Avifauna of a white-sand vegetation enclave in north-west Rondônia, Brazil: relevant records, body mass and morphometrics

Authors: Guilherme, Edson, Marques, Edilaine Lemes, and Santos, Geyse Souza

Source: Bulletin of the British Ornithologists' Club, 138(4) : 286-306

Published By: British Ornithologists' Club

URL: https://doi.org/10.25226/bboc.v138i4.2018.a2

Avifauna of a white-sand vegetation enclave in north-west Rondônia, Brazil: relevant records, body mass and morphometrics

by Edson Guilherme, Edilaine Lemes Marques & Geyse Souza Santos

Received 29 March 2018; revised 27 August 2018; published 14 December 2018

http://zoobank.org/urn:lsid:zoobank.org:pub:84EC74FE-95C0-48F7-AF97-CE8900DAEB4F

Summary.—White-sand vegetation (WSV) enclaves occur throughout Amazonia. WSV, known in Brazil as *campina* or *campinarana*, possesses peculiar floral and faunal communities, different from those in adjacent forests but with biogeographic affinities to those in similar ecosystems far distant. Recent ornithological studies of these 'islands' have yielded new taxa for science and enabled a better understanding of the zoogeography of many poorly known species in Amazonia. Here we report the results of an ornithological survey of a *campinarana* enclave in north-west Rondônia, southern Amazonian Brazil. The area was inventoried three times in 2010–12, totalling 899 net / hours and 110 hours of observations. A total of 171 bird species was identified, belonging to 44 families. Among them, at least nine species are closely associated with WSV: Green-tailed Goldenthroat *Polytmus theresiae*, White-fringed Antwren *Formicivora grisea*, Natterer's Slaty Antshrike *Thamnophilus stictocephalus*, Black Manakin *Xenopipo atronitens*, Plain-crested Elaenia *Elaenia cristata*, Pale-bellied Mourner *Rhytipterna immunda*, Campina Flycatcher *Cnemotriccus fuscatus duidae*, Plush-crested Jay *Cyanocorax chrysops diesingii* and Red-shouldered Tanager *Tachyphonus phoenicius*. Approximately 8% of the species recorded are migratory, most of them austral migrants. In addition, body mass and morphometrics of 136 individuals from 55 species are presented. Our results augment ornithological knowledge in Rondônia, aid our understanding of regional zoogeography, and serve as an alert to the need to preserve a region that has suffered severe anthropogenic impacts for >100 years.

Amazonia is the largest and most diverse biome on Earth (Mittermeier *et al*. 2003). It has the largest extent of continuous forest in the world and harbours impressive biodiversity (Kress *et al*. 1998, Mittermeier *et al*. 2003). The biome as a whole is very heterogeneous (Terborgh & Andresen 1998, ter Steege *et al*. 2003). It is a mosaic of different types of ecosystems resulting from variable regional edaphic and climatic conditions (Duivenvoorden *et al*. 2005, Haugaasen & Peres 2006, Fine & Kembel 2011, Fine *et al*. 2012). Among these ecosystems are several forest types, e.g., *terra firme* and *várzea* (Terborgh & Andresen 1998), as well as some non-forest environments, e.g. the enclaves or 'islands' of open vegetation within forests (Anderson 1981, Fine *et al*. 2012, Fine & Bruna 2016, Mustin *et al*. 2017, Demarchi *et al*. 2018).

Enclaves of open vegetation are distributed discontinuously throughout Amazonia (Adeney *et al*. 2016). The origin of these enclaves is still being discussed—one hypothesis is a Pleistocene and Holocene provenance, when the climate in Amazonia became drier as a consequence of the last glacial maximum (Pessenda *et al*. 2001, Clark *et al*. 2009). The types of open vegetation in Amazonia are distinguished by their general physiognomy dictated by floristic composition according to the local edaphic, hydrological and climatic conditions (Adeney *et al*. 2016). The two main groups are savanna / *cerrado* (Sanaiotti *et al*. 1997, Silva *et*

ISSN-2513-9894 (Online)

al. 1997, Sanaiotti & Cintra 2001, Aleixo & Poletto 2007, Aleixo *et al*. 2011, Boss & Silva 2014, Mustin *et al*. 2017) and a special type of vegetation that grows on white-sand soils, known in Brazil as *campina* and *campinarana* (Anderson 1981, Borges 2004, Borges *et al*. 2016a,b, Adeney *et al*. 2016). Recent ornithological studies of these 'islands' of non-forest vegetation have revealed new taxa to science and helped to understand the zoogeography of the many patchily distributed species in Amazonia (Alvarez-Alonso & Whitney 2003, Whitney & Alvarez-Alonso 2005, Poletto & Aleixo 2009, Guilherme & Borges 2011, Alvarez-Alonso *et al*. 2013, Capurucho *et al*. 2013, Cohn-Haft *et al*. 2013, Whitney *et al*. 2013b,d, Borges *et al*. 2016a,b, Matos *et al*. 2016).

Rondônia state, in south-west Amazonian Brazil, lies within an area of endemism of the same name (Silva *et al*. 2005, Fernandes 2013). Although rich in endemic and / or rare species (Fernandes 2013), the state has already lost >30% of its forest cover due to logging and agroforestry (Serrão *et al*. 1996, Piontekowski *et al*. 2014, Fearnside 2017). Ornithological surveys in the state have progressively increased over the last 100 years (e.g. Hellmayr 1910, Stotz *et al*. 1997, Boçon 1999, Kirwan & Shirihai 2007, Olmos *et al*. 2011, Santos *et al*. 2011) and, as further areas are inventoried, several new species of birds have been discovered (Lanyon *et al*. 1990, Whitney *et al*. 2013a,b,c). Despite this, the richness of bird species and their distribution in the state as a whole are poorly known and have not been subject to major review. There are still numerous gaps in our ornithological knowledge of Rondônia because many areas are yet to be surveyed. Here, we present the results of a rapid inventory of an enclave of WSV near the BR-364 and the recently implemented Jirau hydroelectric power plant in north-west Rondônia.

Methods

Study area.—The study was undertaken in an enclave of WSV and its environs called Miratinga, located along a power transmission line west of the BR-364 (between Porto

