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# Birds of the Ramsar site Estação Ecológica de Taiamã and buffer zone, Pantanal wetlands, Brazil

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**Abstract**
The Estação Ecológica de Taiamã (EET) is one of the Ramsar sites in the Pantanal wetlands of Brazil. We present an annotated list of bird species recorded between 2015 and 2018, along with a compilation of existing data for this area. In our sampling, 207 species were recorded, with 76% documented. We have the first record of *Chlidonias niger* (Linnaeus, 1758) for the Pantanal and Central region of Brazil. Another 30 species are new records for EET, such as the migrant *Hirundo rustica* Linnaeus, 1758. The general list comprises 24 orders, 60 families, and 278 species, of which 160 were assigned to the primary list and 118 to the secondary list. This study will aid in the conservation of biodiversity in the Pantanal. The EET and its buffer zone are important for maintaining biodiversity and expanding its boundaries may further promote the conservation of birds in Brazilian wetlands.

**Keywords**
Bird migration, floodplain, Nearctic migrant, ornithological inventory, Paraguay River, protected areas, waterbirds.

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## Introduction

The Pantanal wetland ecosystem is regulated by the natural flood pulse process, with its biodiversity adapted to water dynamics and the heterogeneous landscape (Junk et al. 1989; Junk and Da Silva 1996). In the Brazilian Pantanal, 582 bird species have been reported (Nunes 2011), of which 104 depend directly on wetlands (Junk et al. 2006). Bird studies in this floodplain still present gaps in the documented record, and a more systematic analysis of taxa, especially for the northwest region is required (Tubelis and Tomas 2003). Given the increasing human pressure on the Pantanal wetland ecosystem, such as large infrastructure projects, agricultural expansion, mining, and the impacts of global climate change (Tomas et al. 2019), ornithological inventories provides important information for developing conservation strategies and actions for biodiversity.

In the Pantanal wetlands is the Ramsar site Estação Ecológica de Taiamã (EET), which has been a full protection area since 1981 by decree 86.061; the EET was assigned as a Wetland of International Importance in 2018 (Brasil 2019). The main objectives of the EET is to preserve nature and conduct scientific studies in accordance with Federal Law 9.985 of 2000 (Brasil 2000). Even with some known bird records (Lopes et al. 2016; Brazil 2017), there is difficulty with accessing

and conducting standardised studies in the EET due to its characteristics in the fluvio-lacustrine region of the upper Paraguay river (Wantzen et al. 2005).

Information contained in species lists is useful for understanding and conserving biodiversity and the environmental (Silveira et al. 2010). Biodiversity knowledge is essential for planning and taking action to protect Brazil's wetlands, and our research aimed to fill in the gaps in the database for this region's wetland birds. The objective of our study was to inventory and consolidate a list of bird species occurring on Ramsar site Estação Ecológica de Taiamã. We also discuss some aspects of the biology and conservation of these species.

## Methods

**Study area.** The EET is a protected river island in the upper Paraguay river basin, located at 16°48′S–16°58′S and 57°24′W–57°40′W in the Cáceres municipality, Mato Grosso, Brazil (Fig. 1). The EET includes 11,555 ha of Pantanal wetland between the Paraguay and Bracinho rivers. According to Kottek et al. (2006), the climate is Aw (hot and humid), with an annual rainfall of 1500 mm and annual average maximum and minimum temperatures of 32 °C and 20 °C, respectively. Veloso et al. (1991) classified the vegetation as Alluvial Semideciduous Seasonal Forest.

The EET is characterised by different functional units. These are Aquatic-Terrestrial Transition Zones (ATTZ), swamps, and permanently aquatic areas. Among the main macrohabitats are the Purple Coraltree Monospecific Forest (forest dominated by *Erythrina fusca* Lour., which is locally known as "abobral"), Shrubland, and Pioneer Polyspecific Forest, which is present of the river margins, Flooded Grasslands composed of herbaceous plants, aquatic macrophytes, and floating islands and meadows (locally known as "campos de batumes", composed of plants and layers of organic matter accumulated by hydrological changes), lakes, and river channels (Frota et al. 2017). The buffer zone is characterised by irregular depression lakes, some of which are interconnected by floodplain channels (Wantzen et al. 2005), flooded grasslands, aquatic macrophytes, abobral, and campos de batumes.

**Sampling and analysis.** We collected systematic and non-systematic data in various EET macrohabitats and the buffer zone. First, we sampled 36 field days of the 2015–2016 hydrological cycle. Subsequently, we carried out new expeditions in the area using the Long-Term Ecological Research (LTER) in the Pantanal wetland "Ecological Dynamics of the Upper Paraguay River floodplain" and added 40 field days from the 2017–2018 hydrological cycle to increase the composition of the species list. We identified bird species and counted individuals by visual and sound contact, using 10 × 42 mm binoculars, a digital recorder, photo cameras, bird guides (Erize et al. 2006; Ridgely and Tudor 2009; Gwynne et al. 2010) and specialised literature (Sick 1997; del Hoyo et al. 2017).

Whenever possible, we documented bird species

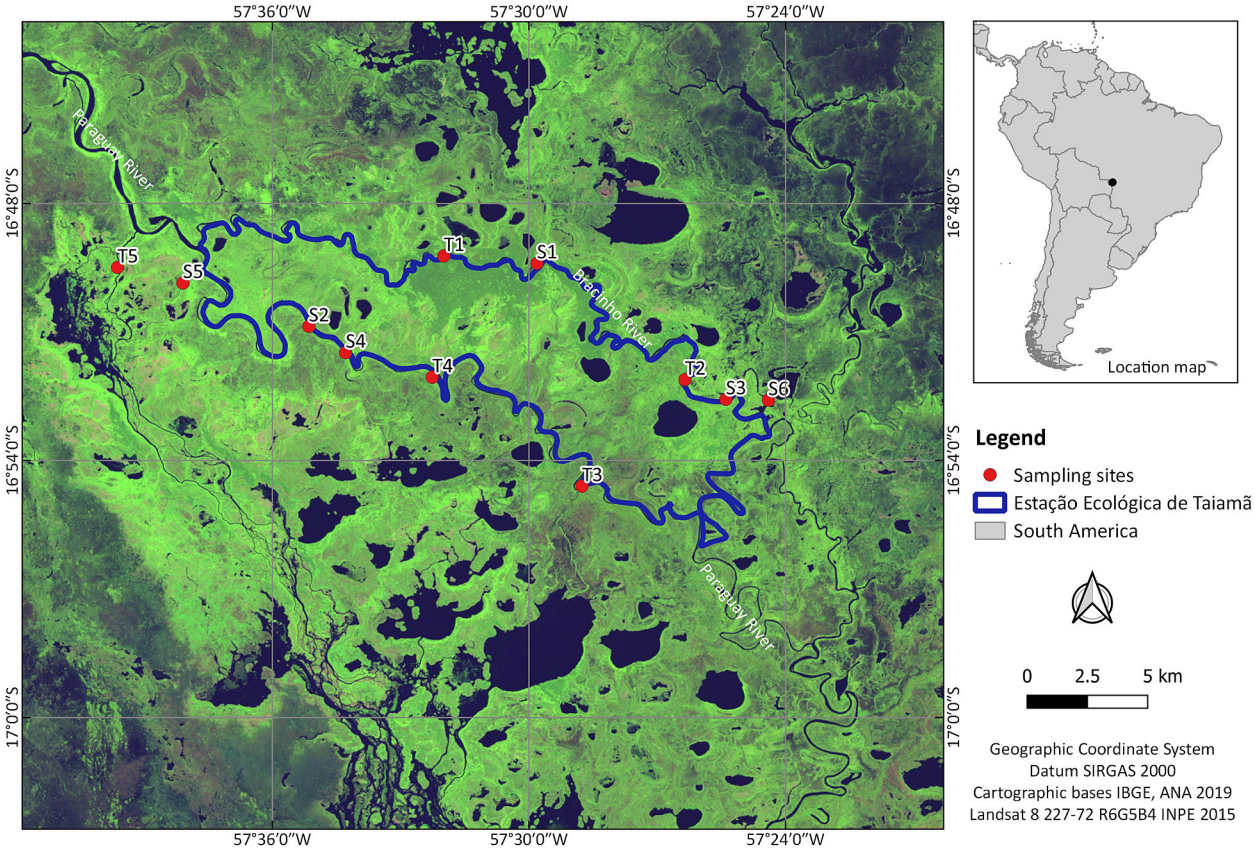


**Figure 1.** Estação Ecológica de Taiamã (EET), Pantanal wetland, Brazil: localization, delimitation and sampling points in the study area.

with photos and audio recordings, which were archived on Wikiaves (http://www.wikiaves.com.br). We followed the Brazilian Ornithological Records Committee's list (Piacentini et al. 2015) for taxonomic classification. We used the Brazilian Red Book of Threatened Species of Fauna (Brasil 2018) for the national conservation status and the Red List of Threatened Species (IUCN 2019) for the international conservation status. For migratory behaviour, we followed the classification of Somenzari et al. (2018): Migratory (MGT), Partially Migratory (MPR), Vagrant (VAG), and Not Defined (ND).

For the survey, we used point counts (Blondel et al. 1970) along the rivers with a 50 m fixed radius and 15 minutes to record all contacts. We sample three macrohabitats types (two stations for each) in the 2015–2016 cycle: Shrubland and Pioneer Forest, *E. fusca* Monospecific Forest and Flooded Grassland. We distributed sixteen points along each macrohabitat type, spaced at least 200 m from each other. Each point was sampled for three consecutive days in two seasons each (wet and dry), at dawn and dusk, totaling 72 hours. In the 2017–2018 cycle, we sampled five tracks in the LTER site and 10 points spaced at least 500 m from each other. The points were sampled at dawn for two days in four hydrological periods (flood, ebb, dry, and flooding), totalling 100 observation-hours. In total, 11 sites (Table 1) and 98 points were sampled on the smaller boat (see Appendix, Table S1).

We assigned the frequency of occurrence (FO) for each species as the number of samples where a given species was recorded divided by the total number of samples (D'Angelo Neto et al. 1998). The categories for FO were: very frequent (100–75%); frequent (74–50%); reasonably frequent (49–25%); less frequent (<25%), and infrequent for non-systematic data.

For the new record, we considered the species range maps of BirdLife International and Handbook of the Birds of the World (2018) on the cartographic base. We used QGIS v. 3.4.4 to draw a map with our new record. We also included secondary records for other places of South America (Dias et al. 2010; Quiroga et al. 2015; Gonsioroski; 2018; Franz et al. 2018; Wikiaves 2019), and that are outside BirdLife's species range maps.

To compile the species list for the EET (systematic and non-systematic data), we combined our field data with previously existing records, including published information (Kantek and Onuma 2013; Lopes et al. 2016), specimens deposited in the scientific collection of Department of Zoology at the Universidade Federal de Minas Gerais (DZUFMG), and the bird list of Estação Ecológica de Taiamã's Management Plan (Brasil 2017).

For the general list of birds, each species was reviewed and separated into three lists according to the methodology adopted by Piacentini et al. (2015) and other check list studies (Nunes et al. 2017; Vitorino et al. 2018):

- Primary list: species with documented evidence for the area in the form of a complete or partial specimen, photograph, or sound recording.
- Secondary list: species with records of occurrence for the area without known documentary evidence. The species were considered of probable occurrence, based on the currently known distribution.
- Tertiary list: species with records of occurrence for the area without known documentary evidence; the occurrence is questionable, invalid taxonomy, or non-existent.

The general list is, thus, composed of species from the primary and secondary lists. The documentation type of ornithological records was based on Carlos et al. (2010), even as applied to another protected area in Brazil (Vitorino et al. 2018): "A-level documentation" for species with specimens deposited in scientific collections; "B-level documentation" for species documented with photographs or audio recordings; and "Indication of Occurrence" for species recorded in the field, but not documented.

