranberry bogs: a case study. Ecology 59:1147–1167, 1178–1187.

Reed, FM. 2001. Title of paper. Journal 13(supplement 1):172–180.

Online journal articles:
Hunstanton V. 2008. Effects of deep-sea injection of carbon dioxide. PLOS Biology DOI: 10.1371/journal.pbio.1001222.

No access dates are needed for citations of online journals.

Edited books:
Cran B, Boy C, Shi L. 1911. Native forest birds of Guam. Pages 4–8 in Wu T, Lee L, editors. Flora and fauna of Guam. 2nd edition. Tell Books, Sydney.

Reports:
Barnes J, Craig S. 2003. Conservation status of riparian areas in southeastern Oregon. General technical report N-24. U.S. Fish and Wildlife Service, Portland, Oregon.

Internet sources other than journals:

Include the name of the organization hosting the website, their geographical location, and access date (month year).

Carne A. 2003. Ranges of endangered Colombian birds. BirdLife International, Cambridge, United Kingdom. Available from http:www.BLI.org/pub2/birdranges (accessed March 2014).

Databases:

IUCN (International Union for the Conservation of Nature), UN Environment Programme (UNEP). 2017. World database on protected areas. IUCN, Gland, Switzerland, UNEP, Paris. Available from www.protectedplanet.net (accessed December 2017).

In press manuscripts:

Officially accepted manuscripts may be cited as in press in Literature Cited: Stevens J Trainer C. 2015. ….on marine ecosystems. Conservation Biology 29: in press. In text and in Literature Cited, you must provide year of publication (e.g., in text use Stevens & Trainer 2018).

Supporting Elements (Tables, Figures, Online Appendices)

Content

A reader should be able to interpret tables and figures without referring to the text and having read only the abstract. Tables and figures should be self-explanatory and supplement rather than duplicate information in the text. Consequently, abbreviations and terms must be defined in the figure legend or in the table caption or footnotes. Common statistical notations need not be defined (e.g., CI, SD, SE). Use the same terminology in supporting elements and in the text. Text boxes are not allowed. Do not present large amounts of data in tables.

Citation in text

Provide a summary or generalization of results and cite supporting elements parenthetically: “Models for species abundance were significant and explained 78% to 92% of variability (Table 2),” rather than “Table 2 shows the outcome of models of species abundance.” Abbreviate (“Fig.,” not “Figure”) unless figure is the first word in a sentence.

Tables

Legends should be one sentence long. Use the legend to describe the contents of the table as it relates to the topic of the manuscript. A list of the table's columns or row headings is not an informative table legend. Use footnotes to provide needed explanations of row and column headings, to provide more information about specific data, and to define terms.

Information too general: "Results of extract tests." or "Analysis of variance F values, treatment means, and habitat means."

Too much information: "Anti-Candida, -leishmania, and -tumor activity of extracts from 11 species of sea cucumber. NA indicates no activity (IC50≥ 500 µg/mL against Candida and leishmania, IC50≥ 80 µg/mL against LoVo cell line). The * denotes that these activities are significantly different from those obtained from extracts isolated from the same species taken from the southern region."

Define abbreviations in a footnote even if they are already defined in the text.

If there is only one footnote, use an asterisk (*). If there is more than one footnote, use letters (a, b, c,). Order footnotes alphabetically from left to right and from top to bottom.

Do not use bold type. Do not use grid lines.

Unless an entry is a complete sentence or a proper noun, capitalize only the first word of the first entry in a row and do not use periods.

Do not split tables into separate sections (e.g., Table 1a and Table 1b). Make separate tables (Table 1, Table 2) or combine data under the same columns or rows.

Use indentation to set off secondary (or tertiary) entries within a column (see example below).

Table 1. Logistic-regression models built with . . . a

Variable	Symbol	p	df
General model b	fg	0.0015	3
landscape ruggedness	rug	0.0113	
forest cover (%)	bosque	0.0085	
Human model			
human population	pob1		
. . .			

aSignificance level of coefficients . . .

bNext-most parsimonious models at . . .

Figures

Figures must be of sufficient quality and resolution to remain clear at 60% reduction. Before publication, you will be required to supply figures in tif, eps, or pdf format. Resolution should be at least 300 dots per inch (dpi); 600 dpi is preferable for figures with lettering. We encourage use of a serif type face on maps and graphs.

For guidance on best practices in graphic design, refer to the following link used with permission from Oryx - The International Journal of Conservation and Fauna & Flora International: http://scalar.usc.edu/works/graphics-for-conservation/index.