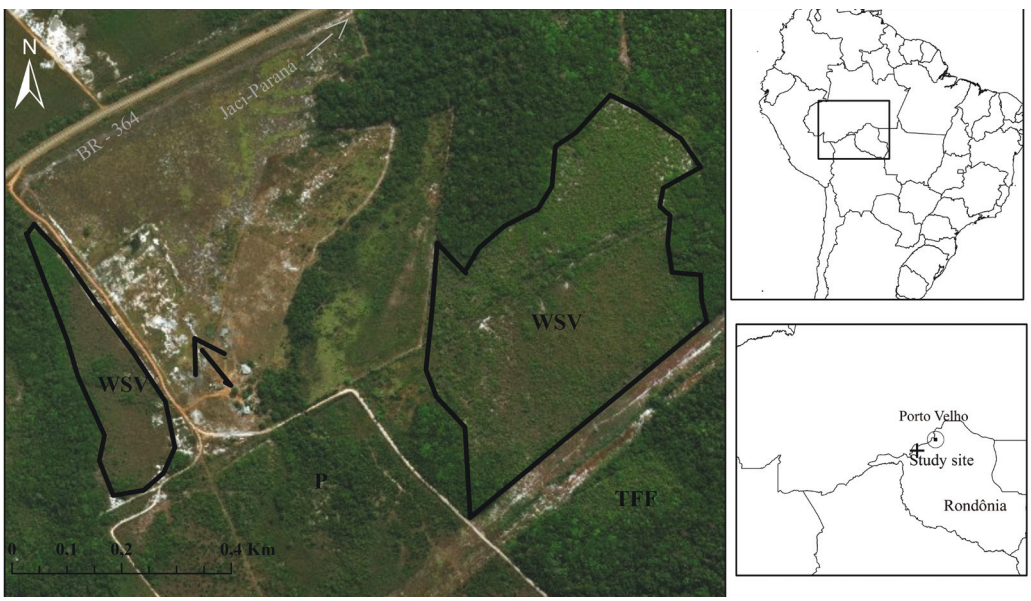

Figure 1. Location of the study area. TFF = terra firme forest, WSV = white-sand vegetation (campinarana), P = pasture. The black arrow indicates the commercial sand mining area. (Map adapted from Google Earth; satellite image courtesy of Google Inc. All rights reserved © 2018.)

ISSN-2513-9894 (Online)

Figure 2. Overview of the white-sand vegetation (*campinarana*) survey area: (A) access road to *campinarana*, (B) panoramic view of the *campinarana*, (C) structure of the *campinarana* highlighting the presence of *Mauritiella armata* palms, (D) *Pteridium* sp. fern, (E) area where sand is being commercially mined.

Velho and Abunã), *c*.30 km from Jaci Paraná in the municipality of Porto Velho, Rondônia (09°21′38.3″S, 64°39′29.2″W; Fig. 1).

Description of the area.—The *campinarana* enclave is mainly covered by dense shrubs, with sparse, small trees (2–5 m tall) (Fig. 2A–C) and some *Astrocaryum acaule* and *Mauritiella armata* palms (Fig. 2C). The soil is covered by grasses (Fig. 2A–B) and, as in other WSV environments, should be of low fertility and high acidity. At the edges of the patch, in areas of sparse vegetation and where the soil is more humid, an invasive fern *Pteridium* sp. is present (Fig. 2D). Part of the *campinarana* has been deforested and sand is being commercially removed (Fig. 2E). In the vicinity, there are small black-water streams and at least one medium-sized pond. During the wet season, puddles form where vegetation is sparse (Fig. 1) and in the *campinarana*, which is surrounded by fragments of *terra firme* forest severely modified by selective logging, and open pastures (Fig. 1).

Avifaunal sampling.—Three visits were made to the area in 2010–12. The avifaunal survey covered both the *campinarana* and surrounding fragments of *terra firme* forest and pastures (Fig. 1). Two approaches were used to inventory the area: (a) quantitative, using mist-nets and (b) qualitative, via field observations using binoculars. The *campinarana* was inventoried on 2 June 2010 (60 net / hours and two hours of observation), 26 February–3 March 2011 (439 net / hours and 54 hours of observation) and 20–24 August 2012 (400 net / hours and 54 hours of observation). Individuals captured with mist-nets were weighed

ISSN-2513-9894 (Online)

using a Pesola® scale and their wing, tarsus and total lengths were taken with a millimetre ruler. Wing, tarsus and total lengths were measured in accordance with standard reference works, see Proctor & Lynch (1993: 295–297) and Sick (1997: 91, Fig. G). Ageing and sexing were performed whenever possible. Some specimens were collected as vouchers and were prepared using standard taxidermy techniques. Specimens were collected under ICMBio / SISBIO authorisation no. 23269-1, and deposited either at the Universidade Federal do Acre (UFAC), Rio Branco, or the Museu Paraense Emílio Goeldi (MPEG), Belém. Scientific nomenclature follows that of the Brazilian Committee of Ornithological Records (Piacentini *et al*. 2015).

Results and Discussion

A total of 171 species from 44 families was recorded in the *campinarana* enclave and its environs (Table 1). Of these, 74 (43.2%) species are non-Passeriformes and 97 (56.7%) Passeriformes. Among the latter, the families Tyrannidae (26), Thraupidae (17) and Thamnophilidae (12) were richest in species (Table 1). At least nine species recorded in the study area are closely associated with *campinarana*: Green-tailed Goldenthroat *Polytmus theresiae*, White-fringed Antwren *Formicivora grisea*, Natterer's Slaty Antshrike *Thamnophilus stictocephalus*, Black Manakin *Xenopipo atronitens*, Plain-crested Elaenia *Elaenia cristata*, Pale-bellied Mourner *Rhytipterna immunda*, Campina Flycatcher *Cnemotriccus fuscatus duidae*, Plush-crested Jay *Cyanocorax chrysops diesingii* and Red-shouldered Tanager *Tachyphonus phoenicius* (Table 1). Two other important records included Rondônia Bushbird *Clytoctantes atrogularis* (Guilherme & Souza 2013) and Buff-cheeked Tody-Flycatcher *Poecilotriccus senex*. Approximately 8% of the species recorded are visitors, mostly austral migrants, e.g. Large Elaenia *Elaenia spectabilis*, Chilean Elaenia *E. chilensis*, Small-billed Elaenia *E. parvirostris*, Fork-tailed Flycatcher *Tyrannus savana*, Crowned Slaty Flycatcher *Griseotyrannus aurantioatrocristatus*, Variegated Flycatcher *Empidonomus varius*, Southern Scrub Flycatcher *Sublegatus modestus*, Vermilion Flycatcher *Pyrocephalus rubinus*, Fuscous Flycatcher *Cnemotriccus fuscatus bimaculatus*, Chivi Vireo *Vireo chivi*, Creamy-bellied Thrush *Turdus amaurochalinus*, Yellow-bellied Seedeater *Sporophila nigricollis* and Double-collared Seedeater *S. caerulescens*, while Solitary Sandpiper *Tringa solitaria* was the only Nearctic migrant (Table 1).

Species accounts

GREEN-TAILED GOLDENTHROAT *Polytmus theresiae*

Relatively common but discontinuously distributed in enclaves of open vegetation throughout Amazonia (Schuchmann 1999, Borges *et al*. 2001, Sanaiotti & Cintra 2001, Aleixo & Poletto 2007, Schulenberg *et al*. 2007, Guilherme 2012). Hellmayr (1910) reported two collected by W. Hoffmanns around Rio Preto, in the north-east of the state, and Aleixo & Poletto (2007) the presence at MPEG of one collected by J. Hidasi at Guajará-Mirim, on the border with Bolivia. Additionally, the species was photographed in the municipalities of Cabixi and Vilhena in southern Rondônia (Wikiaves 2018). On 2 June 2010, three were collected (MPEG 70938, 70939, male, 70940) and on 22–23 August 2012 we collected another five (UFAC 507, 508, 511, 522, 523). Available records of *P. theresiae* in Rondônia indicate that the species is locally common, but only in enclaves of *cerrado*, *campina* and *campinarana*.