## Results

We found 23 orders, 58 families, and 207 bird species occurring in the EET and buffer zone. Of these, 46 species were non-systematic and 31 were exclusive in the LTER expeditions. Of the total species recorded in the field, 76% have vouchers (Table 2). The most representative families

**Table 1.** List of sampling sites in the Estação Ecológica de Taiamã (EET), Pantanal wetland, Brazil, with sampled hydrological cycle, geographic coordinates (at cener point of sites) and predominant macrohabitats.

| Hydrological cycle | Site names | Site code | Latitude | Longitude | Macrohabitats |
|---|---|---|---|---|---|
| 2015–2016 | Station 1 | S1 | 16°49.28'S | 057°32.30'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | Station 2 | S2 | 16°51.95'S | 057°32.26'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | Station 3 | S3 | 16°51.92'S | 057°32.88'W | Shrubland and pioneer forest / river channels |
| | Station 4 | S4 | 16°52.48'S | 057°26.29'W | Shrubland and pioneer forest / river channels |
| | Station 5 | S5 | 16°50.04'S | 057°38.14'W | Flooded grassland / river and floodplain channels |
| | Station 6 | S6 | 16°52.51'S | 057°24.45'W | Flooded grassland / lakes / river channels |
| 2017–2018 | Track 1 | T1 | 16°49.53'S | 057°31.13'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | Track 2 | T2 | 16°52.64'S | 057°25.69'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | Track 3 | T3 | 16°54.06'S | 057°28.63'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / river channels |
| | Track 4 | T4 | 16°51.86'S | 057°32.41'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / aquatic macrophytes / river channels |
| | Track 5 | T5 | 16°50.06'S | 057°39.70'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |

**Table 2.** List of birds recorded at Estação Ecológica de Taiamã (EET), Pantanal wetland, Brazil. Legend: *Migratory status* (Somenzari et al. 2018): resident (RDT), migratory (MGT), partially migratory (MPR), vagrant (VAG), and not defined (ND). *Occurrence status of this study*: very frequent (100–75%), frequent (74–50%), reasonably frequent (49–25%), less frequent (<25%), and infrequent for non-systematic data (IN). *Record type* (Carlos et al. 2010): IO = indication of occurrence (species not documented), AD = A-level documentation (species with specimens deposited in scientific collections), and BD = B-level documentation (species documented with photographs or audio recordings). *Source*: this study (1), Lopes et al. 2016 (2), Kantek and Onuma 2013 (3), specimens deposited in the Department of Zoology of the Universidade Federal de Minas Gerais (4), and Brazil 2017 (5); Secondary list species in brackets. VU = Vulnerable (IUCN 2019) and VU* = Vulnerable (Brasil 2018).

| Taxon | English name | Voucher | Migratory status | Sites | % occurrence in 2015–2016 | % occurrence in 2017–2018 | Record type | Source |
|---|---|---|---|---|---|---|---|---|
| **Anseriformes Linnaeus, 1758** | | | | | | | | |
| **Anhimidae Stejneger, 1885** | | | | | | | | |
| *Chauna torquata* (Oken, 1816) | Southern Screamer | WA1961724 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 63 | 82 | BD | 1, 2, 5 |
| **Anatidae Leach, 1820** | | | | | | | | |
| *Dendrocygna viduata* (Linnaeus, 1766) | White-faced Whistling-Duck | WA2335098 | — | S6, T1, T3, T5 | 4 | 8 | BD | 1, 2, 5 |
| *Dendrocygna autumnalis* (Linnaeus, 1758) | Black-bellied Whistling-Duck | WA2347021 | — | T1, T2, T3, T4, T5 | 8 | 26 | BD | 1, 2, 5 |
| *Cairina moschata* (Linnaeus, 1758) | Muscovy Duck | WA2698723 | — | T1, T3, T4, T5 | 6 | 10 | BD | 1, 2, 5 |
| [*Amazonetta brasiliensis* (Gmelin, 1789)] | Brazilian Teal | | — | T3 | — | 2 | IO | 1, 2, 5 |
| **Galliformes Linnaeus, 1758** | | | | | | | | |
| **Cracidae Rafinesque, 1815** | | | | | | | | |
| [*Penelope ochrogaster* Pelzeln, 1870] VU* | Chestnut-bellied Guan | | — | | — | — | IO | 5 |
| *Aburria cumanensis* (Jacquin, 1784) | Blue-throated Piping-Guan | WA2698724 | — | S1, S2, S4, T1, T2, T3, T4 | 19 | 16 | BD | 1 |
| *Aburria cujubi* (Pelzeln, 1858) | Red-throated Piping-Guan | WA2028639 | — | S1, S2, T1, T2, T3, T4 | 4 | 26 | BD | 1, 2, 5 |
| *Ortalis canicollis* (Wagler, 1830) | Chaco Chachalaca | WA2080183 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 85 | 82 | BD | 1, 2, 5 |
| *Crax fasciolata* Spix, 1825VU | Bare-faced Curassow | WA2080188 | — | S1, S2, S4, T1, T2, T3, T4 | 13 | 62 | BD | 1, 2, 5 |
| **Podicipediformes Fürbringer, 1888** | | | | | | | | |
| **Podicipedidae Bonaparte, 1831** | | | | | | | | |
| [*Tachybaptus dominicus* (Linnaeus, 1766)] | Least Grebe | | — | | — | — | IO | 2 |
| [*Podilymbus podiceps* (Linnaeus, 1758)] | Pied-billed Grebe | | — | | — | — | IO | 5 |
| **Ciconiiformes Bonaparte, 1854** | | | | | | | | |
| **Ciconiidae Sundevall, 1836** | | | | | | | | |
| *Ciconia maguari* (Gmelin, 1789) | Maguari Stork | WA2346180 | — | T5 | IN | 2 | BD | 1, 5 |
| *Jabiru mycteria* (Lichtenstein, 1819) | Jabiru | WA2346422 | — | S6, T2, T3, T4, T5 | 2 | 12 | BD | 1, 2, 5 |
| *Mycteria americana* Linnaeus, 1758 | Wood Stork | WA3363870 | — | T3 | 6 | 4 | BD | 1, 2, 5 |
| **Suliformes Sharpe, 1891** | | | | | | | | |
| **Phalacrocoracidae Reichenbach, 1849** | | | | | | | | |
| *Nannopterum brasilianus* (Gmelin, 1789) | Neotropic Cormorant | WA2706121 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 60 | 84 | BD | 1, 2, 5 |
| **Anhingidae Reichenbach, 1849** | | | | | | | | |
| *Anhinga anhinga* (Linnaeus, 1766) | Anhinga | WA1986843 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 63 | 66 | BD | 1, 2, 5 |
| **Pelecaniformes Sharpe, 1891** | | | | | | | | |
| **Ardeidae Leach, 1820** | | | | | | | | |
| *Tigrisoma lineatum* (Boddaert, 1783) | Rufescent Tiger-Heron | WA2026526 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 65 | 82 | BD | 1, 2, 5 |
| *Cochlearius cochlearius* (Linnaeus, 1766) | Boat-billed Heron | WA2901405 | — | S2, S3, S4, T2, T3, T4 | 17 | 12 | BD | 1, 5 |
| *Ixobrychus exilis* (Gmelin, 1789) | Least Bittern | WA1986845 | — | S3, S5, T1, T2, T3, T4, T5 | 4 | 72 | BD | 1, 5 |
| *Nycticorax nycticorax* (Linnaeus, 1758) | Black-crowned Night-Heron | WA2696526 | — | T2, T3, T4, T5 | — | 12 | BD | 1, 5 |
| *Butorides striata* (Linnaeus, 1758) | Striated Heron | WA2031279 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 52 | 100 | BD | 1, 5 |
| *Bubulcus ibis* (Linnaeus, 1758) | Cattle Egret | WA2901507 | — | S3, S6, T1, T3 | 8 | 14 | BD | 1, 2 |
| *Ardea cocoi* Linnaeus, 1766 | Cocoi Heron | WA2706120 | — | S1, S2, S4, S5, S6, T1, T2, T3, T4, T5 | 35 | 68 | BD | 1, 2, 5 |
| *Ardea alba* Linnaeus, 1758 | Great Egret | WA2102176 | — | S5, S6, T1, T2, T3, T4, T5 | 13 | 63 | BD | 1, 2, 5 |
| *Pilherodius pileatus* (Boddaert, 1783) | Capped Heron | WA2715200 | — | | IN | IN | BD | 1, 2, 5 |
| *Egretta thula* (Molina, 1782) | Snowy Egret | WA3358045 | — | T1, T2, T3, T4, T5 | 19 | 30 | BD | 1, 2, 5 |
| *Egretta caerulea* (Linnaeus, 1758) | Little Blue Heron | WA2346433 | — | S6 | 2 | IN | BD | 1 |
| **Threskiornithidae Poche, 1904** | | | | | | | | |
| *Mesembrinibis cayennensis* (Gmelin, 1789) | Green Ibis | WA2698730 | — | S1, S2, S3, S6, T1, T3 | 21 | 6 | BD | 1, 2, 5 |
| *Phimosus infuscatus* (Lichtenstein, 1823) | Bare-faced Ibis | WA2698725 | — | T1, T2 | IN | 4 | BD | 1, 2, 5 |
| *Theristicus caerulescens* (Vieillot, 1817) | Plumbeous Ibis | WA3358044 | — | S4 | 2 | IN | BD | 1, 5 |
| [*Theristicus caudatus* (Boddaert, 1783)] | Buff-necked Ibis | | — | S6 | 2 | IN | IO | 1, 2, 5 |
| *Platalea ajaja* Linnaeus, 1758 | Roseate Spoonbill | WA2346434 | MPR | S6, T1 | 6 | 2 | BD | 1, 2, 5 |

| Taxon | English name | Voucher | Migratory status | Sites | % occurrence in 2015–2016 | % occurrence in 2017–2018 | Record type | Source |
|---|---|---|---|---|---|---|---|---|
| **Cathartiformes Seebohm, 1890** | | | | | | | | |
| **Cathartidae Lafresnaye, 1839** | | | | | | | | |
| *Cathartes aura* (Linnaeus, 1758) | Turkey Vulture | WA3363006 | — | T1, T2, T3, T4, T5 | 28 | 36 | BD | 1, 2, 5 |
| *Cathartes burrovianus* Cassin, 1845 | Lesser Yellow-headed Vulture | WA2102175 | — | S4, T1, T2, T3, T4, T5 | 4 | 50 | BD | 1, 2, 5 |
| *Coragyps atratus* (Bechstein, 1793) | Black Vulture | WA2352546 | — | S1, S2, S3, S4, S6, T1, T2, T3, T5 | 19 | 42 | BD | 1, 2, 5 |
| **Accipitriformes Bonaparte, 1831** | | | | | | | | |
| **Pandionidae Bonaparte, 1854** | | | | | | | | |
| *Pandion haliaetus* (Linnaeus, 1758) | Osprey | WA2346063 | MGT | T1, T5 | IN | 10 | BD | 1 |
| **Accipitridae Vigors, 1824** | | | | | | | | |
| *Leptodon cayanensis* (Latham, 1790) | Gray-headed Kite | WA2697657 | — | T1 | — | 2 | BD | 1 |
| *Ictinia mississippiensis* (Wilson, 1811) | Mississippi Kite | WA2346791 | MGT | S1 | 3 | — | BD | 1 |
| *Ictinia plumbea* (Gmelin, 1788) | Plumbeous Kite | WA3363778 | MPR | | — | IN | BD | 1, 5 |
| *Busarellus nigricollis* (Latham, 1790) | Black-collared Hawk | WA2696527 | — | S1, S4, T1, T2, T3, T4, T5 | 6 | 42 | BD | 1, 2, 5 |
| *Rostrhamus sociabilis* (Vieillot, 1817) | Snail Kite | WA2697716 | MPR | S1, S4, T1, T2, T3, T4, T5 | 6 | 78 | BD | 1, 2, 5 |
| *Geranospiza caerulescens* (Vieillot, 1817) | Crane Hawk | WA3357993 | — | T1, T2 | 19 | 4 | BD | 1, 2 |
| *Heterospizias meridionalis* (Latham, 1790) | Savanna Hawk | WA2346836 | — | S3, S6, T1, T2, T3, T4, T5 | 8 | 10 | BD | 1, 2, 5 |
| *Urubitinga urubitinga* (Gmelin, 1788) | Great Black Hawk | WA2335087 | — | S1, S2, S3, S4, T1, T2, T3, T4, T5 | 15 | 36 | BD | 1, 2, 5 |
| *Rupornis magnirostris* (Gmelin, 1788) | Roadside Hawk | WA2697661 | — | S4, T1, T2, T3, T4, T5 | 4 | 28 | BD | 1, 2, 5 |
| *Geranoaetus albicaudatus* (Vieillot, 1816) | White-tailed Hawk | WA3126426 | — | | — | IN | BD | 1, 5 |
| **Eurypygiformes Fürbringer, 1888** | | | | | | | | |
| **Eurypygidae Selby, 1840** | | | | | | | | |
| [*Eurypyga helias* (Pallas, 1781)] | Sunbittern | | — | | — | IN | IO | 1 |
| **Gruiformes Bonaparte, 1854** | | | | | | | | |
| **Aramidae Bonaparte, 1852** | | | | | | | | |
| *Aramus guarauna* (Linnaeus, 1766) | Limpkin | WA2028644 | — | S2, S4, S6, T1, T2, T3, T4, T5 | 15 | 60 | BD | 1, 2, 5 |
| **Rallidae Rafinesque, 1815** | | | | | | | | |
| *Aramides cajaneus* (Statius Müller, 1776) | Gray-necked Wood-Rail | WA2715199 | — | S4, T1, T4 | 2 | 6 | BD | 1, 2, 5 |
| [*Mustelirallus albicollis* (Vieillot, 1819)] | Ash-throated Crake | | — | S4, T5 | 14 | 6 | IO | 1, 5 |
| [*Pardirallus nigricans* (Vieillot, 1819)] | Blackish Rail | | — | | — | — | IO | 5 |
| *Porphyrio martinicus* (Linnaeus, 1766) | Purple Gallinule | WA2346181 | MPR | T5 | IN | 2 | BD | 1, 5 |
| *Porphyrio flavirostris* (Gmelin, 1789) | Azure Gallinule | WA1952134 | ND | S5, S6, T4, T5 | 13 | 10 | BD | 1, 5 |
| **Heliornithidae Gray, 1840** | | | | | | | | |
| *Heliornis fulica* (Boddaert, 1783) | Sungrebe | WA1961721 | — | S1, S2, S3, S4, S5, T1, T2, T3 | 27 | 16 | BD | 1, 2, 5 |
| **Charadriiformes Huxley, 1867** | | | | | | | | |
| **Charadriidae Leach, 1820** | | | | | | | | |
| *Vanellus cayanus* (Latham, 1790) | Pied Lapwing | WA2698726 | — | S6 | 4 | IN | BD | 1, 2, 5 |
| *Vanellus chilensis* (Molina, 1782) | Southern Lapwing | WA2698732 | — | S5, S6, T2, T4, T5 | 6 | 12 | BD | 1, 2, 5 |
| *Charadrius collaris* Vieillot, 1818 | Collared Plover | WA2390287 | — | S6 | 4 | IN | BD | 1, 2 |
| **Recurvirostridae Bonaparte, 1831** | | | | | | | | |
| *Himantopus melanurus* Vieillot, 1817 | White-backed Stilt | WA2346395 | — | S6, T5 | 2 | 6 | BD | 1, 5 |
| **Scolopacidae Rafinesque, 1815** | | | | | | | | |
| *Actitis macularius* (Linnaeus, 1766) | Spotted Sandpiper | WA2346027 | MGT | S1 | 2 | — | BD | 1, 2 |
| *Tringa solitaria* Wilson, 1813 | Solitary Sandpiper | WA2363200 | MGT | S6 | 2 | — | BD | 1, 2, 5 |
| *Tringa flavipes* (Gmelin, 1789) | Lesser Yellowlegs | WA2363199 | MGT | S6 | 6 | — | BD | 1 |
| *Calidris fuscicollis* (Vieillot, 1819) | White-rumped Sandpiper | WA2901496 | MGT | S6 | 2 | IN | BD | 1 |
| *Calidris melanotos* (Vieillot, 1819) | Pectoral Sandpiper | WA2704505 | MGT | S6 | 2 | — | BD | 1 |
| *Phalaropus tricolor* (Vieillot, 1819) | Wilson's Phalarope | WA2704503 | MGT | S6 | 2 | — | BD | 1 |
| **Jacanidae Chenu & Des Murs, 1854** | | | | | | | | |
| *Jacana jacana* (Linnaeus, 1766) | Wattled Jacana | WA2028626 | — | S5, S6, T1, T2, T3, T4, T5 | 23 | 76 | BD | 1, 2, 5 |
| **Laridae Rafinesque, 1815** | | | | | | | | |
| *Leucophaeus pipixcan* (Wagler, 1831) | Franklin's Gull | | VAG | | — | — | BD | 3 |
| **Sternidae Vigors, 1825** | | | | | | | | |
| *Sternula superciliaris* (Vieillot, 1819) | Yellow-billed Tern | WA1953400 | — | S6, T2, T3, T5 | 4 | 26 | BD | 1, 2, 5 |
| *Phaetusa simplex* (Gmelin, 1789) | Large-billed Tern | WA2696528 | — | S6, T1, T2, T3, T4, T5 | 2 | 64 | BD | 1, 2, 5 |
| *Chlidonias niger* (Linnaeus, 1758) | Black Tern | | MGT | T2 | — | 2 | BD | 1 |
| [*Sterna hirundo* Linnaeus, 1758] | Common Tern | | MGT | | — | — | BD | 5 |
| **Rynchopidae Bonaparte, 1838** | | | | | | | | |
| *Rynchops niger* Linnaeus, 1758 | Black Skimmer | WA2698728 | MPR | S6, T5 | 2 | 8 | BD | 1, 5 |