Conservation Biology cannot waive charges for printing of color figures ($700/page). We discourage the use of color because in some countries download speeds are slow and gray-scale photocopies of articles are common. You may have color figures in the online version and gray-scale figures in print for no charge. However, reference to color cannot be made in the figure legend or in the text, and elements in the gray-scale version must be distinguishable. Supply separate files for color and gray-scale figures.

The legends for all figures should be grouped on a page that precedes the figures, and include a figure's legend below the figure itself.

Maps

Scale bars and compass direction must be provided. Author portrayals of borders or other jurisdictional boundaries do not imply support of those representations by the journal or the Society for Conservation Biology.

Graphs

Label all axes and include units of measure in the label, for example, Number of species/km2, Basal area (m2/ha).

Capitalize the first letter of the axis labels: Years since burn, Burned area (%), Burned area (ha), Seed production (seeds/plot).

Include a key in the figure itself rather that describing shading or shapes in the figure legend.

Match typeface and type size among figures. On a graph, the type size of axis labels and units of measure should be similar.

If a figure has more than one panel, use lowercase letters to designate the parts: (a), (b), (c). Each panel must be referenced clearly in the figure legend by its letter.

If there are many digits in numbers or relatively long descriptions along the x-axis, orient entries at 45 or fewer degrees.

All numbers along an axis must have the same number of significant figures: 1.0, 2.5, 2.0 (not 1, 2.5, 2).

The label for the y-axis should be oriented vertically to the left of the units (reading from bottom to top), and numerals should be horizontally oriented.

Center the labels along both axes.

Do not enclose graphs in a rectangle.

Do not use color on a figure that will be published in gray scale.

Supporting Information (online appendices)

Supporting Information (i.e., online appendices) should be cited in the text of the paper. Every piece is cited as Supporting Information, not by specific appendix number. Before Literature Cited, insert a paragraph in the exact format shown below that provides a brief description of supporting-information elements.

Supporting Information

XXX (Appendix S1), XXX (Appendix S2), and a XXX translation of the article (Appendix S3) are available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

Language and Grammar

Clear language

Our audience is broad and international. Clarity in language and syntax is important, especially for readers whose first language is not English. Avoid jargon and colloquialisms. If English is not your first language, we strongly recommend that you ask a native English speaker with experience in publishing scientific papers to proofread your manuscript.

Terminology

Some common terms in conservation science have multiple meanings (e.g., biological diversity, wildlife, connectivity). Clarify how you use such terms, and define specialized terms at first use in the Abstract and in the body of the paper.

Abbreviations and acronyms

Do not begin a sentence with an abbreviation. Use abbreviations sparingly. Define all abbreviations, initializations, and acronyms at first use. For example: analysis of variance (ANOVA), International Union for Conservation of Nature (IUCN).

Capitalization

Geographic designations: Do not capitalize a term that indicates region unless it is being used as a proper noun (e.g., western states, Southeast Asia). Capitalization of terms used commonly in Conservation Biology: the Tropic of Cancer, the tropics; North Temperate Zone, temperate zone; East Africa, North Africa, central Africa; central Asia; tropics, Neotropics; Amazon Basin; Central Honshu Lowland Forest (an endemic bird area); Cape Floristic Region (a hotspot of biological diversity); taiga.

Threat categories: Do not capitalize threat categories used by institutions or authoritative bodies: threatened, endangered, critically endangered, conservation concern, etc.

Active voice

In general, use we or I (i.e., active voice). For example: “We converted all GIS data to raster format.” rather than “All GIS data were converted to raster format.” Or, “Trained technicians surveyed the plots.” rather than “The plots were surveyed by trained technicians.” In particular, Methods should not be written entirely in passive voice.

Tense

Use past tense in the Methods (describing what you did), Results (describing what your results were), and in the Discussion (referring to your results). Use present tense when you refer to published results. The principal exception to this rule is in the area of attribution and presentation. It is correct to say, for example, “Toffel (2008) found [past] that extracts from iron weed inhibit [present] fungal growth.”

Word usage

Using: In scientific writing, the word using is often the cause of dangling participles and misplaced modifiers.

Examples: “Using tissue-isolation protocol, mtDNA was isolated from dried skins.” Who is doing the using is unclear. Better: “We used tissue-isolation protocol to isolate mtDNA from dried skins.”

“Ivory samples were taken from tusks using a 16-mm drill bit on a 40-cm drill.” This implies that the tusks used the drill. Better: “We used a 16-mm drill bit on a 40-cm drill to take ivory samples from tusks.”

Impact: Use affected, not impacted.