NATTERER'S SLATY ANTSHRIKE *Thamnophilus stictocephalus*

Previously treated as a race of a widespread Eastern Slaty Antshrike *T. punctatus* (Isler *et al*. 1997). Distributed patchily in *campina* and *campinarana* east of the Guaporé / Madeira Rivers

ISSN-2513-9894 (Online)

TABLE 1
Birds recorded in a *campinarana* (white-sand vegetation) and its environs in north-west Rondônia, Brazil. Habitat: C = *campinarana*; TF = *terra firme* forest; R = reservoirs and lakes; AO = open areas; P = pasture and man-modified areas. Record types: V = vocalisation; O = sight; S = museum specimen. Nomenclature follows Piacentini *et al*. (2015). [1] = follows *Handbook of the birds of the world* (del Hoyo & Collar 2016). * = white-sand specialists following Stotz *et al*. (1996) and Borges *et al*. (2015). ** = migrants [a] = austral; [n] = Nearctic.

Family / Species	English name	Habitat	Record
TINAMIDAE			
Crypturellus cinereus	Cinereous Tinamou	TF	V
Crypturellus strigulosus	Brazilian Tinamou	C	V
ANATIDAE			
Amazonetta brasiliensis	Brazilian Teal	R	O
CRACIDAE			
Penelope jacquacu	Spix's Guan	TF	O
Ortalis guttata	Speckled Chachalaca	TF	O
ARDEIDAE			
Tigrisoma lineatum	Rufescent Tiger Heron	R	O
Bubulcus ibis	Cattle Egret	P	O
Ardea cocoi	Cocoi Heron	R	O
Ardea alba	Great Egret	R	O
Egretta thula	Snowy Egret	R	O
CATHARTIDAE			
Cathartes aura	Turkey Vulture	OA, P	O
Cathartes melambrotus	Greater Yellow-headed Vulture	OA, P	O
Coragyps atratus	Black Vulture	OA, P	O
ACCIPITRIDAE			
Rupornis magnirostris	Roadside Hawk	TF	O
Buteo nitidus	Grey-lined Hawk	TF	O
RALLIDAE			
Laterallus viridis	Russet-crowned Crake	R	V
Laterallus melanophaius	Rufous-sided Crake	R	V, O
Porphyrio martinicus	Purple Gallinule	R	O
CHARADRIIDAE			
Vanellus chilensis	Southern Lapwing	P	O
SCOLOPACIDAE			
Tringa solitaria [**n]	Solitary Sandpiper	R	O
JACANIDAE			
Jacana jacana	Wattled Jacana	R	O
COLUMBIDAE			
Columbina passerina	Common Ground Dove	C, P	S
Columbina talpacoti	Ruddy Ground Dove	C, P	S
Claravis pretiosa	Blue Ground Dove	C	S
Patagioenas speciosa	Scaled Pigeon	C	O
Leptotila verreauxi	White-tipped Dove	C	S
Geotrygon montana	Ruddy Quail-Dove	TF	S

ISSN-2513-9894 (Online)

Family / Species	English name	Habitat	Record
CUCULIDAE			
Piaya cayana	Squirrel Cuckoo	TF	O
Crotophaga ani	Smooth-billed Ani	P, C	O
TYTONIDAE			
Tyto furcata	American Barn Owl	TF	V
STRIGIDAE			
Megascops choliba	Tropical Screech Owl	TF	V
Athene cunicularia	Burrowing Owl	P	O
CAPRIMULGIDAE			
Nyctidromus nigrescens	Blackish Nightjar	C	S
Nyctidromus albicollis	Common Pauraque	C, P	V, O
APODIDAE			
Chaetura brachyura	Short-tailed Swift	OA	O
Panyptila cayennensis	Lesser Swallow-tailed Swift	OA	O
TROCHILIDAE			
Phaethornis ruber	Reddish Hermit	TF	O
Phaethornis philippii	Needle-billed Hermit	TF	S
Campylopterus largipennis	Grey-breasted Sabrewing	TF	S
Polytmus theresiae *	Green-tailed Goldenthroat	C	S
TROGONIDAE			
Trogon curucui	Blue-crowned Trogon	TF	O
ALCEDINIDAE			
Megaceryle torquata	Ringed Kingfisher	R	O
Chloroceryle amazona	Amazon Kingfisher	R	O
Chloroceryle americana	Green Kingfisher	R	O
Chloroceryle inda	Green-and-rufous Kingfisher	R	O
BUCCONIDAE			
Bucco tamatia	Spotted Puffbird	TF	S
Monasa nigrifrons	Black-fronted Nunbird	TF	O
Chelidoptera tenebrosa	Swallow-winged Puffbird	TF	O
CAPITONIDAE			
Capito dayi	Black-girdled Barbet	TF	O
RAMPHASTIDAE			
Ramphastos tucanus	White-throated Toucan	TF	O, V
Ramphastos vitellinus	Channel-billed Toucan	TF	O, V
Pteroglossus inscriptus	Lettered Aracari	TF	O
Pteroglossus castanotis	Chestnut-eared Aracari	TF	O, V
PICIDAE			
Picumnus aurifrons	Bar-breasted Piculet	TF	S
Melanerpes cruentatus	Yellow-tufted Woodpecker	TF	O, V
Colaptes punctigula	Spot-breasted Woodpecker	TF	O
Dryocopus lineatus	Lineated Woodpecker	TF	O, V
Campephilus melanoleucos	Crimson-crested Woodpecker	TF	O, V
FALCONIDAE			
Daptrius ater	Black Caracara	OA	O, V

ISSN-2513-9894 (Online)