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|---|---|---|---|---|---|---|---|---|
| **Columbiformes Latham, 1790** | | | | | | | | |
| **Columbidae Leach, 1820** | | | | | | | | |
| [*Columbina minuta* (Linnaeus, 1766)] | Plain-breasted Ground-Dove | | — | | IN | IN | IO | 1 |
| *Columbina talpacoti* (Temminck, 1810) | Ruddy Ground-Dove | WA2698731 | — | S6 | 2 | IN | BD | 1, 2, 5 |
| [*Columbina squammata* (Lesson, 1831)] | Scaled Dove | | — | | — | — | IO | 5 |
| *Columbina picui* (Temminck, 1813) | Picui Ground-Dove | WA3363864 | — | | IN | IN | BD | 1, 2, 5 |
| [*Claravis pretiosa* (Ferrari-Perez, 1886)] | Blue Ground-Dove | | — | S1, S1 | 2 | 2 | IO | 1, 5 |
| [*Patagioenas picazuro* (Temminck, 1813)] | Picazuro Pigeon | | — | S3, S4, T1, T2, T3, T4, T5 | 8 | 40 | IO | 1, 2, 5 |
| *Patagioenas cayennensis* (Bonnaterre, 1792) | Pale-vented Pigeon | WA2901501 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 65 | 82 | BD | 1, 2, 5 |
| *Leptotila verreauxi* Bonaparte, 1855 | White-tipped Dove | WA3363957 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 69 | 86 | BD | 1, 2, 5 |
| [*Leptotila rufaxilla* (Richard & Bernard, 1792)] | Gray-fronted Dove | | — | S3 | 14 | — | IO | 1, 5 |
| **Cuculiformes Wagler, 1830** | | | | | | | | |
| **Cuculidae Leach, 1820** | | | | | | | | |
| *Coccycua minuta* (Vieillot, 1817) | Little Cuckoo | WA1952141 | — | S2, S4, S5, T1, T2, T3, T4, T5 | 17 | 24 | BD | 1, 2, 5 |
| [*Piaya cayana* (Linnaeus, 1766)] | Squirrel Cuckoo | | — | S3, S4, T1, T2, T3, T4 | 13 | 18 | IO | 1, 5 |
| *Crotophaga major* Gmelin, 1788 | Greater Ani | WA2028628 | — | S1, S2, S3, S4, T1, T2, T3, T4, T5 | 50 | 54 | BD | 1, 2, 5 |
| *Crotophaga ani* Linnaeus, 1758 | Smooth-billed Ani | WA2028634 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 73 | 86 | BD | 1, 2, 5 |
| *Guira guira* (Gmelin, 1788) | Guira Cuckoo | WA3363958 | — | T5 | IN | 10 | BD | 1, 5 |
| [*Tapera naevia* (Linnaeus, 1766)] | Striped Cuckoo | | — | S1, S5, S6, T1, T2, T3, T4, T5 | 17 | 30 | IO | 1, 5 |
| **Strigiformes Wagler, 1830** | | | | | | | | |
| **Tytonidae Mathews, 1912** | | | | | | | | |
| *Tyto furcata* (Temminck, 1827) | American Barn Owl | WA2972378 | — | | IN | IN | BD | 1, 2 |
| **Strigidae Leach, 1820** | | | | | | | | |
| [*Megascops choliba* (Vieillot, 1817)] | Tropical Screech-Owl | | — | | — | — | IO | 5 |
| [*Bubo virginianus* (Gmelin, 1788)] | Great Horned Owl | | — | S3 | 2 | IN | IO | 1, 5 |
| [*Glaucidium brasilianum* (Gmelin, 1788)] | Ferruginous Pygmy-Owl | | — | S1, S3, T1, T3, T4 | 6 | 6 | IO | 1, 5 |
| **Nyctibiiformes Yuri et al., 2013** | | | | | | | | |
| **Nyctibiidae Chenu & Des Murs, 1851** | | | | | | | | |
| *Nyctibius griseus* (Gmelin, 1789) | Common Potoo | WA3363846 | — | S4 | 2 | — | BD | 1, 5 |
| **Caprimulgiformes Ridgway, 1881** | | | | | | | | |
| **Caprimulgidae Vigors, 1825** | | | | | | | | |
| [*Nyctiprogne leucopyga* (Spix, 1825)] | Band-tailed Nighthawk | | — | T3, S1 | IN | 4 | IO | 1 |
| *Nyctidromus albicollis* (Gmelin, 1789) | Common Pauraque | WA2715203 | — | S3, T3, T4 | 6 | 10 | BD | 1, 2, 5 |
| [*Hydropsalis parvula* (Gould, 1837)] | Little Nightjar | | MPR | | — | — | IO | 2, 5 |
| [*Podager nacunda* (Vieillot, 1817)] | Nacunda Nighthawk | | MPR | | — | IN | IO | 1, 2, 5 |
| **Apodiformes Peters, 1940** | | | | | | | | |
| **Apodidae Olphe-Galliard, 1887** | | | | | | | | |
| *Streptoprocne zonaris* (Shaw, 1796) | White-collared Swift | WA3363751 | — | T3 | — | 2 | BD | 1 |
| **Trochilidae Vigors, 1825** | | | | | | | | |
| [*Glaucis hirsutus* (Gmelin, 1788)] | Rufous-breasted Hermit | | — | | — | — | IO | 5 |
| [*Phaethornis ruber* (Linnaeus, 1758)] | Reddish Hermit | | — | | — | — | IO | 5 |
| *Phaethornis subochraceus* Todd, 1915 | Buff-bellied Hermit | WA2336756 | — | S3, S4, T1, T2, T3, T4 | 6 | 14 | BD | 1, 5 |
| [*Phaethornis pretrei* (Lesson & Delattre, 1839)] | Planalto Hermit | | — | S3 | 3 | — | IO | 1, 2, 5 |
| [*Chlorostilbon lucidus* (Shaw, 1812)] | Glittering-bellied Emerald | | — | | — | — | IO | 2, 5 |
| *Thalurania furcata* (Gmelin, 1788) | Fork-tailed Woodnymph | WA3357991 | — | T3 | — | 4 | BD | 1, 5 |
| [*Hylocharis cyanus* (Vieillot, 1818)] | White-chinned Sapphire | | — | | — | — | IO | 2 |
| *Hylocharis chrysura* (Shaw, 1812) | Gilded Hummingbird | WA2336899 | — | S1, S4, T1, T2, T3, T4 | 4 | 14 | BD | 1, 2, 5 |
| *Polytmus guainumbi* (Pallas, 1764) | White-tailed Goldenthroat | WA2697678 | — | T5, S5 | 8 | 4 | BD | 1, 5 |
| [*Amazilia versicolor* (Vieillot, 1818)] | Versicolored Emerald | | — | | — | — | IO | 2, 5 |
| [*Amazilia fimbriata* (Gmelin, 1788)] | Glittering-throated Emerald | | — | | — | — | IO | 2, 5 |
| **Trogoniformes A. O. U., 1886** | | | | | | | | |
| **Trogonidae Lesson, 1828** | | | | | | | | |
| *Trogon curucui* Linnaeus, 1766 | Blue-crowned Trogon | WA1986817 | — | S1, S2, S3, S4, T1, T2, T3, T4 | 33 | 34 | BD | 1, 2, 5 |
| **Coraciiformes Forbes, 1844** | | | | | | | | |
| **Alcedinidae Rafinesque, 1815** | | | | | | | | |
| *Megaceryle torquata* (Linnaeus, 1766) | Ringed Kingfisher | WA2901877 | — | S1, S2, S3, S4, S5, T1, T2, T3, T4 | 23 | 42 | BD | 1, 2, 5 |