Multiple modifiers

Do not use multiple adjectival nouns to modify a noun that is the subject or the object of the sentence: “We studied illegal African elephant ivory trade.” or “infected bird populations’ responses.” Better: “We studied illegal trade in African elephant ivory.” and “responses of infected bird populations.”

Split infinitives

A sentence should not sound awkward because it has been rearranged to avoid a split infinitive. When an adverb qualifies a verb phrase, the adverb usually should be placed between the auxiliary verb and the principal verb (e.g., this research will soon attract attention). Splitting an infinitive verb with an adverb can be useful for adding emphasis or making a sentence sound less stilted. Phrases such as the following are acceptable: the traps had been seriously damaged in a storm; differences in abundance were highly significant; to strongly favor.

Pronouns

Be careful with the pronouns this, these, and it. If you do not provide a qualifier, it is sometimes difficult to tell what these words refer to: “This program offers solutions to that problem.” Better: “This computer program offers solutions to the problem of incorrect sequencing of numbers.”

Numbers, Variables, and Statistical Elements

Numeral versus word: We follow Scientific Style and Format, 7th edition. Most numbers in most circumstances, even those under 10, appear as numerals (i.e., they are not spelled out). The numbers zero and one present exceptions; copyeditors will address these.

Longitude and latitude: l48oN, 78oW (no periods).

Percentages and degrees: use symbols (15% and 15°).

Fractions: spell out (one-half, one-third) unless used with units of measure (0.5 mm or 0.5 years).

Decimal point: insert 0 before a decimal point (0.4, not .4).

Significant figures: Express calculated values (e.g., means, standard deviation) to not more than one significant digit beyond the accuracy of the original measurement. Report test statistics (e.g., p values, correlation coefficients) to not more than 3 significant digits.

SD and SE: mean (SD)=44% (3) or mean of 44% (SD 3)

Dates: day, month, year (e.g., 6 October 1987). Do not use abbreviations such as 5/3/14 or 5-3-14.

Numbered lists: avoid use of numbered lists in the text. “We used x, y, and z to take soil samples” rather than “We used three techniques to take soil samples: (1) . . . , (2) . . . , and (3) . . .

Insert a space between numbers and the unit of measure (6 m, 14 mL).

Delimiters: in mathematical expressions the order of delimiters (i.e., fences) is braces { }, brackets [ ], and parentheses ( ): {[( )]}. In narrative text, the order is the opposite, ([ ]). In functional notation, nested pairs of parentheses are used.

Define all variables used in an equation.

Italicize all single-letter variables in equations. Do not italicize variables with more than one letter (e.g., “RU” meaning reproductive units as opposed to RU, in which R and U are separate interacting variables) or words used in association with variables (e.g., xforest).

Complete words used as a variable should be lowercase (e.g., species). Each letter in multiple-letter abbreviations that are not complete words should be capitalized (e.g., AMF is acceptable for area of managed forest; PATCH for patch area is unacceptable).

Use the following abbreviations:
p, probability
df, degrees of freedom
χ2, chi-square
F (F test, variance ratio)
FST (fraction of total genetic variance among subpopulations)
CI, confidence interval or credible interval
SE, standard error (do not use ±)
SD, standard deviation (do not use ±).

Scientific Names

English and scientific names of birds should follow the checklist of the International Ornithological Congress (http://worldbirdnames.org/names.html). Deviations from spellings in this checklist must be supported by an explicit citation of the nomenclatural source (i.e., a published regional checklist or book on the birds of a specific area).

Common names of taxonomic groups other than birds should be in lower case (creeping thistle, common bushtail possum, gopher tortoise).

In the abstract and at first mention in the text, use common name followed by scientific name (genus and species) in parentheses: cane toad (Bufo marinus), Douglas-fir (Pseudotsuga menziesii), Florida Scrub Jay (Aphelocoma coerulescens). With a few exceptions, after scientific name has been provided use common name.

Organisms: Clarkia springvillensis (first use); C. springvillensis (thereafter, even starting a sentence); spp. or sp. or var. (no italics).

Conservation Biology Style Sources

Day, R. A., and B. Gastel. 2011. How to write and publish a scientific paper. 7th edition. Greenwood, Santa Barbara, California.

Council of Science Editors. 2006. Scientific style and format. 7th edition. Council of Science Editors, Reston, Virginia.

Merriam-Webster. 2003. Third new international dictionary, unabridged. Merriam-Webster, Springfield, Massachusetts.

University of Chicago Press. 2010. The Chicago manual of style. 16th edition. University of Chicago Press, Chicago.

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