Family / Species	English name	Habitat	Record
Ibycter americanus	Red-throated Caracara	TF	O, V
Caracara plancus	Southern Caracara	P	O, V
Milvago chimachima	Yellow-headed Caracara	P	O, V
Herpetotheres cachinnans	Laughing Falcon	TF	O, V
Falco rufigularis	Bat Falcon	TF	O
PSITTACIDAE			
Ara ararauna	Blue-and-yellow Macaw	TF	O, V
Ara macao	Scarlet Macaw	TF	O, V
Ara chloropterus	Red-and-green Macaw	TF	O, V
Ara severus	Chestnut-fronted Macaw	TF	O, V
Orthopsittaca manilatus	Red-bellied Macaw	TF	O, V
Psittacara leucophthalmus	White-eyed Parakeet	TF	O, V
Aratinga weddellii	Dusky-headed Parakeet	TF	O, V
Pionus menstruus	Blue-headed Parrot	TF	O, V
Amazona farinosa	Mealy Parrot	TF	O, V
Amazona ochrocephala	Yellow-crowned Parrot	TF	O, V
THAMNOPHILIDAE			
Pygiptila stellaris	Spot-winged Antshrike	TF	S
Microrhopias quixensis	Dot-winged Antwren	TF	O
Clytoctantes atrogularis	Rondônia Bushbird	C	S
Myrmophylax atrothorax	Black-throated Antbird	TF	O, V
*Formicivora grisea**	White-fringed Antwren	C	S
Thamnomanes saturninus	Saturnine Antshrike	TF	S
Thamnophilus doliatus	Barred Antshrike	TF	O, V
Thamnophilus schistaceus	Plain-winged Antshrike	TF	O, V
*Thamnophilus stictocephalus**	Natterer's Slaty Antshrike	C	S
Sciaphylax hemimelaena	Chestnut-tailed Antbird	TF	S,O, V
Hypocnemis ochrogyna	Rondônia Warbling Antbird	TF	S
Willisornis poecilinotus	Common Scale-backed Antbird	TF	O, V
DENDROCOLAPTIDAE			
Glyphorynchus spirurus	Wedge-billed Woodcreeper	TF	S
Xiphorhynchus elegans	Elegant Woodcreeper	TF	S
Xiphorhynchus guttatoides	Lafresnaye's Woodcreeper	TF	O, V
Dendroplex picus	Straight-billed Woodcreeper	TF	O, V
XENOPIDAE			
Xenops minutus	Plain Xenops	TF	S
FURNARIIDAE			
Berlepschia rikeri	Point-tailed Palmcreeper	TF	O, V
Furnarius leucopus	Pale-legged Hornero	TF	O, V
Anabacerthia ruficaudata	Rufous-tailed Foliage-gleaner	TF	O
Philydor erythrocercum	Rufous-rumped Foliage-gleaner	TF	S
Synallaxis rutilans	Ruddy Spinetail	C	S
PIPRIDAE			
Ceratopipra rubrocapilla	Red-headed Manakin	C, TF	S
Manacus manacus	White-bearded Manakin	C	S

ISSN-2513-9894 (Online)

Family / Species	English name	Habitat	Record
Machaeropterus pyrocephalus	Fiery-capped Manakin	TF, C	S
*Xenopipo atronitens**	Black Manakin	C	S
ONYCHORHYNCHIDAE			
Terenotriccus erythrurus	Ruddy-tailed Flycatcher	TF	S
TITYRIDAE			
Iodopleura isabellae	White-browed Purpletuft	TF	O
Tityra semifasciata	Masked Tityra	TF	O
COTINGIDAE			
Querula purpurata	Purple-throated Fruitcrow	TF	O
Lipaugus vociferans	Screaming Piha	TF	V, O
RHYNCHOCYCLIDAE			
Mionectes oleagineus	Ochre-bellied Flycatcher	TF	S
Tolmomyias flaviventris	Yellow-breasted Flycatcher	C	S
Todirostrum maculatum	Spotted Tody-Flycatcher	TF, C	O, V
Poecilotriccus senex	Buff-cheeked Tody-Flycatcher	C	S
Poecilotriccus latirostris	Rusty-fronted Tody-Flycatcher	TF	O, V, S
TYRANNIDAE			
Camptostoma obsoletum	Southern Beardless Tyrannulet	C, TF	O, V
*Elaenia spectabilis***[a]	Large Elaenia	C	S
*Elaenia chilensis***[a]	Chilean Elaenia	C	S
*Elaenia parvirostris***[a]	Small-billed Elaenia	C	S
*Elaenia cristata**	Plain-crested Elaenia	C	S
Myiopagis viridicata	Greenish Elaenia	C	O, V
Tyrannulus elatus	Yellow-crowned Tyrannulet	C, TF	S
Phaeomyias murina	Mouse-coloured Tyrannulet	C	S, V
Legatus leucophaius	Piratic Flycatcher	TF	O, V
Myiarchus ferox	Short-crested Flycatcher	C, TF	S, V, O
*Rhytipterna immunda**	Pale-bellied Mourner	C	S, O
Pitangus sulphuratus	Great Kiskadee	C, TF	O, V
Myiodynastes maculatus	Streaked Flycatcher	C, TF	O, V
Tyrannopsis sulphurea	Sulphury Flycatcher	C, TF	O, V
Megarynchus pitangua	Boat-billed Flycatcher	C, TF	O, V
Myiozetetes cayanensis	Rusty-margined Flycatcher	C, TF	O, V
Myiozetetes similis	Social Flycatcher	C, TF	O, V
Tyrannus melancholicus	Tropical Kingbird	C, TF	O, V
*Tyrannus savana***[a]	Fork-tailed Flycatcher	C, P, TF	O
*Griseotyrannus aurantioatrocristatus***[a]	Crowned Slaty Flycatcher	C	O
*Empidonomus varius***[a]	Variegated Flycatcher	C	O
*Sublegatus modestus***[a]	Southern Scrub Flycatcher	C	S
*Pyrocephalus rubinus***[a]	Vermilion Flycatcher	C, P	O
*Cnemotriccus fuscatus duidae**	Campina Flycatcher[1]	C	S
Cnemotriccus fuscatus beniensis	Fuscous Flycatcher	TF	S
*Cnemotriccus fuscatus bimaculatus***[a]	Fuscous Flycatcher	C	S
VIREONIDAE			
Cyclarhis gujanensis	Rufous-browed Peppershrike	C, TF	O, V

ISSN-2513-9894 (Online)

Family / Species	English name	Habitat	Record
*Vireo chivi***[a]	Chivi Vireo	C	S
CORVIDAE			
*Cyanocorax chrysops diesingii**	Plush-crested Jay	C	O, V
HIRUNDINIDAE			
Stelgidopteryx ruficollis	Southern Rough-winged Swallow	OA	O
Progne tapera	Brown-chested Martin	OA	O
Progne chalybea	Grey-breasted Martin	OA	O
Tachycineta albiventer	White-winged Swallow	R	O
TROGLODYTIDAE			
Troglodytes musculus	Southern House Wren	C, P	O, V
Campylorhynchus turdinus	Thrush-like Wren	TF	O, V
Pheugopedius genibarbis	Moustached Wren	TF	S
TURDIDAE			
*Turdus amaurochalinus***[a]	Creamy-bellied Thrush	TF	S
Turdus ignobilis	Black-billed Thrush	C, TF	S
PASSERELLIDAE			
Ammodramus aurifrons	Yellow-browed Sparrow	C, P	O, V
ICTERIDAE			
Psarocolius bifasciatus	Olive Oropendola	TF	O
Cacicus cela	Yellow-rumped Cacique	TF	O, V
Icterus cayanensis	Epaulet Oriole	TF	O
Sturnella militaris	Red-breasted Meadowlark	P	O
THRAUPIDAE			
Schistochlamys melanopis	Black-faced Tanager	C	O
Paroaria gularis	Red-capped Cardinal	R	O
Tangara episcopus	Blue-grey Tanager	C, P, TF	S, O, V
Tangara palmarum	Palm Tanager	TF	O, V
Hemithraupis flavicollis	Yellow-backed Tanager	TF	O
Volatinia jacarina	Blue-black Grassquit	C, P	S
*Tachyphonus phoenicius**	Red-shouldered Tanager	C	S
Ramphocelus carbo	Silver-beaked Tanager	C, P, TF	S, O, V
Tersina viridis	Swallow Tanager	TF	S
Cyanerpes cyaneus	Red-legged Honeycreeper	TF	O
Dacnis cayana	Blue Dacnis	TF	O
Dacnis lineata	Black-faced Dacnis	TF	O
*Sporophila nigricollis***[a]	Yellow-bellied Seedeater	TF, P	S, O
*Sporophila caerulescens***[a]	Double-collared Seedeater	C, P	S
Sporophila angolensis	Chestnut-bellied Seed Finch	C	O
Saltator maximus	Buff-throated Saltator	TF	O
Saltator coerulescens	Greyish Saltator	TF	O
FRINGILLIDAE			
Euphonia chrysopasta	Golden-bellied Euphonia	TF	O