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|---|---|---|---|---|---|---|---|---|
| *Chloroceryle amazona* (Latham, 1790) | Amazon Kingfisher | WA2697688 | — | S1, T1, T2, T3, T4 | 4 | 20 | BD | 1, 2, 5 |
| *Chloroceryle aenea* (Pallas, 1764) | American Pygmy Kingfisher | WA2390288 | — | S3, S6, T3, T4 | 6 | 8 | BD | 1, 5 |
| *Chloroceryle americana* (Gmelin, 1788) | Green Kingfisher | WA2347015 | — | S1, S3, S4, T1, T2, T3, T4 | 13 | 42 | BD | 1, 5 |
| [*Chloroceryle inda* (Linnaeus, 1766)] | Green-and-rufous Kingfisher | | — | S2, T2 | 4 | 2 | IO | 1, 5 |
| **Momotidae Gray, 1840** | | | | | | | | |
| [*Momotus momota* (Linnaeus, 1766)] | Amazonian Motmot | | — | | — | — | IO | 2 |
| **Galbuliformes Fürbringer, 1888** | | | | | | | | |
| **Galbulidae Vigors, 1825** | | | | | | | | |
| *Galbula ruficauda* Cuvier, 1816 | Rufous-tailed Jacamar | WA2080244 | — | S1, S2, S3, S4, S6, T1, T2, T3, T4 | 48 | 66 | BD | 1, 2, 5 |
| **Bucconidae Horsfield, 1821** | | | | | | | | |
| *Monasa nigrifrons* (Spix, 1824) | Black-fronted Nunbird | WA2704528 | — | S1, S2, S3, S4, T1, T2, T3, T4 | 29 | 30 | BD | 1, 2, 5 |
| **Piciformes Meyer & Wolf, 1810** | | | | | | | | |
| **Ramphastidae Vigors, 1825** | | | | | | | | |
| *Ramphastos toco* Statius Müller, 1776 | Toco Toucan | WA2901404 | — | S1, S2, S3, T1, T4 | 8 | 6 | BD | 1, 2, 5 |
| *Pteroglossus castanotis* Gould, 1834 | Chestnut-eared Aracari | WA3357747 | — | S3, S4, T2, T3 | 4 | 6 | BD | 1 |
| **Picidae Leach, 1820** | | | | | | | | |
| *Picumnus albosquamatus* d'Orbigny, 1840 | White-wedged Piculet | WA3357982 | — | T1, T2, T3, T4 | — | 12 | BD | 1, 5 |
| [*Melanerpes cruentatus* (Boddaert, 1783)] | Yellow-tufted Woodpecker | | — | | — | — | IO | 5 |
| *Veniliornis passerinus* (Linnaeus, 1766) | Little Woodpecker | WA2901406 | — | S1, S2, S3, S4, T1, T2, T3, T4 | 17 | 20 | BD | 1, 2, 5 |
| [*Piculus chrysochloros* (Vieillot, 1818)] | Golden-green Woodpecker | | — | S1, S3, S4, T1, T2 | 10 | 4 | IO | 1, 5 |
| [*Colaptes melanochloros* (Gmelin, 1788)] | Green-barred Woodpecker | | — | S1 | 2 | IN | IO | 1, 5 |
| *Celeus lugubris* (Malherbe, 1851) | Pale-crested Woodpecker | WA2901876 | — | S1, S4, T1, T2, T4 | 6 | 10 | BD | 1, 2, 5 |
| *Celeus flavus* (Statius Müller, 1776) | Cream-colored Woodpecker | WA2901875 | — | S4, T1, T2, T3, T4 | 2 | 20 | BD | 1, 5 |
| [*Campephilus melanoleucos* (Gmelin, 1788)] | Crimson-crested Woodpecker | | — | S1, S2, T1, T2 | 10 | 6 | IO | 1, 2, 5 |
| **Falconiformes Bonaparte, 1831** | | | | | | | | |
| **Falconidae Leach, 1820** | | | | | | | | |
| *Caracara plancus* (Miller, 1777) | Southern Caracara | WA1999800 | — | S1, S2, S4, S5, S6, T2, T3, T4, T5 | 19 | 36 | BD | 1, 2, 5 |
| [*Milvago chimachima* (Vieillot, 1816)] | Yellow-headed Caracara | | — | | — | — | IO | 5 |
| [*Herpetotheres cachinnans* (Linnaeus, 1758)] | Laughing Falcon | | — | S4, T3 | 2 | 4 | IO | 1, 5 |
| [*Falco sparverius* Linnaeus, 1758] | American Kestrel | | — | | — | — | IO | 5 |
| *Falco rufigularis* Daudin, 1800 | Bat Falcon | WA2706122 | — | S4 | 2 | — | BD | 1 |
| **Psittaciformes Wagler, 1830** | | | | | | | | |
| **Psittacidae Rafinesque, 1815** | | | | | | | | |
| *Ara ararauna* (Linnaeus, 1758) | Blue-and-yellow Macaw | WA2901436 | — | T3, S1 | — | 6 | BD | 1 |
| *Primolius auricollis* (Cassin, 1853) | Yellow-collared Macaw | WA3363933 | — | S2, T1, T3, S3 | 2 | 10 | BD | 1, 5 |
| [*Diopsittaca nobilis* (Linnaeus, 1758)] | Red-shouldered Macaw | | — | S1, S2, S3, S4, T2, T4 | 8 | 12 | IO | 1, 2, 5 |
| *Thectocercus acuticaudatus* (Vieillot, 1818) | Blue-crowned Parakeet | WA2697662 | — | T1, T2, T3, T4 | — | 24 | BD | 1 |
| *Psittacara leucophthalmus* (Statius Müller, 1776) | White-eyed Parakeet | WA2033574 | — | T1, T2, T3, T4 | 14 | 12 | BD | 1, 2, 5 |
| [*Aratinga nenday* (Vieillot, 1823)] | Nanday Parakeet | | — | | — | IN | IO | 1, 2, 5 |
| [*Eupsittula aurea* (Gmelin, 1788)] | Peach-fronted Parakeet | | — | | — | 4 | IO | 2, 5 |
| *Myiopsitta monachus* (Boddaert, 1783) | Monk Parakeet | WA2031283 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 54 | 96 | BD | 1, 2, 5 |
| [*Forpus xanthopterygius* (Spix, 1824)] | Blue-winged Parrotlet | | — | | — | — | IO | 2, 5 |
| *Brotogeris chiriri* (Vieillot, 1818) | Yellow-chevroned Parakeet | WA3357746 | — | S2, S3, T1, T2, T3, T4, T5 | 6 | 36 | BD | 1, 2, 5 |
| [*Pionus menstruus* (Linnaeus, 1766)] | Blue-headed Parrot | | — | | — | IN | IO | 1 |
| *Pionus maximiliani* (Kuhl, 1820) | Scaly-headed Parrot | WA2141194 | — | S4 | 6 | IN | BD | 1, 2, 5 |
| [*Amazona amazonica* (Linnaeus, 1766)] | Orange-winged Parrot | | — | S1 | 6 | IN | IO | 1, 2, 5 |
| *Amazona aestiva* (Linnaeus, 1758) | Turquoise-fronted Parrot | WA2901499 | — | S1, S2, S3, S4, S6, T1, T2, T3, T4, T5 | 44 | 70 | BD | 1, 2, 5 |
| **Passeriformes Linnaeus, 1758** | | | | | | | | |
| **Thamnophilidae Swainson, 1824** | | | | | | | | |
| [*Herpsilochmus longirostris* Pelzeln, 1868] | Large-billed Antwren | | — | | — | — | IO | 5 |
| [*Thamnophilus doliatus* (Linnaeus, 1764)] | Barred Antshrike | | — | S2, T2, T3, T4 | 2 | 12 | IO | 1, 5 |
| [*Thamnophilus sticturus* Pelzeln, 1868] | Bolivian Slaty-Antshrike | | — | | — | — | IO | 2 |
| [*Thamnophilus caerulescens* Vieillot, 1816] | Variable Antshrike | | — | | — | — | IO | 5 |
| *Taraba major* (Vieillot, 1816) | Great Antshrike | WA2080191 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 83 | 96 | BD | 1, 2, 5 |
| *Hypocnemoides maculicauda* (Pelzeln, 1868) | Band-tailed Antbird | WA3041345 | — | S3, T1, T2, T3, T4 | 2 | 10 | BD | 1, 5 |

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|---|---|---|---|---|---|---|---|---|
| [*Pyriglena leuconota* (Spix, 1824)] | White-backed Fire-eye | | — | | — | — | IO | 5 |
| *Cercomacra melanaria* (Ménétriès, 1835) | Mato Grosso Antbird | WA2141195 | — | S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 60 | 62 | BD | 1, 2, 5 |
| **Dendrocolaptidae Gray, 1840** | | | | | | | | |
| [*Sittasomus griseicapillus* (Vieillot, 1818)] | Olivaceous Woodcreeper | | — | T2, S1 | — | 4 | IO | 1, 2, 5 |
| *Xiphorhynchus guttatoides* (Lafresnaye, 1850) | Lafresnaye's Woodcreeper | WA2901880 | — | S1, S4, T3 | 4 | 2 | BD | 1 |
| *Campylorhamphus trochilirostris* (Lichtenstein, 1820) | Red-billed Scythebill | WA2901500 | — | S1, S3, T1, T2, T3, T4, T5 | 6 | 20 | BD | 1, 2 |
| *Dendroplex picus* (Gmelin, 1788) | Straight-billed Woodcreeper | WA3358042 | — | S1, S2, T1, T3, T4 | 6 | 12 | BD | 1, 2, 5 |
| [*Lepidocolaptes angustirostris* (Vieillot, 1818)] | Narrow-billed Woodcreeper | | — | | — | — | IO | 5 |
| **Furnariidae Gray, 1840** | | | | | | | | |
| *Furnarius leucopus* Swainson, 1838 | Pale-legged Hornero | WA2698729 | — | S1, S2, S3, S4, S6, T1, T2, T3, T4, T5 | 52 | 82 | BD | 1, 2, 5 |
| [*Furnarius rufus* (Gmelin, 1788)] | Rufous Hornero | | — | | — | — | IO | 2, 5 |
| *Pseudoseisura unirufa* (d'Orbigny & Lafresnaye, 1838) | Rufous Cacholote | WA1952114 | — | S2, S3, S4, S6, T1, T2, T3, T4 | 15 | 14 | BD | 1, 2, 5 |
| [*Phacellodomus rufifrons* (Wied, 1821)] | Rufous-fronted Thornbird | | — | | — | — | IO | 2, 5 |
| *Phacellodomus ruber* (Vieillot, 1817) | Greater Thornbird | WA2390289 | — | S1, S3, S6, T4 | 6 | 2 | BD | 1, 5 |
| *Certhiaxis cinnamomeus* (Gmelin, 1788) | Yellow-chinned Spinetail | WA2031282 | — | S1, S2, S3, S5, S6, T1, T2, T3, T4, T5 | 42 | 98 | BD | 1, 2, 5 |
| *Synallaxis hypospodia* Sclater, 1874 | Cinereous-breasted Spinetail | WA2365310 | — | S5, T3, T4, T5 | 2 | 20 | BD | 1 |
| *Synallaxis albilora* Pelzeln, 1856 | White-lored Spinetail | WA2905329 | — | S1, S2, S4, T1, T2, T3, T4, T5 | 17 | 66 | BD | 1, 2, 5 |
| *Cranioleuca vulpina* (Pelzeln, 1856) | Rusty-backed Spinetail | WA2141187 | — | S1, S2, S3, S4, T1, T3, T4 | 21 | 10 | BD | 1, 2 |
| **Tityridae Gray, 1840** | | | | | | | | |
| *Pachyramphus polychopterus* (Vieillot, 1818) | White-winged Becard | WA3363852 | MPR | S2 | 2 | — | BD | 1, 5 |
| [*Xenopsaris albinucha* (Burmeister, 1869)] | White-naped Xenopsaris | | — | | — | — | IO | 5 |
| Rhynchocyclidae Berlepsch, 1907 | | | | | | | | |
| [*Tolmomyias sulphurescens* (Spix, 1825)] | Yellow-olive Flycatcher | | — | T2, T3 | — | 4 | IO | 1 |
| *Todirostrum cinereum* (Linnaeus, 1766) | Common Tody-Flycatcher | WA2035462 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4 | 31 | 52 | BD | 1, 2, 5 |
| *Poecilotriccus latirostris* (Pelzeln, 1868) | Rusty-fronted Tody-Flycatcher | WA2697679 | — | S3, S4, T1, T2, T3, T4 | 6 | 18 | BD | 1, 2, 5 |
| [*Hemitriccus margaritaceiventer* (d'Orbigny & Lafresnaye, 1837)] | Pearly-vented Tody-tyrant | | — | | — | — | IO | 5 |
| **Tyrannidae Vigors, 1825** | | | | | | | | |
| [*Inezia inornata* (Salvadori, 1897)] | Plain Tyrannulet | | MGT | T2, T3 | — | 4 | IO | 1, 5 |
| [*Euscarthmus meloryphus* Wied, 1831] | Tawny-crowned Pygmy-Tyrant | | — | | — | — | IO | 5 |
| [*Camptostoma obsoletum* (Temminck, 1824)] | Southern Beardless-Tyrannulet | | — | S4, S1 | 2 | 2 | IO | 1, 2, 5 |
| [*Elaenia flavogaster* (Thunberg, 1822)] | Yellow-bellied Elaenia | | — | | — | — | IO | 2, 5 |
| *Elaenia spectabilis* Pelzeln, 1868 | Large Elaenia | WA2346878 | MPR | S1, S2, T4 | 6 | 2 | BD | 1 |
| [*Elaenia cristata* Pelzeln, 1868] | Plain-crested Elaenia | | — | | — | — | IO | 5 |
| [*Elaenia chiriquensis* Lawrence, 1865] | Lesser Elaenia | | MPR | | — | — | IO | 5 |
| [*Myiopagis gaimardii* (d'Orbigny, 1839)] | Forest Elaenia | | — | | — | — | IO | 5 |
| [*Myiopagis caniceps* (Swainson, 1835)] | Gray Elaenia | | — | | — | — | IO | 5 |
| [*Serpophaga subcristata* (Vieillot, 1817)] | White-crested Tyrannulet | | — | | — | — | IO | 5 |
| [*Attila bolivianus* Lafresnaye, 1848] | Dull-capped Attila | | — | S3, S4 | 6 | — | IO | 1 |
| [*Legatus leucophaius* (Vieillot, 1818)] | Piratic Flycatcher | | MPR | | — | — | IO | 5 |
| *Myiarchus ferox* (Gmelin, 1789) | Short-crested Flycatcher | | — | S2, S4, T1, T2, T3, T4 | 4 | 14 | AD | 1, 2, 4 |
| [*Myiarchus tyrannulus* (Statius Müller, 1776)] | Brown-crested Flycatcher | | — | | — | — | IO | 5 |
| *Casiornis rufus* (Vieillot, 1816) | Rufous Casiornis | WA2696556 | — | T3 | — | 2 | BD | 1, 2 |
| *Pitangus sulphuratus* (Linnaeus, 1766) | Great Kiskadee | WA2704529 | MPR | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4 | 100 | 100 | BD | 1, 2, 5 |
| *Philohydor lictor* (Lichtenstein, 1823) | Lesser Kiskadee | WA2352668 | — | S1, S4, T2, T3 | 6 | 20 | BD | 1, 5 |
| [*Machetornis rixosa* (Vieillot, 1819)] | Cattle Tyrant | | — | | — | — | IO | 5 |
| [*Megarynchus pitangua* (Linnaeus, 1766)] | Boat-billed Flycatcher | | — | S4, T1, T2, T3, T4 | 6 | 16 | IO | 1, 2, 5 |
| *Myiozetetes cayanensis* (Linnaeus, 1766) | Rusty-margined Flycatcher | WA1986818 | — | S1, S2, S3, S4, S6, T1, T2, T3, T4 | 65 | 42 | BD | 1, 2, 5 |
| [*Tyrannus albogularis* Burmeister, 1856] | White-throated Kingbird | | MPR | | — | — | IO | 5 |
| *Tyrannus melancholicus* Vieillot, 1819 | Tropical Kingbird | WA1998625 | MPR | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 81 | 92 | BD | 1, 2, 5 |