ISSN-2513-9894 (Online)

to the island of Marajó in Pará (Isler *et al*. 1997, Zimmer & Isler 2003). Olmos *et al*. (2011) reported *T. stictocephalus* in savannas at Serra da Cutia National Park, in the south-west of the state, and at Campos do Urupa within the Uru-Eu-Wau-Wau Indigenous Territory, in central Rondônia. Natterer's Slaty-Antshrike has been found in several municipalities along the BR-364, between Vilhena and Porto Velho (Wikiaves 2018). Very common in the study area, being seen and caught in mist-nets daily (Fig. 3A). Five specimens were collected, a female on 2 June 2010 (MPEG 70950) and two pairs, on 27 February 2011 (UFAC 284, 286) and 1 March 2011 (UFAC 310, 309). Our records of *T. stictocephalus* extend the species' range to extreme north-west Rondônia.

RONDÔNIA BUSHBIRD *Clytoctantes atrogularis*
A globally threatened species (BirdLife International 2017) whose unusual record in the study area was discussed by Guilherme & Santos (2013). The female collected (UFAC 473) represents the westernmost available record (Costa *et al*. 2017).

WHITE-FRINGED ANTWREN *Formicivora grisea*
Occurs from the right bank of the Madeira River east to the Atlantic coast, including all of north-east Brazil, as well as in northern South America including the Guianas, Venezuela and Colombia (Zimmer & Isler 2003). Recently found in *campinarana* in extreme south-west Amazonas (Guajará) and westernmost Acre (Cruzeiro do Sul and Mâncio Lima) (Poletto & Aleixo 2005, Guilherme 2012). In Rondônia, it was known from around Rio Preto in the north-east (Hellmayr 1910) and in savanna at Traçadal Biological Reserve and Serra da Cutia National Park (Olmos *et al*. 2011) in the centre-west. Abundant in *campinarana* at Miratinga. On 2 June 2010, three were collected (MPEG 70951, male, 70952, female, 70953, male). On 27–28 February 2011, four were trapped of which three were collected (UFAC 283, male, 288, female, 304, female) and on 20–23 August 2012 seven were trapped of which four were prepared as specimens (UFAC 476, juvenile male, 480, male, 510, female, 525, male). Records of *F. grisea* at Miratinga extend the species' range in Rondônia 232 km to the north-west and 227 km north, from Rio Preto and Traçadal Biological Reserve, respectively.

BLACK MANAKIN *Xenopipo atronitens*
Considered an indicator species of *campinarana* (Borges *et al*. 2016a). Although abundant in habitat, it is patchily distributed (Aleixo & Poletto 2007, Poletto & Aleixo 2005, Guilherme & Borges 2011, Borges *et al*. 2014, 2016b). Previous records in Rondônia were by Whittaker (2004) at Taquaras (BR-425) and by Olmos *et al*. (2011) in savanna at Traçadal Biological Reserve and Serra da Cutia National Park. Since 2010, it has been photographed in several municipalities in eastern Rondônia, e.g. Machadinho d'Oeste, Parecis and Chupinguaia (Wikiaves 2018). At Miratinga, Black Manakin was seen and trapped daily. A male was collected on 6 February 2010 (MPEG 70977), while another four were collected subsequently, three in 2011 on 26 February (UFAC 276, female, 282, male) and 1 March (AC 312, female), and one on 22 August 2012 (UFAC 512, male). Records of *X. atronitens* at Miratinga extend its range to far north-west Rondônia.

BUFF-CHEEKED TODY-FLYCATCHER *Poecilotriccus senex*
Until very recently, known only from the type locality at Borba, Amazonas state, on the right bank of the lower Madeira River (Hellmayr 1910, Hoyo *et al*. 2004). In recent years, recorded at localities on the right bank of the middle (Cohn-Haft *et al*. 2007, Whittaker 2009) and upper Madeira (Whittaker 2004, Wikiaves 2018). In Rondônia, reported initially in 2002, at a *campina* at Taquaras (BR-425), in the north-west of the state (Whittaker

ISSN-2513-9894 (Online)

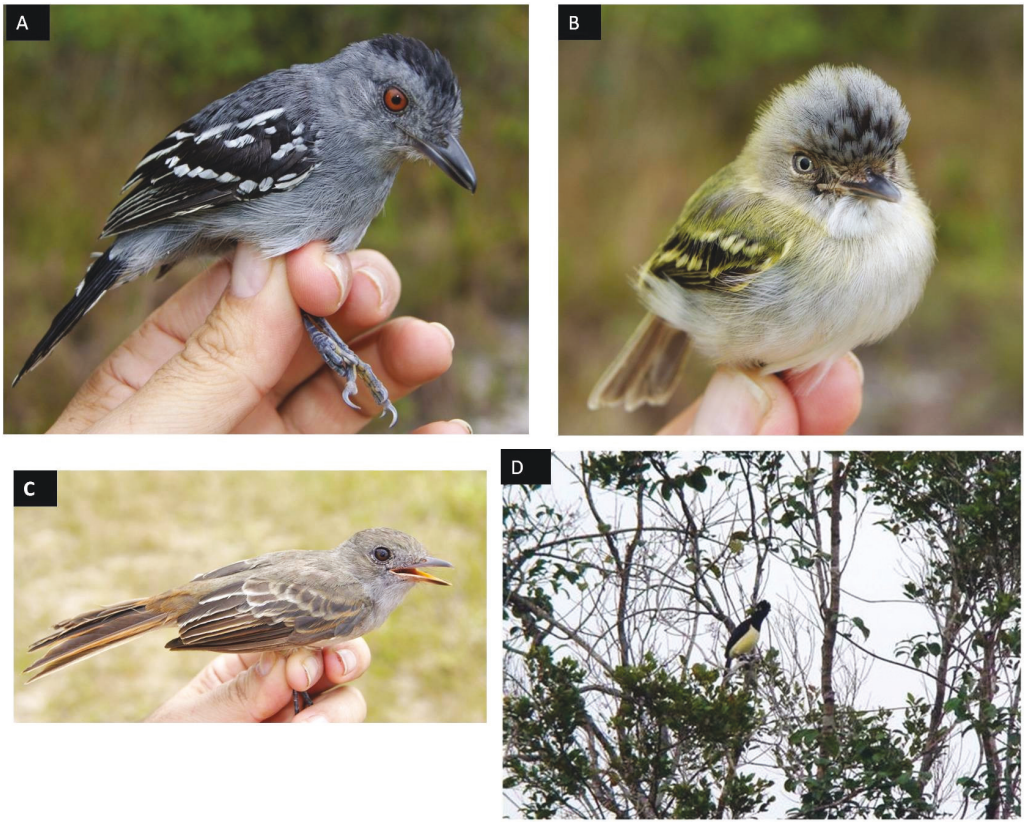

Figure 3. Bird specialists of white-sand vegetation in Amazonia: (A) male Natterer's Slaty-Antshrike *Thamnophilus stictocephalus*, 27 February 2011, (B) Pale-bellied Mourner *Rhytipterna immunda*, 28 February 2011, (C) Buff-cheeked Tody-Flycatcher *Poecilotriccus senex*, 27 February 2011, (D) Plush-crested Jay *Cyanocorax chrysops diesingii*, 1 March 2011 (Edson Guilherme)

2004). On 27 February 2011, we collected one at the edge of *campinarana* (MPEG 74005). Unfortunately, during its preparation, mass was not taken and neither was it possible to sex the bird (Fig. 3B; Table 2). Recent records indicate that the species inhabits patches of open vegetation in a swath from northern Rondônia and extreme south-east Amazonas (e.g. Humaitá National Forest) from the right bank of the Madeira east to the Madeira / Tapajós interfluvium (Whittaker 2004, 2009, Cohn-Haft *et al*. 2007, Wikiaves 2018).

PALE-BELLIED MOURNER *Rhytipterna immunda* (Figure 3C)

An uncommon species readily confused with a *Myiarchus* (Lanyon 1973). *R. immunda* is unique to savanna environments in Amazonia, from easternmost Colombia to the Guianas, and in Brazil it occurs patchily in WSV through the Negro drainage east to Pará, Amapá and Tocantins, and in southern Rondônia and Mato Grosso (Lanyon 1973, Scholes 2004, Whittaker 2004, Dornas *et al*. 2012). It has also been recorded in north-east Bolivia (Scholes 2004, Tobias & Seddon 2007). The first record in Rondônia was documented by Whittaker (2004) in the north-west of the state, in a *campina* at Taquaras, Porto Velho municipality. Subsequently, it was recorded in savanna at Serra da Cutia National Park, south-west Rondônia, and in Uru-Eu-Wau-Wau Indigenous Territory, in central Rondônia (Olmos *et al*. 2011). Also documented in the municipalities of Guajará-Mirim and Machadinho d'Oeste (Wikiaves 2018). Among species associated with *campinarana*, this was one of the most

ISSN-2513-9894 (Online)

abundant in mist-nets. Ten were trapped, of which five were collected: three on 26 and 28 February 2011 (UFAC 278, 295, 296) and two on 22 August 2012 (MPEG 82235–36). Records of *R. immunda* in north-west Rondônia (e.g. Miratinga) are the south-westernmost in Brazil.

CAMPINA FLYCATCHER *Cnemotriccus fuscatus duidae*

Strongly associated with *campina* / *campinarana* (Borges *et al*. 2016a). Differs from other races of *C. fuscatus* by its much more yellowish underparts (Zimmer 1938; Fig. 4A). It occurs patchily across almost all of Amazonia (Tobias & Seddon 2007, Guilherme & Borges 2011, Borges *et al*. 2016a). One was collected on 22 February 2011 in *campinarana* (UFAC 294; Fig. 4A–B), the first record of this taxon in Rondônia. The closest previous record of *C. f. duidae* was on the Bolivia / Brazil border at Piedritas, on the left bank of the Madeira River, *c*.100 km south-west of our study area (Tobias & Seddon 2007). *C. f. duidae*, unlike its congeners (see below), appears to be resident in *campina* / *campinarana* in the region.

FUSCOUS FLYCATCHER *Cnemotriccus fuscatus*

In addition to the specimen attributed to C. *f. duidae* (above), three other specimens of *C. fuscatus* were collected. Two (MPEG 70971 and UFAC 509) match *C. f. beniensis* and a third (UFAC 477) more closely resembles *C. f. bimaculatus* (Fig. 4A–C). Although Tobias & Seddon (2007) argued that *C. f. beniensis* could be synonymous with *C. f. fuscatior*, a series collected in Acre (Guilherme 2009, 2012, 2016) plus the two from Rondônia agree with the description presented by Gyldenstolpe (1945) to differentiate it from *C. f. bimaculatus*. Some of the differences noted by Gyldenstolpe (1945) and observed in UFAC 509 are: '…chin and throat grayish-white, usually without any yellowish tinge; breast greyish brown without olivaceous suffusion; bill larger and stronger…' (Fig. 4A–C). Although bill length is almost identical among specimens UFAC 509 (*beniensis*) and 477 (*bimaculatus*) (14.1 vs. 14.04 mm respectively), in UFAC 509 it is broader (5.0 vs. 3.92 mm) and flatter than in UFAC 477 (Fig. 4C). The morphological similarities, as a whole, between UFAC 509 from Rondônia (Fig. 4A–C) and the holotype of *C. f. beniensis*, from Bolivia, were proven by comparing it with the photograph of the type specimen (NRM 569425) online (http://www.nrm.se). UFAC 509 also shows clear differences from the holotype of *C. f. fuscatior* (Fig. 4D). The latter, AMNH 211013 from Ecuador, as described by Chapman (1926) has '…Upperparts much darker and wing-bars narrower than in any other described race of the species… the breast grayish olive, the belly pale sulphur-yellow…' (Fig. 4D). In UFAC 509, the wingbars are broad as in UFAC 477 (*bimaculatus*) (Fig. 4B) and the back and chest are brown (Fig. 4A–B), not grey as in *C. f. fuscatior* (Fig. 4D). Additionally, *C. f. fuscatior* is associated with *várzea* and river islands (Tobias & Seddon 2007), while UFAC 509 (Fig. 4A–C) and MPEG 70971 are from a *campinarana* enclave in *terra firme*, which reinforces our conviction that the two latter specimens represent *beniensis*. Taxonomy of the group is confused (Chapman 1926, Zimmer 1938, Gyldenstolpe 1945, Tobias & Seddon 2007) and genetic and vocal analyses should seek to clarify how many species-level taxa are involved. The certainty is that at least three taxa of the *C. fuscatus* complex occur at Miratinga. This is the first record of *beniensis* in Rondônia (where its status is uncertain), while *bimaculatus* is an austral migrant (Hellmayr 1910, Stotz *et al*. 1997, Whittaker 2004, Santos *et al*. 2011).