| Taxon | English name | Voucher | Migratory status | Sites | % occurrence in 2015–2016 | % occurrence in 2017–2018 | Record type | Source |
|---|---|---|---|---|---|---|---|---|
| [*Tyrannus savana* Daudin, 1802] | Fork-tailed Flycatcher | | MPR | | — | IN | IO | 1 |
| [*Tyrannus tyrannus* (Linnaeus, 1758)] | Eastern Kingbird | | MGT | | — | — | IO | 5 |
| [*Griseotyrannus aurantioatrocristatus* (d'Orbigny & Lafresnaye, 1837)] | Crowned Slaty Flycatcher | | MPR | | — | — | IO | 5 |
| *Empidonomus varius* (Vieillot, 1818) | Variegated Flycatcher | WA2724800 | MPR | | — | IN | AD | 1, 4, 5 |
| [*Colonia colonus* (Vieillot, 1818)] | Long-tailed Tyrant | | — | | — | — | IO | 5 |
| [*Myiophobus fasciatus* (Statius Müller, 1776)] | Bran-colored Flycatcher | | MPR | | — | — | IO | 5 |
| [*Sublegatus modestus* (Wied, 1831)] | Southern Scrub-Flycatcher | | MPR | | — | — | IO | 2, 5 |
| *Pyrocephalus rubinus* (Boddaert, 1783) | Vermilion Flycatcher | WA3357752 | MPR | S6, T1 | 2 | 2 | BD | 1, 2, 5 |
| *Fluvicola albiventer* (Spix, 1825) | Black-backed Water-Tyrant | WA2901460 | MPR | S1, S5, S6, T1, T3, T4, T5 | 10 | 26 | BD | 1, 2 |
| *Arundinicola leucocephala* (Linnaeus, 1764) | White-headed Marsh Tyrant | WA2031280 | — | S1, S5, S6, T5 | 21 | 4 | BD | 1, 5 |
| [*Gubernetes yetapa* (Vieillot, 1818)] | Streamer-tailed Tyrant | | — | | — | — | IO | 5 |
| *Cnemotriccus fuscatus* (Wied, 1831) | Fuscous Flycatcher | WA3041344 | — | S2 | — | 4 | BD | 1, 2, 5 |
| [*Knipolegus hudsoni* Sclater, 1872] | Hudson's Black-Tyrant | | VAG | | — | — | IO | 2, 5 |
| *Satrapa icterophrys* (Vieillot, 1818) | Yellow-browed Tyrant | WA2696555 | — | T5 | — | 8 | BD | 1, 5 |
| [*Xolmis irupero* (Vieillot, 1823)] | White Monjita | | — | | — | — | IO | 5 |
| **Vireonidae Swainson, 1837** | | | | | | | | |
| *Cyclarhis gujanensis* (Gmelin, 1789) | Rufous-browed Peppershrike | WA2704502 | — | S1, S2, S3, S4, T1, T2, T3, T4 | 46 | 46 | BD | 1, 2, 5 |
| *Hylophilus pectoralis* Sclater, 1866 | Ashy-headed Greenlet | WA3363016 | — | S3, T2, T3 | 2 | 10 | BD | 1, 2, 5 |
| [*Vireo olivaceus* (Linnaeus, 1766)] | Red-eyed Vireo | | MGT | | — | — | IO | 5 |
| **Corvidae Leach, 1820** | | | | | | | | |
| [*Cyanocorax cyanomelas* (Vieillot, 1818)] | Purplish Jay | | — | S1, S3 | 6 | — | IO | 1 |
| **Hirundinidae Rafinesque, 1815** | | | | | | | | |
| *Stelgidopteryx ruficollis* (Vieillot, 1817) | Southern Rough-winged Swallow | WA2697690 | MPR | S1, S2, S4, T1, T2, T3, T4, T5 | 10 | 24 | BD | 1, 2, 5 |
| *Progne tapera* (Vieillot, 1817) | Brown-chested Martin | WA2698727 | MPR | T3, T5 | 31 | 10 | BD | 1, 2, 5 |
| [*Progne subis* (Linnaeus, 1758)] | Purple Martin | | MGT | | IN | — | IO | 1 |
| [*Progne chalybea* (Gmelin, 1789)] | Gray-breasted Martin | | MPR | | — | 8 | IO | 2, 5 |
| *Tachycineta albiventer* (Boddaert, 1783) | White-winged Swallow | WA2907502 | — | S4, T1, T2, T3, T4, T5 | 2 | 16 | BD | 1, 2, 5 |
| [*Tachycineta leucorrhoa* (Vieillot, 1817)] | White-rumped Swallow | | — | | — | IN | IO | 1, 2, 5 |
| *Riparia riparia* (Linnaeus, 1758) | Bank Swallow | WA3363003 | MGT | S1 | 6 | — | BD | 1 |
| *Hirundo rustica* Linnaeus, 1758 | Barn Swallow | | MGT | S5, T2, T3, T5 | 13 | 14 | BD | 1 |
| *Petrochelidon pyrrhonota* (Vieillot, 1817) | Cliff Swallow | | MPR | S5, T2, T3, T5 | 17 | 28 | BD | 1 |
| **Troglodytidae Swainson, 1831** | | | | | | | | |
| [*Troglodytes musculus* Naumann, 1823] | Southern House Wren | | — | | — | — | IO | 5 |
| *Campylorhynchus turdinus* (Wied, 1831) | Thrush-like Wren | WA2815039 | — | S1, S2, S3, S4, S6, T1, T2, T3, T4, T5 | 77 | 78 | BD | 1, 2, 5 |
| [*Pheugopedius genibarbis* (Swainson, 1838)] | Moustached Wren | | — | S4, T2, T3, T4 | 4 | 10 | IO | 1, 2, 5 |
| [*Cantorchilus leucotis* (Lafresnaye, 1845)] | Buff-breasted Wren | | — | S3 | 2 | IN | IO | 1, 2, 5 |
| **Donacobiidae Aleixo & Pacheco, 2006** | | | | | | | | |
| *Donacobius atricapilla* (Linnaeus, 1766) | Black-capped Donacobius | WA1961723 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 58 | 100 | BD | 1, 2, 5 |
| **Polioptilidae Baird, 1858** | | | | | | | | |
| *Polioptila dumicola* (Vieillot, 1817) | Masked Gnatcatcher | WA2905054 | — | T1, T3 | — | 6 | BD | 1, 2, 5 |
| **Turdidae Rafinesque, 1815** | | | | | | | | |
| [*Turdus leucomelas* Vieillot, 1818] | Pale-breasted Thrush | | — | S1 | 4 | — | IO | 1, 5 |
| *Turdus rufiventris* Vieillot, 1818 | Rufous-bellied Thrush | WA2704809 | — | S1, S3, S4, T2, T4 | 13 | 6 | BD | 1, 2, 5 |
| *Turdus amaurochalinus* Cabanis, 1850 | Creamy-bellied Thrush | WA3357978 | MPR | T1, T2, T5 | — | 8 | BD | 1, 2, 5 |
| **Mimidae Bonaparte, 1853** | | | | | | | | |
| [*Mimus saturninus* (Lichtenstein, 1823)] | Chalk-browed Mockingbird | | — | | — | — | IO | 2, 5 |
| **Motacillidae Horsfield, 1821** | | | | | | | | |
| [*Anthus lutescens* Pucheran, 1855] | Yellowish Pipit | | — | S6 | 2 | — | IO | 1 |
| **Passerellidae Cabanis & Heine, 1850** | | | | | | | | |
| [*Zonotrichia capensis* (Statius Müller, 1776)] | Rufous-collared Sparrow | | — | | — | — | IO | 5 |
| **Parulidae et al., 1947** | | | | | | | | |
| *Setophaga pitiayumi* (Vieillot, 1817) | Tropical Parula | WA3357779 | — | T3 | — | 2 | BD | 1, 2, 5 |
| *Geothlypis aequinoctialis* (Gmelin, 1789) | Masked Yellowthroat | WA2696554 | — | T2, T3, T4, T5 | — | 16 | BD | 1, 5 |
| [*Myiothlypis flaveola* Baird, 1865] | Flavescent Warbler | | — | | — | — | IO | 5 |
| **Icteridae Vigors, 1825** | | | | | | | | |
| [*Psarocolius decumanus* (Pallas, 1769)] | Crested Oropendola | | — | T1, T2, T5 | — | 6 | IO | 1, 2 |
| *Procacicus solitarius* (Vieillot, 1816) | Solitary Black Cacique | WA1998619 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 83 | 98 | BD | 1, 2, 5 |

| Taxon | English name | Voucher | Migratory status | Sites | % occurrence in 2015–2016 | % occurrence in 2017–2018 | Record type | Source |
|---|---|---|---|---|---|---|---|---|
| *Cacicus cela* (Linnaeus, 1758) | Yellow-rumped Cacique | WA1999799 | — | S1, S2, S3, S4, S6, T1, T2, T3, T4, T5 | 69 | 84 | BD | 1, 2, 5 |
| [*Icterus pyrrhopterus* (Vieillot, 1819)] | Variable Oriole | | — | S2, S3, S4, S6, T1, T2, T3, T4 | 31 | 24 | IO | 1, 2, 5 |
| *Icterus croconotus* (Wagler, 1829) | Orange-backed Troupial | WA2901878 | — | S1, S2, S3, S4, S6, T2, T3, T4 | 65 | 78 | BD | 1, 2, 5 |
| [*Gnorimopsar chopi* (Vieillot, 1819)] | Chopi Blackbird | | — | | — | — | IO | 5 |
| *Amblyramphus holosericeus* (Scopoli, 1786) | Scarlet-headed Blackbird | WA1961722 | — | T3, T4, T5 | 6 | 10 | BD | 1, 5 |
| *Agelasticus cyanopus* (Vieillot, 1819) | Unicolored Blackbird | WA2080187 | — | S1, S2, S3, S5, S6 | 56 | 96 | AD | 1, 2, 4, 5 |
| [*Agelaioides badius* (Vieillot, 1819)] | Grayish Baywing | | — | | — | — | IO | 2, 5 |
| *Molothrus oryzivorus* (Gmelin, 1788) | Giant Cowbird | WA3363866 | — | | IN | — | BD | 1, 2, 5 |
| [*Molothrus bonariensis* (Gmelin, 1789)] | Shiny Cowbird | | — | | IN | — | IO | 1, 2, 5 |
| [*Sturnella superciliaris* (Bonaparte, 1850)] | White-browed Meadowlark | | — | | — | — | IO | 2 |
| **Thraupidae Cabanis, 1847** | | | | | | | | |
| [*Paroaria coronata* (Miller, 1776)] | Red-crested Cardinal | | — | | — | — | IO | 5 |
| *Paroaria capitata* (d'Orbigny & Lafresnaye, 1837) | Yellow-billed Cardinal | WA1952236 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 79 | 94 | AD | 1, 2, 4, 5 |
| [*Tangara sayaca* (Linnaeus, 1766)] | Sayaca Tanager | | — | S2, T1, T2, T3, T4 | 2 | 30 | IO | 1, 2, 5 |
| *Tangara palmarum* (Wied, 1821) | Palm Tanager | WA2706124 | — | S3, T1 | 4 | 2 | BD | 1, 5 |
| [*Nemosia pileata* (Boddaert, 1783)] | Hooded Tanager | | — | | — | — | IO | 5 |
| [*Conirostrum speciosum* (Temminck, 1824)] | Chestnut-vented Conebill | | — | | — | — | IO | 2, 5 |
| [*Sicalis flaveola* (Linnaeus, 1766)] | Saffron Finch | | — | | — | — | IO | 5 |
| [*Volatinia jacarina* (Linnaeus, 1766)] | Blue-black Grassquit | | — | | — | IN | IO | 1, 2, 5 |
| [*Eucometis penicillata* (Spix, 1825)] | Gray-headed Tanager | | — | | — | — | IO | 5 |
| *Coryphospingus cucullatus* (Statius Müller, 1776) | Red-crested Finch | | — | | — | — | AD | 2, 4, 5 |
| [*Tachyphonus rufus* (Boddaert, 1783)] | White-lined Tanager | | — | | — | — | IO | 2, 5 |
| *Ramphocelus carbo* (Pallas, 1764) | Silver-beaked Tanager | WA2704530 | — | S1, S2, S3, S4, S5, S6, T2, T3, T4 | 67 | 72 | BD | 1, 2, 5 |
| [*Dacnis cayana* (Linnaeus, 1766)] | Blue Dacnis | | — | | — | — | IO | 5 |
| [*Sporophila lineola* (Linnaeus, 1758)] | Lined Seedeater | | MPR | T5 | IN | 6 | IO | 1, 5 |
| *Sporophila collaris* (Boddaert, 1783) | Rusty-collared Seedeater | WA1952061 | — | S1, S5, S6, T2, T3, T4, T5 | 29 | 32 | BD | 1, 5 |
| [*Sporophila nigricollis* (Vieillot, 1823)] | Yellow-bellied Seedeater | | — | | — | — | IO | 5 |
| *Sporophila caerulescens* (Vieillot, 1823) | Double-collared Seedeater | WA2901879 | MPR | S6, T2, T3, T4, T5 | 4 | 18 | BD | 1, 5 |
| *Sporophila leucoptera* (Vieillot, 1817) | White-bellied Seedeater | WA2697745 | — | S3, S5, T4, T5 | 8 | 4 | BD | 1, 5 |
| [*Sporophila nigrorufa* (d'Orbigny & Lafresnaye, 1837)] | Black-and-tawny Seedeater | | — | | — | — | IO | 5 |
| [*Sporophila bouvreuil* (Statius Müller, 1776)] | Copper Seedeater | | MPR | | — | — | IO | 5 |
| [*Sporophila hypoxantha* Cabanis, 1851] | Tawny-bellied Seedeater | | MPR | | — | IN | IO | 1, 5 |
| [*Sporophila angolensis* (Linnaeus, 1766)] | Chestnut-bellied Seed-Finch | | — | | — | — | IO | 5 |
| *Saltator coerulescens* Vieillot, 1817 | Grayish Saltator | WA2697740 | — | S1, S2, S3, S4, S5, S6, T1, T2, T3, T4, T5 | 77 | 90 | AD | 1, 2, 4, 5 |
| [*Saltator similis* d'Orbigny & Lafresnaye, 1837] | Green-winged Saltator | | — | S2, S3, T3, T5 | 6 | 6 | IO | 1, 5 |
| [*Thlypopsis sordida* (d'Orbigny & Lafresnaye, 1837)] | Orange-headed Tanager | | — | | IN | IN | IO | 1, 2, 5 |
| **Fringillidae Leach, 1820** | | | | | | | | |
| [*Euphonia chlorotica* (Linnaeus, 1766)] | Purple-throated Euphonia | | — | S2, S3, T3 | 4 | 2 | IO | 1, 5 |
| [*Passer domesticus* (Linnaeus, 1758)] | House Sparrow | | — | | — | — | IO | 5 |

were Tyrannidae (18 species), followed by Thraupidae (15), Psittacidae (12), and Ardeidae (11). Non-passerine families were more representative (67%) than passerine families (33%). Of the 34 migrant species, 13 were migratory and 21 were partially migratory. Only *Crax fasciolata* Spix, 1825 has been globally classified as Vulnerable (IUCN 2019).

*Pitangus sulphuratus* (Linnaeus, 1766) was recorded in all samples. *Butorides striata* (Linnaeus, 1758) and *Donacobius atricapilla* (Linnaeus, 1766) were recorded in all samples of the 2017–2018 cycle. Other species with a high frequency of occurrence and which were very common in EET were *Nannopterum brasilianus* (Gmelin, 1789), *Taraba major* (Vieillot, 1816), *Agelasticus cyanopus* (Vieillot, 1819), *Procacicus solitarius* (Vieillot, 1816), and *Saltator coerulescens* Vieillot, 1817, as well as others in Table 2.

For the less frequent category, we highlight species such as *Platalea ajaja* Linnaeus, 1758 (Fig. 2A) and *Rynchops niger* Linnaeus, 1758 (Fig. 2B), which are partially migratory, and *Phalaropus tricolor* (Vieillot, 1819) and *Hirundo rustica* Linnaeus, 1758, which are migratory. Also among the lower frequency species are *Ciconia maguari* (Gmelin, 1789) (Fig. 2C) and *Amblyramphus*


**Figure 2. A.** *Platalea ajaja* Linnaeus, 1758. **B.** *Rynchops niger* Linnaeus, 1758. **C.** *Ciconia maguari* (Gmelin, 1789). **D.** *Amblyramphus holosericeus* (Scopoli, 1786). **E.** *Actitis macularius* (Linnaeus, 1766). **F.** *Ixobrychus exilis* (Gmelin, 1789). (Photos: BDV, except for *Actitis macularius*, photographed by AVBF).

*holosericeus* (Scopoli, 1786) (Fig. 2D), which have been recorded specifically in flooded grassland or floating meadows.

### New record for the Pantanal wetland and the Central region of Brazil

Order Charadriiformes
Family Sternidae

***Chlidonias niger* (Linnaeus, 1758)**
Figure 3

**Materials examined.** Tables 1, 2.

**Identification.** In April 2018, we saw two non-breeding individuals of *C. niger* flying on the river (16°52′S, 057°24′W) together with *Phaetusa simplex* (Gmelin, 1789) and *Sternula superciliaris* (Vieillot, 1819). The

**Figure 3.** *Chlidonias niger* (Linnaeus, 1758). (Photo: BDV).

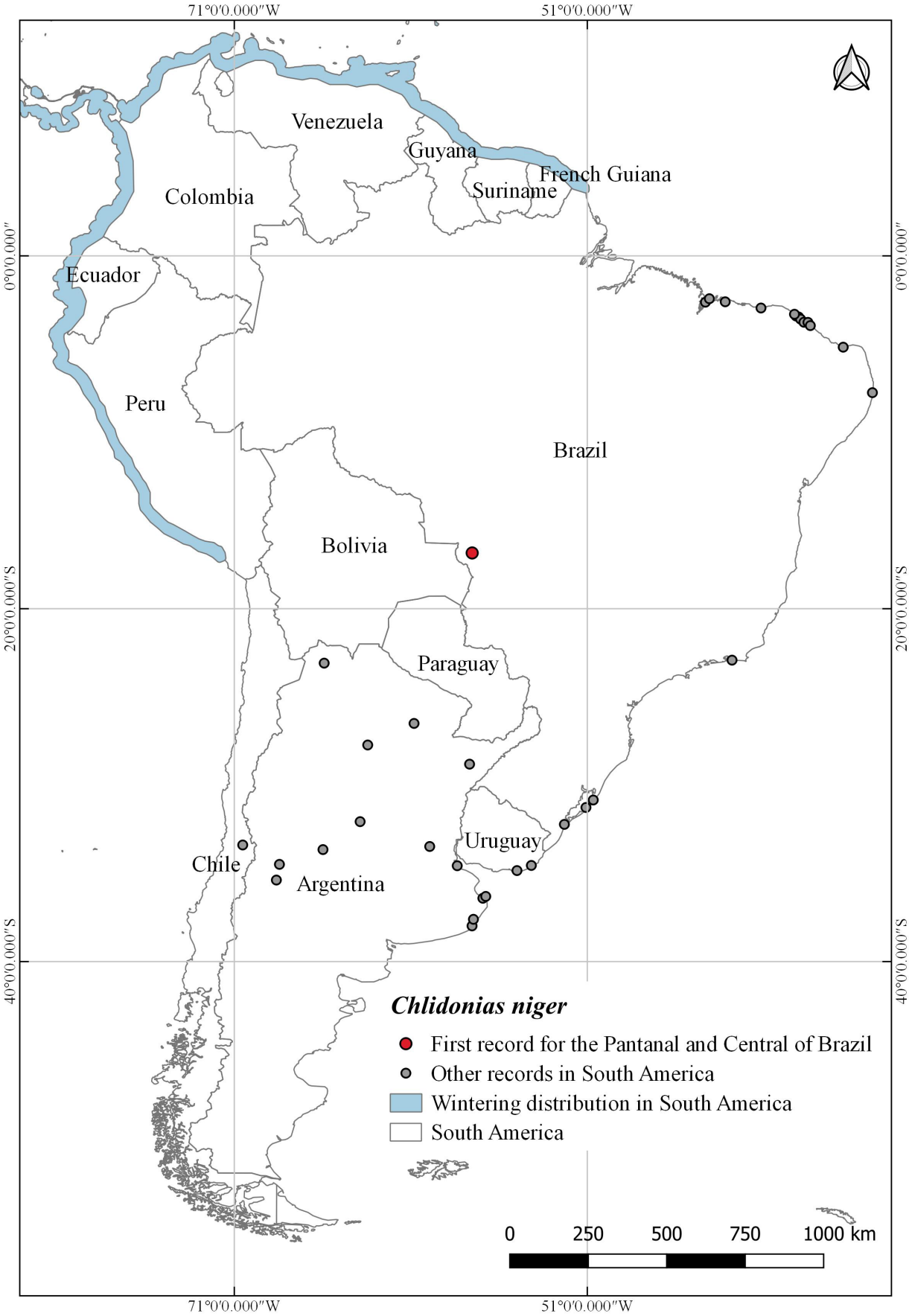


**Figure 4.** Map of known wintering distribution of *Chlidonias niger* (Linnaeus, 1758) in South America (BirdLife International, Handbook of the Birds of the World 2018). Red circle is the first documented record for the Pantanal wetland and also for the Central region of Brazil. Black circles are secondary records of this species on the coast of Brazil and other places of South America (Dias et al. 2010; Quiroga et al. 2015; Gonsioroski; 2018; Franz et al. 2018; Wikiaves 2019).


**Figure 5. A.** *Aburria cumanensis* (Jacquin, 1784). **B.** *Egretta caerulea* (Linnaeus, 1758). **C.** *Calidris fuscicollis* (Vieillot, 1819). **D.** *Calidris melanotos* (Vieillot, 1819). **E.** *Phalaropus tricolor* (Vieillot, 1819). **F.** *Thectocercus acuticaudatus* (Vieillot, 1818). **G.** *Hirundo rustica* Linnaeus, 1758. **H.** *Petrochelidon pyrrhonota* (Vieillot, 1817). (Photos: BDV, except for *Aburria cumanensis*, photographed by AVBF).

individuals of *C. niger* were identified by their grey wings and back and white head and belly. The birds present with a dark crown and nape, with a black patch behind the eye and an extensive dark patch on the side of the breast (Gochfeld et al. 2019).

This is the first record of *C. niger* for the Pantanal

wetland and the Central Region of Brazil (Fig. 4) The closest South American localities to our new record is Tres Pozos, Argentina (980 km) and Lagoa de Maricá, Rio de Janeiro, Brazil (1,675 km).

### New records for Estação Ecológica de Taiamã

Order Galliformes
Family Cracidae

***Aburria cumanensis* (Jacquin, 1784)**
Figure 5A

**Material examined.** Tables 1, 2.

**Identification.** We generally observed this cracid in the forest of the EET. *Aburria cumanensis* differs from *Aburria cujubi* (Pelzeln, 1858) mainly by having a blue rather than red throat (Gwynne et al. 2010). We found both *Aburria* species in the EET, which had not been reported by Lopes et al. (2016).

Order Pelecaniformes
Family Ardeidae

***Egretta caerulea* (Linnaeus, 1758)**
Figure 5B

**Material examined.** Tables 1, 2.

**Identification.** We observed adult and immature individuals in mudslides and on beaches formed during the dry season. This heron can be readily identified by the predominantly blue colour of adults and white colour in the immature phase. The beak, tarsus, and toes are black (Sick 1997).

Order Accipitriformes
Family Pandionidae

***Pandion haliaetus* (Linnaeus, 1758)**

**Material examined.** Tables 1, 2.

**Identification.** This species was observed foraging on the Paraguay River during all hydrological periods, although it is classified as migratory. We identified this eagle by the combination of its white head and bottom and the presence of a black band behind the eye, which extends onto the upper part of the body (Sick 1997).

Family Accipitridae

***Leptodon cayanensis* (Latham, 1790)**

**Material examined.** Tables 1, 2.

**Identification.** We observed this kite, usually alone, perched on the river's edge. We identified it by the small grey head, black back, and black tail with three whitish bars and a white tip (Gwynne et al. 2010).

***Ictinia mississippiensis* (Wilson, 1811)**

**Material examined.** Tables 1, 2.

**Identification.** We recorded two individuals on different occasions in October 2016, which is during this species' migration to South America. The individuals were seen in flight near *Erythrina fusca* Monodominant Forest. This is a new record for Cáceres municipality. This species differs from *I. plumbea* by its paler head, the lack of rufous primaries, the uniform dark tail, and the dark tarsus (Sick 1997; Gwynne et al. 2010).

Order Eurypygiformes
Family Eurypygidae

***Eurypyga helias* (Pallas, 1781)**

**Material examined.** Tables 1, 2.

**Identification.** This species was seen on the ground in polyspecific forests along the Paraguay River. We identified this species by the small head with a long, straight beak, and slender body with an unmistakable, complex colour (Gwynne et al. 2010).

Order Charadriiformes
Family Scolopacidae

***Tringa flavipes* (Gmelin, 1789)**

**Material examined.** Tables 1, 2.

**Identification.** We saw individuals foraging on mudflats and shoreline created during low water periods in Baía do Formoso, which forms part of the protection area buffer zone, and also in EET. This species differs from others of its genus by the slender, straight bill which is as long as the head, and the long yellow legs (Erize et al. 2006).

***Calidris fuscicollis* (Vieillot, 1819)**
Figure 5C

**Material examined.** Tables 1, 2.

**Identification.** During the dry season, we observed *C. fuscicollis* on mudflats with other scolopacid species, both in Baía do Formoso, in the EET area, and buffer zone. This species presents with grey upper parts, a white eyebrow, white underparts, grey-striated chest and flanks, and a black bill and legs (Erize et al. 2006; Gwynne et al. 2010).