PLUSH-CRESTED JAY *Cyanocorax chrysops diesingii*

This subspecies is the Amazonian substitute of *C. c. chrysops*, which is common in south-east Brazil, northern Argentina, Uruguay, Paraguay and Bolivia (Ridgely & Tudor 1994). *C. c. diesingii* is a specialist of *campina* / *campinarana* (Aleixo & Poletto 2007, Whittaker 2009, Borges *et al*. 2016a). On 1 March 2011 a pair was observed vocalising and later one was

ISSN-2513-9894 (Online)

Figure 4. Three specimens of the Fuscous Flycatcher *Cnemotriccus fuscatus* complex collected in *campinarana* and deposited at the Universidade Federal do Acre, Rio Branco (UFAC) compared to the holotype of *C. f. fuscatior* in the American Museum of Natural History, New York (AMNH 211013): (A–B) ventral and lateral views of UFAC 509, 477 and 294; (C) front view showing difference between bills of UFAC 477 and UFAC 509 (Edson Guilherme); (D) ventral and lateral views of AMNH 211013 (Paul Sweet). UFAC 294 = *C. f. duidae*; UFAC 477 = *C. f. bimaculatus*, UFAC 509 = *C. f. beniensis* and AMNH 211013 = *C. f. fuscatior* holotype.

photographed at the edge of *campinarana* at Miratinga (Fig. 3D). In 2012, the species was seen daily in the same place. This taxon appears to be common in enclaves of *campinarana* along the BR-364 between Porto Velho and Abunã, in the north-west of the state. It is possible that *C. c. diesingii* occurs sympatrically with the recently discovered Campina Jay *C. hafferi* (Cohn-Haft *et al*. 2013) in *campina* / *campinarana* further north, in Amazonas, e.g. in WSV enclaves around Borba (Hellmayr 1910, Wikiaves 2018).

RED-SHOULDERED TANAGER *Tachyphonus phoenicius*

Typical of open vegetation in Amazonia (e.g. *cerrado*, *campina* and *campinarana*) and present in three different biogeographic regions. North of the Solimões / Amazon River in the states of Roraima, Pará and Amapá, as well as in eastern Colombia, southern Venezuela and the Guianas; in the south, from the Madeira basin in the region of Guayaramerin

ISSN-2513-9894 (Online)

in Bolivia (Tobias & Seddon 2007) to the east; and in the extreme south-west, in north-east Peru (Loreto), western Acre (Mâncio Lima and Cruzeiro do Sul) and south-western Amazonas (municipality of Guajará) (Hilty 2011, Guilherme 2012, 2016; E. Guilherme & A. Aleixo unpubl.). In Rondônia, *T. phoenicius* was recorded by Olmos *et al*. (2011) at Traçadal Biological Reserve and Serra da Cutia National Park, in the south-west of the state, with other documented records from the municipalities of Parecis and Vilhena (Naumburg 1930, Wikiaves 2018). A female was collected in *campinarana* at our study site on 20 August 2012 (UFAC 475), extending the species' range in Rondônia to the north, *c*.230 km from Traçadal Biological Reserve.

Discussion

Although our visits to the study site were short, totalling just nine days, a significant number of species was recorded. The avifauna found exclusively in *campinarana* represented 17.7% of all species recorded and consists of birds that colonise forest edge, open country or habitat specialists (*sensu* Stotz *et al*. 1996, Borges 2004, Borges *et al*. 2016a). Of the 35 taxa considered by Borges *et al*. (2016a) to be WSV specialists throughout Amazonia, 17.1% were recorded in this small *campinarana*. However, if we consider only the 11 WSV specialists from the southern Solimões / Amazon basin (*sensu* Stotz *et al*. 1996), representativeness increases to 54.5%. Some species (e.g. *Xenopipo atronitens*) have specialised to such an extent that they occur only in enclaves of open vegetation across Amazonia (Capurucho *et al*. 2013, Borges *et al*. 2016a). This implies that vegetation growing on white sand functions as 'islands' or mini-refugia (*sensu* Isler *et al*. 1997) within the surrounding forest. These 'islands' also offer a range of food resources capable of attracting seasonal migrants from other open biomes (e.g., Cerrado, Chaco, *campos sulinos*), which explains the comparatively large number of austral migrant species in this small patch of WSV. The result is a unique community of birds different from that in surrounding forest (Borges 2004). Therefore, the presence of an enclave of *campinarana* contributes significantly to regional diversity in Amazonia (Borges *et al*. 2016a).

Body mass and morphometrics.—These data, taken from 136 individuals of 55 different species (Table 2), are presented separately by age and gender (Table 2). Because many species in the study area are uncommon and patchily distributed, we consider it important to publish these mass and morphometric data. Such information forms the basis of comparative studies in various aspects of animal biology, including community structure and theoretical modelling (Hudson *et al*. 2013, Frasier 2016). Dunning (2008) compiled body mass data for 8,700 species worldwide, but for some the number of individuals sampled was very small and from a single locality, e.g. *Thamnophilus stictocephalus*, for which just one male from Bolivia was available to Dunning (2008). In this study, we not only increased the number of *T. stictocephalus* so measured, but we also collected mass and morphometrics for many other species from Brazil that were poorly sampled or unrepresented in Dunning's work, e.g. Rondônia Warbling Antbird *Hypocnemis ochrogyna*, which was recently split from *H. cantator* (Isler *et al*. 2007; Table 2).

Conservation.—The small enclave of WSV at Miratinga lies within a region that is highly threatened (Vale *et al*. 2008, Fernandes *et al*. 2010). It is directly impacted by the BR-364 and, according to the Socioecological and Economic Zoning of Rondônia, forms part of 1.2 Sub-zone, which is subject to accelerated occupation and uncontrolled deforestation. Furthermore, the area is likely to witness increasing agricultural and other anthropogenic disturbance in the future (Fernandes *et al*. 2010). A concrete example of this is the recently implanted Jirau Hydroelectric Plant, 9.5 km from the study site. Allied to this, an energy transmission line, linking the states of Rondônia and Acre, transects the *campinarana* (see

ISSN-2513-9894 (Online)

TABLE 2

Body mass and morphometrics of 55 different species captured in a *campinarana* and its environs in north-west Rondônia, Brazil. Age: A= adult; Y = young. Sex: F = female; M = male, U = undetermined. Nomenclature follows Piacentini *et al*. (2015). Wing, tarsus and total length in mm; body mass in g. * No mass data from South America in Dunning (2008). ** No mass data from Brazil in Dunning (2008).[1] Sample of fewer than ten individuals in Dunning (2008). [2] No mass data in Dunning (2008).