***Calidris melanotos* (Vieillot, 1819)**
Figure 5D

**Material examined.** Tables 1, 2.

**Identification.** Individuals were observed foraging on mudflats with other scolopacid species. We identified *C. melanotos* by its brown, mixed with black-brown crown, neck, face, breast, and upperparts, white belly, and olive-yellow bill and legs (Erize et al. 2006; Van Gils et al. 2018).

***Phalaropus tricolor* (Vieillot, 1819)**
Figure 5E

**Material examined.** Tables 1, 2.

**Identification.** Individuals were observed only in October 2016, when they were foraging with other scolopacids. This species was distinguished from all others on the mudflats by its white colour. This species was identified for by the grey upperparts, long slender bill, and white face, neck, and underparts (Erize et al. 2006).

Order Columbiformes
Family Columbidae

***Columbina minuta* (Linnaeus, 1766)**

**Material examined.** Tables 1, 2.

**Identification.** Small flocks of this species were observed around in the head office of the EET, where they were feeding on the ground. We identified this species by its dark-brown colour, with a bluish-grey head and pale reddish chest (Gwynne et al. 2010).

Order Caprimulgiformes
Family Caprimulgidae

***Nyctiprogne leucopyga* (Spix, 1825)**

**Material examined.** Tables 1, 2.

**Identification.** We observed this species during overflight in the evening on the Paraguay River. We identified this species by the dark wing and black tail, which has a white bar midway (Erize et al. 2006).

Order Apodiformes
Family Apodidae

***Streptoprocne zonaris* (Shaw, 1796)**

**Material examined.** Tables 1, 2.

**Identification.** We recorded this species during overflights on the Paraguay River. This is a new record for Cáceres municipality. This species presents a blackish plumage which is broken by a distinctive white collar on the neck (Chantler et al. 2019).

Order Piciformes
Family Ramphastidae

***Pteroglossus castanotis* Gould, 1834**

**Material examined.** Tables 1, 2.

**Identification.** We observed this species in various places in the EET, but it was especially common around the head office where it was eating fruits of *Sterculia apetala* (Jacq.) H. Karst. We identified this species by its song and coloration: the eyes are white and surrounded by blue skin; the back and wings are green; and the belly is yellow, crossed by a red band (Gwynne et al. 2010).

Order Falconiformes
Family Falconidae

***Falco rufigularis* Daudin, 1800**

**Material examined.** Tables 1, 2.

**Identification.** We saw this species only once, while it was preying on a nest of *Paroaria capitata* (d'Orbigny & Lafresnaye, 1837). This species was identified by the presence of a barred, white chest, with chestnut-rufous belly, thighs, and undertail-coverts (Gwynne et al. 2010).

Order Psittaciformes
Family Psittacidae

***Ara ararauna* (Linnaeus, 1758)**

**Material examined.** Tables 1, 2.

**Identification.** We observed these macaws only in flight on two occasions. We identified this species by its blue back, yellow belly, and white face (Gwynne et al. 2010).

***Thectocercus acuticaudatus* (Vieillot, 1818)**
Figure 5F

**Material examined.** Tables 1, 2.

**Identification.** This species was observed only during the dry season. Large flocks were feeding on the flowers and fruits of *E. fusca*. We identified this species by it blue forehead and predominantly green body (Gwynne et al. 2010).

***Pionus menstruus* (Linnaeus, 1766)**

**Material examined.** Tables 1, 2.

**Identification.** We recorded the voice of this species while in flight. The voice of this species differs from *Pionus maximiliani* (Kuhl, 1820) which also occurs in the EET.

Order Passeriformes
Family Dendrocolaptidae

***Xiphorhynchus guttatoides* (Lafresnaye, 1850)**

**Material examined.** Tables 1, 2.

**Identification.** This species was identified from a sound recording of its voice and by sight. It was in Polyspecific Forest of Shrubs and Pioneers.

Family Furnariidae

***Synallaxis hypospodia* Sclater, 1874**

**Material examined.** Tables 1, 2.

**Identification.** This species was identified from a sound recording of its voice. It was in Flooded Grassland and aquatic macrophytes. This is a new record for the Cáceres municipality.

Family Rhynchocyclidae

***Tolmomyias sulphurescens* (Spix, 1825)**

**Material examined.** Tables 1, 2.

**Identification.** This species was identified from a sound recording of its voice. It was in Polyspecific Forest of Shrubs and Pioneers.

Family Tyrannidae

***Elaenia spectabilis* Pelzeln, 1868**

**Material examined.** Tables 1, 2.

**Identification.** This species was identified from a sound recording of its voice. It was in Polyspecific Forest of Shrubs and Pioneers.

***Attila bolivianus* Lafresnaye, 1848**

**Material examined.** Tables 1, 2.

**Identification.** This species was identified from a sound recording of its voice. It was in Polyspecific Forest of Shrubs and Pioneers.

***Tyrannus savana* Daudin, 1802**

**Material examined.** Tables 1, 2.

**Identification.** This species was observed during migration. It was recognised by the characteristically long forked tail in flight (Gwynne et al. 2010).

Family Corvidae

***Cyanocorax cyanomelas* (Vieillot, 1818)**

**Material examined.** Tables 1, 2.

**Identification.** This species was identified from a sound recording of its voice. It was in Polyspecific Forest of Shrubs and Pioneers, next to the head office of the EET.

Family Hirundinidae

***Progne subis* (Linnaeus, 1758)**

**Material examined.** Tables 1, 2.

**Identification.** We observed a female of *P. subis* foraging on the banks of the river channel. The female of this species is dark at the top with some metallic blue luster and lighter underparts (Gwynne et al. 2010; Turner 2018).

***Riparia riparia* (Linnaeus, 1758)**

**Material examined.** Tables 1, 2.

**Identification.** This species was observed flying over the Paraguay River together with resident species like *Stelgidopteryx ruficollis* (Vieillot, 1817) and *Progne tapera* (Vieillot, 1817). We identified it as is a small swallow, with a uniform brown upper and somewhat darker wings. *Progne tapera* is similarly colored and patterned but is considerably larger (Ridgely and Tudor 2009).

***Hirundo rustica* Linnaeus, 1758**
Figure 5G

**Material examined.** Tables 1, 2.

**Identification.** This species was seen flying with individuals of *Petrochelidon pyrrhonota* (Vieillot, 1817); we observed many individuals foraging in the EET and buffer zone. We identified this species by its long, deeply forked tail and steely blue upper, with chestnut forehead and chestnut to buff throat (Ridgely and Tudor 2009).

***Petrochelidon pyrrhonota* (Vieillot, 1817)**
Figure 5H

**Material examined.** Tables 1, 2.

**Identification.** We observed this species in great flocks, foraging in the Flooded Grassland area. We observed a large number of foraging individuals in the EET and buffer zone. We identified this species by its square tail, dark blue upper, dirty white forehead and underneath, brown collar on the throat, face, and nape, and cinnamon upper tail (Ridgely and Tudor 2009).

Family Motacillidae

***Anthus lutescens* Pucheran, 1855**

**Material examined.** Tables 1, 2.

**Identification.** This species was identified from a sound recording of its voice made during he dry season in the flooded grassland.

## Species in IUCN Red List category

Order Galliformes
Family Cracidae

***Crax fasciolata* Spix, 1825**

**Material examined.** Tables 1, 2.

**Identification.** Species of Cracidae were observed in forests and around the EET head office. A couple was observed with two pups in November 2016 and again in 2017. In 2018, we saw a couple with three puppies. *Crax fasciolata* is considered globally Vulnerable (IUCN 2019). In Brazil, it is listed as Least Concern. This is the only species of *Crax* with a white tail tip. It has a grey bill and yellow cere. Males are mostly black, with white on the belly, while females have a bicolour crest, with a black back striped white and a cinnamon-coloured belly (Sick 1997; del Hoyo et al. 2018).

## Other noteworthy records

We recorded other migratory and resident birds that are difficult to detect in the field due to their inconspicuous behaviour or occasional observations.

Order Charadriiformes

Family Scolopacidae

***Actitis macularius* (Linnaeus, 1766)**
Figure 2E

**Material examined.** Tables 1, 2.

**Identification.** One individual in eclipse plumage was seen foraging on a small mudflat on the shore of the Bracinho River. We identified this species by its brown upper, white belly and eyebrow, dark beak, and yellowish legs (Gwynne et al. 2010). We saw discreet spots on the belly, indicating its non-breeding status.

Order Pelecaniformes
Family Ardeidae

***Ixobrychus exilis* (Gmelin, 1789)**
Figure 2F

**Material examined.** Tables 1, 2.

**Identification.** This species was detected in all periods, mostly by voice. It was rarely seen but frequently heard. This species was observed making short flights and discreet landings among aquatic macrophytes (Pontederiaceae and Polygonaceae). *Ixobrychus exilis* has a characteristic voice and vocalises frequently. This species is a small, reddish-brown bittern, with two white stripes on the back. The male has a black cap and back, with yellowish stripes on the throat, while the female has a brown cap and back, with the darkest bands on the neck (Martínez-Vilata et al. 2018).

## General list of EET birds

Field data, combined with data from the literature and museum specimens, yielded 278 bird species that occur in the EET. These species belong to 60 families in 24 orders (Table 2). Of these species, 160 were assigned to the primary list and 118 to the secondary list. None of the species recorded is endemic to the Pantanal biome. Of the species, 49 are migrant species, with 30 being partially migratory, 16 migratory, two vagrants, and one not

defined. In the general list, there are two globally Vulnerable species and one nationally Vulnerable species, *Penelope ochrogaster* Pelzeln, 1870.

For the tertiary list, seven species are included based on the known distribution their patterns (Table 3). We highlight the need for documented evidence of the species in the secondary list, especially for those whose documentation is unknown for the northwest region of the Pantanal, such as *Podilymbus podiceps* (Linnaeus, 1758), *Pardirallus nigricans* (Vieillot, 1819), and *Thamnophilus caerulescens* Vieillot, 1816, and the Nearctic migrants. *Tyrannus tyrannus* (Linnaeus, 1758) and *Sterna hirundo* Linnaeus, 1758.

## Discussion

The highly preserved and well-located Estação Ecológica de Taiamã, with its varied macrohabitats (Frota et al. 2017), harbours considerable bird richness, even though it is a predominantly open area. Nunes (2010) observed that this floodplain region shelters a greater number of species and individuals than the straighter and more human-disturbed segments of the Paraguay River. According to Lopes et al. (2016), Cáceres municipality, where EET is located, harbours the greatest number of bird species of all of Brazil's non-forest areas. This is due to the high diversity of habitats in the Cáceres municipality and because it lies at the contact zone between ecoregions, such as the Chiquitano Dry Forests and the Cerrado.

The Pantanal stands out in terms of species numbers when compared to other wetlands, such as the Florida Everglades or the Venezuelan Llanos. Our sampling comprised 35.56% of the Pantanal's avifauna (Nunes 2011), while the general list including the previously existing data comprised 47.76%. When systematic, non-systematic, LTER expeditions and secondary records are considered, we see the potential of the area to harbour high species richness, which may be due to its environmental heterogeneity regulated by hydrological variation.

Among all families, Tyrannidae tends to be abundant in the Pantanal region (Cintra and Yamashita 1990; Pinho et al. 2016; Vitorino et al. 2017) and represents one of the richest Neotropical bird families; the Tyraniidae is widely distributed in South and North America (Sick 1997). We highlight the representativeness of non-passerine families recorded in our study, and also reported in other Pantanal regions (Cintra and Yamashita 1990; Antas et al. 2009; Nunes et al. 2010), due to the high species diversity in the families Ardeidae, Threskiornithidae, Anatidae, and Alcedinidae, among other non-passerines, which are associated with water bodies and open areas, such as found in the Pantanal.

Some key factors influencing variations in the frequency of bird occurrence in the EET include changes in the macrohabitats caused by the dry season and the presence of migratory species. Cintra and Yamashita (1990) also observed that seasonality and migratory movements affected the occurrence of bird species in northern Pantanal. In the southern Pantanal, Donatelli et al. (2017) found that even with a relatively stable abundance of bird species in different habitats over the years, there is a greater concentration of birds during the dry season, mainly due to lower water levels, which allow birds to explore more resources. In fact, the continuity of LTER in the EET can further promote information about fluctuations and enable the detection of other species.

The Pantanal is the final destination or stopover site for several migratory and nomad birds, which forage and breed there (Morrison et al. 2008; Oliveira et al. 2016). Ornithological inventories are extremely important, as they generate data on the occurrence and distribution patterns of bird species. In addition, monitoring can provide data on displacement and movement patterns throughout the year.

We highlight the record of *Chlidonias niger*, a migratory bird that breeds in North America and winters on the coast of Central America and South America. This species arrives back on the breeding grounds in April (Gochfeld et al. 2019), which is the same month as we observated an individual in the Pantanal. Our record adds information on the movements and habitat use of this species in Brazil. Until now, records in Brazil have been limited to coastal regions. Brazil is an important wintering destination for *C. niger*, which is usually observed between September and February (Somenzari et al. 2018). Individual birds in the Pantanal wetland are possibly vagrants, as seen in other intercontinental wetlands of South America, like in Chile and Argentina (Gochfeld et al. 2019). Nevertheless, the EET's wetlands ensure a very important stopover for this species.

Some resident species were only observed in certain periods, which strengthens the need for year-round monitoring to determine species' annual movements. Long-term studies are important not only for showing patterns of annual fluctuations but also to detect the occurrence

**Table 3.** Tertiary list of birds recorded at Estação Ecológica de Taiamã, Mato Grosso Pantanal, Brazil. Birds without a documented evidence, whose occurrence is questionable, invalid, or non-existent in the Pantanal wetlands.

| |
|---|
| *Crypturellus noctivagus* (Wied, 1820): Listed by Brazil (2017). No context given. Distribution unknown to the Pantanal wetlands. |
| *Aramides saracura* (Spix, 1825): Listed by Brazil (2017). No context given. Distribution unknown to the Pantanal wetlands. |
| *Gallinula angulata* Sundevall, 1850: Listed by Brazil (2017). No context given. Distribution unknown to the Pantanal wetlands. |
| *Celeus flavescens* (Gmelin, 1788): Listed by Brazil (2017). No context given. Distribution unknown to the Pantanal wetlands. |
| *Brotogeris versicolurus* (Statius Müller, 1776): Listed by Brazil (2017). No context given. Distribution unknown to the Pantanal wetlands. Likely use of old nomenclature for *Brotogeris chiriri.* |
| *Thamnophilus palliatus* (Lichtenstein, 1823): Listed by Brazil (2017). No context given. Distribution unknown to the Pantanal wetlands. |
| *Conopophaga lineata* (Wied, 1831): Listed by Brazil (2017). No context given. Distribution unknown to the Pantanal wetlands. |

of species, which may be associated with the availability of food resources (Alves 2007). As for migrant species of the Hirundinidae family, we associate their occurrence with an abundance of their food resources, the insect flock, in the Pantanal wetland.

During the dry season, water levels are low, and especially in the buffer zone, this provides limnicolous habitats for migrant scolopacids to forage, whereas the formation of beaches offers habitat for the nesting of colonial species such as *Rynchops niger*, as also observed by Antas et al. (2016) on the Cuiabá River.

The habitat occupation patterns differ among migratory species (Signor and Pinho 2011) and the abundance of residents is related to the use of a greater variety of Pantanal habitats (Figueira et al. 2011). The various macrohabitats such Aquatic-Terrestrial Transition Zones, Marshes, and Permanently Flooded Areas in the of the EET and buffer zone are due to the hydric dynamics of the Paraguay River and favour a greater availability of habitats and resources for bird species.

Migratory birds depend on habitats and food resources in breeding and wintering grounds that are often thousands of kilometres apart (Oliveira et al. 2016). If these habitats and resources are not protected, the birds are at risk of great population losses. According to Bird Life International (2018), around 40% of migratory bird species in decline.

Da Silva et al. (2015) and Tomas et al. (2019) stated that the diverse impacts that take place in Pantanal wetland directly affect ecosystem dynamics caused by the hydrological regime and landscape changes, such as hydroelectric power plants and the Paraguay River Waterway (Hydrovia). Cintra (2011) emphasised that the protection and conservation of rivers, baías (floodplain ponds), and lake beaches, as habitats adjacent, are fundamental for maintaining bird diversity. Thus, conservation actions must protect of the Pantanal wetlands and also of the surrounding plateau (Pinho et al. 2017).

The EET harbours bird species typical of wetlands as well as some savanna species. There are no species endemic to the Pantanal biome, but species directly associated with or dependent on these wetlands are well represented, such as *Cercomacra melanaria* (Ménétriès, 1835) and *Synallaxis albilora* Pelzeln, 1856. The importance of bird surveys in the Pantanal biome is, thus, underscored, especially given the difficultly in detecting resident and migratory species in the EET.

Environmental heterogeneity of the EET may observed by species richness and composition. For example, some birds inhabiting flooded grasslands, such as species of the genus *Sporophila*; from floating macrophyte mats, like *Amblyramphus holosericeus*; from aquatic areas, like *Heliornis fulica*; from mudflats, such as species in the family Scolopacidae; from open areas, like *Ardea cocoi* Linnaeus, 1766 and *Ciconia maguari* (Gmelin, 1789); and from forests, such as *Campylorhamphus trochilirostris* (Lichtenstein, 1820), *Trogon curucui* Linnaeus, 1766, *Procacicus solitarius* (Vieillot, 1816), and *Cercomacra melanaria*.

The occurrence of some as migrant and vagrant species in the EET shows that this area is very significant for maintaining the ecosystem and its biodiversity. Documention of the bird species is necessary to support scientific knowledge of this wetland. Expanding the boundaries of this protected area further may promote its conservation, as the EET is important as a stopover, feeding and breeding ground, and wintering site for migratory birds. Long-term monitoring in the EET is needed for an understanding of the ecology of these bird species in this protected area and for improved management and conservation of the Pantanal wetland.

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## Authors' Contributions

AVBF project design, data collection, identification of species, compilation, and review of occurrence records and preparation of the manuscript. BDV project design, data collection, species identification, and review of the manuscript. CJS project design and review of the manuscript. SKI and JRN review of the manuscript.

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# Appendix

**Table S1.** Survey sites, site codes, and points, with their geographic positions and macrohabitats.

| Hydrological cycle | Site name | Site code | Point | Latitude | Longitude | Macrohabitats |
|---|---|---|---|---|---|---|
| 2015–2016 | Station 1 | S1 | MF1P1 | 16°49.36'S | 057°32.48'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | MF1P2 | 16°49.24'S | 057°32.45'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | MF1P3 | 16°49.17'S | 057°32.36'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | MF1P4 | 16°49.28'S | 057°32.30'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | MF1P5 | 16°49.33'S | 057°32.19'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | MF1P6 | 16°49.27'S | 057°32.06'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | MF1P7 | 16°49.20'S | 057°31.97'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | MF1P8 | 16°49.19'S | 057°31.84'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | Station 2 | S2 | MF2P1 | 16°52.27'S | 057°32.06'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | | | MF2P2 | 16°52.15'S | 057°32.13'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | | | MF2P3 | 16°52.04'S | 057°32.19'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | | | MF2P4 | 16°51.95'S | 057°32.26'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | | | MF2P5 | 16°51.86'S | 057°32.35'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | | | MF2P6 | 16°51.82'S | 057°32.46'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |

| Hydrological cycle | Site name | Site code | Point | Latitude | Longitude | Macrohabitats |
|---|---|---|---|---|---|---|
| 2015–2016 | Station 2 | S2 | MF2P7 | 16°51.67'S | 057°33.42'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | | | MF2P8 | 16°51.62'S | 057°33.54'W | Monospecific forest with *Erythrina fusca* Lour. / floating islands and meadows / river channels |
| | Station 3 | S3 | PF1P1 | 16°51.89'S | 057°33.17'W | Shrubland and pioneer forest / river channels |
| | | | PF1P2 | 16°51.95'S | 057°33.06'W | Shrubland and pioneer forest / river channels |
| | | | PF1P3 | 16°51.94'S | 057°32.94'W | Shrubland and pioneer forest / river channels |
| | | | PF1P4 | 16°51.92'S | 057°32.88'W | Shrubland and pioneer forest / river channels |
| | | | PF1P5 | 16°51.89'S | 057°32.69'W | Shrubland and pioneer forest / river channels |
| | | | PF1P6 | 16°50.86'S | 057°35.17'W | Shrubland and pioneer forest / river channels |
| | | | PF1P7 | 16°50.95'S | 057°35.11'W | Shrubland and pioneer forest / river channels |
| | | | PF1P8 | 16°51.04'S | 057°35.02'W | Shrubland and pioneer forest / river channels |
| | Station 4 | S4 | PF2P1 | 16°52.18'S | 057°26.47'W | Shrubland and pioneer forest / river channels |
| | | | PF2P2 | 16°52.29'S | 057°26.42'W | Shrubland and pioneer forest / river channels |
| | | | PF2P3 | 16°52.38'S | 057°26.34'W | Shrubland and pioneer forest / river channels |
| | | | PF2P4 | 16°52.48'S | 057°26.29'W | Shrubland and pioneer forest / river channels |
| | | | PF2P5 | 16°52.56'S | 057°26.19'W | Shrubland and pioneer forest / river channels |
| | | | PF2P6 | 16°52.56'S | 057°26.07'W | Shrubland and pioneer forest / river channels |
| | | | PF2P7 | 16°52.58'S | 057°25.96'W | Shrubland and pioneer forest / river channels |
| | | | PF2P8 | 16°52.62'S | 057°25.84'W | Shrubland and pioneer forest / river channels |
| | Station 5 | S5 | FG1P1 | 16°49.71'S | 057°38.11'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | | | FG1P2 | 16°49.82'S | 057°38.09'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | | | FG1P3 | 16°49.94'S | 057°38.07'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | | | FG1P4 | 16°50.04'S | 057°38.14'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | | | FG1P5 | 16°50.15'S | 057°38.18'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | | | FG1P6 | 16°50.23'S | 057°38.27'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | | | FG1P7 | 16°50.30'S | 057°38.35'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | | | FG1P8 | 16°50.25'S | 057°38.45'W | Flooded grassland / floating islands and meadows / river and floodplain channels |
| | Station 6 | S6 | FG2P1 | 16°52.75'S | 057°24.61'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| | | | FG2P2 | 16°52.72'S | 057°24.51'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| | | | FG2P3 | 16°52.63'S | 057°24.47'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| | | | FG2P4 | 16°52.51'S | 057°24.45'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| | | | FG2P5 | 16°52.45'S | 057°24.31'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| | | | FG2P6 | 16°52.48'S | 057°24.18'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| | | | FG2P7 | 16°52.38'S | 057°24.14'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| | | | FG2P8 | 16°52.26'S | 057°24.19'W | Flooded grassland / floating islands and meadows / lakes / river channels |
| 2017–2018 | Track 1 | T1 | T1P1 | 16°49.32'S | 057°32.24'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P2 | 16°49.18'S | 057°31.91'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P3 | 16°49.27'S | 057°31.68'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P4 | 16°49.49'S | 057°31.40'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P5 | 16°49.53'S | 057°31.13'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P6 | 16°49.44'S | 057°30.80'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P7 | 16°49.33'S | 057°30.61'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P8 | 16°49.48'S | 057°30.38'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P9 | 16°49.68'S | 057°30.18'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | | | T1P10 | 16°49.55'S | 057°29.93'W | Monospecific forest with *Erythrina fusca* Lour. / aquatic macrophytes / river channels |
| | Track 2 | T2 | T2P1 | 16°51.77'S | 057°26.14'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P2 | 16°52.07'S | 057°26.33'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P3 | 16°52.46'S | 057°26.28'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P4 | 16°52.57'S | 057°26.00'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P5 | 16°52.64'S | 057°25.69'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P6 | 16°52.57'S | 057°25.35'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P7 | 16°52.45'S | 057°25.14'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P8 | 16°52.70'S | 057°25.07'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P9 | 16°52.98'S | 057°25.06'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | | | T2P10 | 16°52.94'S | 057°24.68'W | Shrubland and pioneer forest / aquatic macrophytes / river channels |
| | Track 3 | T3 | T3P1 | 16°53.39'S | 057°29.62'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P2 | 16°53.67'S | 057°29.45'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P3 | 16°54.03'S | 057°29.36'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P4 | 16°53.98'S | 057°28.93'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |

| Hydrological cycle | Site name | Site code | Point | Latitude | Longitude | Macrohabitats |
|---|---|---|---|---|---|---|
| 2017–2018 | Track 3 | T3 | T3P5 | 16°54.06'S | 057°28.63'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P6 | 16°54.66'S | 057°28.92'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P7 | 16°54.59'S | 057°28.33'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P8 | 16°54.92'S | 057°28.26'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P9 | 16°55.03'S | 057°28.00'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T3P10 | 16°55.01'S | 057°27.72'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | Track 4 | T4 | T4P1 | 16°51.69'S | 057°33.50'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P2 | 16°51.81'S | 057°33.30'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P3 | 16°51.93'S | 057°33.00'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P4 | 16°51.91'S | 057°32.68'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P5 | 16°51.86'S | 057°32.41'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P6 | 16°52.07'S | 057°32.23'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P7 | 16°52.33'S | 057°32.04'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P8 | 16°51.99'S | 057°31.96'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P9 | 16°51.80'S | 057°31.86'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | | | T4P10 | 16°51.64'S | 057°31.64'W | Monospecific forest with *Erythrina fusca* Lour. / shrubland and pioneer forest / flooded grasslands / aquatic macrophytes / floating islands and meadows / river channels |
| | Track 5 | T5 | T5P1 | 16°49.00'S | 057°39.43'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P2 | 16°49.22'S | 057°39.59'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P3 | 16°49.54'S | 057°39.55'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P4 | 16°49.81'S | 057°39.64'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P5 | 16°50.06'S | 057°39.70'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P6 | 16°50.33'S | 057°39.83'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P7 | 16°50.60'S | 057°39.63'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P8 | 16°50.87'S | 057°39.56'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P9 | 16°51.04'S | 057°39.28'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |
| | | | T5P10 | 16°51.19'S | 057°39.51'W | Flooded grassland / aquatic macrophytes / floating islands and meadows / lakes / river and floodplain channels |