Species name	**Age**	**Sex**	**Body mass** Mean ± SD (*n*) max.–min.	**Wing** Mean ± SD (*n*) max.–min.	**Tarsus** Mean ± SD (*n*) max.–min.	**Total length** Mean ± SD (*n*) max.–min.
*Columbina passerina**	A	F	34	80	12	160
*Columbina talpacoti***	A	F	42	86	13	175
*Leptotila verreauxi**	A	M	130	129	35	270
*Geotrygon montana***	A	F	100	125	32	230
*Nyctidromus nigrescens***	A	F	45	138	13	215
*Phaethornis philippi***	A	U	(2) 4	(2) 55–70	(2) 4–3	(2) 124–154
Campylopterus largipennis	A	U	7	74	3.1	135
*Polytmus theresiae***	A	F	3	56	3	101
	A	M	3	60	3	102
	J	U	4	55	3	96
	A	U	(2) 3	(2) 56	(2) 4	(2) 100–101
*Bucco tamatia***	A	U	35	79	16	185
	A	F	33	75	19	181
Picumnus aurifrons[1]	A	M	8	48	15	82
*Pygiptila stellaris***	A	M	23	81	16	148
Clytoctantes atrogularis[1]	A	F	33	85	27	197
*Formicivora grisea***	A	M	10.6 ± 0.8 (5) 10–12	54.6 ± 2.0 (5) 52–57	20 ± 2.5 (5) 18–24	134 ± 3.7 (5) 130–139
	A	F	10.6 ± 0.8 (6) 1 0–12	51.3 ± 2.5 (6) 48–55	21.6 ± 5.1 (6) 17–29	129.5 ± 6.4 (6) 122–139
Thamnomanes saturninus	A	F	19	72	18	155
	A	U	21	80	16	156
Thamnophilus stictocephalus[1]**	A	M	(2) 17–19	(2) 65–66	(2) 25–27	(2) 148–158
	A	F	(2) 12–16	(2) 65–66	(2) 24–27	(2) 135–160
*Sciaphylax hemimelaena***	A	F	13	54	22	115
Hypocnemis ochrogyna[2]	A	U	11	55	18	124
Glyphorynchus spirurus	A	U	13 ± 0 (3)	73.3 ± (3) 71–76	15 ± 1.7 (3) 13–16	154 ± 2 (3) 152–156
Xiphorhynchus elegans	A	U	39	105	20	226
Xenops minutus	A	U	14	65	15	123
*Philydor erythrocercum***	A	U	27	95	20	176
*Synallaxis rutilans***	A	U	13	61	15	155
Ceratopipra rubrocapilla	A	M	12	59	17	106
	A	F	(2) 14	(2) 62–63	(2) 12	(2) 112
Manacus manacus	A	M	13.6 ± 1.1 (3) 13–15	51.3 ± 2 (3) 105–106	21.6 ± 5.5 (3) 16–27	105.3 ± 0.5 (3) 105–106
	A	F	13	47	21	110
*Machaeropterus pyrocephalus***	A	M	9	48	18	86

ISSN-2513-9894 (Online)

Species name	Age	Sex	Body mass Mean ± SD (*n*) max.–min.	Wing Mean ± SD (*n*) max.–min.	Tarsus Mean ± SD (*n*) max.–min.	Total length Mean ± SD (*n*) max.–min.
	A	F	8.3 ± 0.5 (3) 8–9	49.6 ± 1.5 (3) 48–51	15.6 ± 2 (3) 14–18	85.6 ± 5.5 (3) 80–91
*Xenopipo atronitens***	A	M	(2) 13	(2) 72–74	(2) 15	(2) 123–130
	A	F	13.8 ± 1.4 (5) 12–16	66.6 ± 2.4 (5) 64–70	16.4 ± 2.4 (5) 14–19	127.4 ± 4.6 (5) 120–131
*Terenotriccus erythrurus***	A	U	7	48	13	102
*Mionectes oleagineus***	A	M	10	56	19	105
	A	U	11 ± 1 (3) 10–12	56.6 ± 1.1 (3) 56–58	14.6 ± 4.6 (3) 12–20	122 ± 6 (3) 115–126
*Tolmomyias flaviventris***	A	M	11	58	21	125
	A	F	(2) 13–11	(2) 54	(2) 19–21	(2) 126–130
	A	U	(2) 10–12	(2) 60–61	(2) 16	(2) 120–127
Poecilotriccus senex	A	U	------	44	16	101
*Poecilotriccus latirostris***	A	U	6	43	17	101
Elaenia spectabilis[1]	A	U	22	92		165
*Elaenia chilensis***	J	U	14	68	16	113
*Elaenia parvirostris***	A	U	12 ± 2.4 (6) 8–14	71 ± 2.5 (6) 66–73	15.8 ± 2.5 (6) 12–20	147 ± 8.3 (6) 133–158
*Elaenia cristata***	A	U	(2) 13–17	(2) 67–69	(2) 14.4–15	(2) 160
*Tyrannulus elatus***	A	U	9	60	13	112
*Phaeomyias murina***	A	U	7.75 ± 0.5 (4) 7–8	56.5 ± 1.2 (4) 55–58	16 ± 0.8 (4) 15–17	122 ± 1.4 (4) 120–123
	J	U	8	56	15	114
Myiarchus ferox	A	U	27 ± 1.7 (3) 25–28	86 ± 3.4 (3) 82–88	19.3 ± 0.5 (3) 19–20	198.3 ± 5.7 (3) 195–205
*Rhytipterna immunda***	A	M	23	85	23	179
	A	F	(2) 26	(2) 84–92	(2) 26–29	(2) 180–187
	A	U	24.8 ± 2.6 (6) 20–27	89 ± 4.6 (6) 85–96	19.8 ± 0.9 (6) 18–21	196 ± 7.1 (6) 188–206
*Tyrannus melancholicus***	A	U	31	95	15	199
Sublegatus modestus[1]	A	U	(2) 13–14	(2) 66	(2) 13–15	(2) 138–142
Cnemotriccus fuscatus duidae[2]	A	U	11	66	21	145
Cnemotriccus fuscatus beniensis[2]	A	U	11	65	22	150
Cnemotriccus fuscatus bimaculatus[2]	A	U	12	69	23	156
*Turdus ignobilis***	A	M	55	108	31	220
	J	F	59	109	34	206
Turdus amaurochalinus	A	U	60	122	30	225
Pheugopedius genibarbis	A	F	18	59	25	----
Tangara episcopus	A	U	21	88	17	170
*Volatinia jacarina***	J	M	(2) 7–10	(2) 53–55	(2) 12–15	(2) 114–116
	A	M	(2) 09–11	(2) 51–52	(2) 13–19	(2) 108–117
	A	F	8	47	14	106
Tachyphonus phoenicius	A	F	24	71	18	168
Ramphocelus carbo	A	F	26	76	18	180

ISSN-2513-9894 (Online)

Species name	Age	Sex	Body mass Mean ± SD (*n*) max.–min.	Wing Mean ± SD (*n*) max.–min.	Tarsus Mean ± SD (*n*) max.–min.	Total length Mean ± SD (*n*) max.–min.
	A	M	23.3 ± 0.5 (3) 23–24	78.3 ± 3.2 (3) 76–82	18 ± 1.7 (3) 17–20	171.3 ± 12 (3) 159–183
Tersina viridis	J	M	25	82	15	161
*Sporophila caerulescens***	J	U	10	58	13	121
	J	M	9	56	12	118
*Sporophila nigricollis***	A	F	8	52	14	101
Sporophila angolensis	A	F	11.8 ± 0.4 (5) 11–12	55.6 ± 1.5 (5) 54–58	13.6 ± 1.3 (5) 12–15	134.8 ± 17.5 (5) 125–166

Fig. 4 in Guilherme & Santos 2013) affecting also adjacent *terra firme* forests. Furthermore, commercial sand mining has directly impacted this small 'island' of WSV in north-west Rondônia. This process completely destroys the vegetation, thereby exposing the soil (Ferreira *et al*. 2013, Adeney *et al*. 2016). Post-exploration, the mined areas are usually abandoned without any type of environmental recovery (Ferreira *et al*. 2013; Fig. 2E). Finally, human impacts on this area date back many decades. One evidence of this is the Madeira / Mamoré railway, whose scar, 52 years after its decommissioning, is still visible in the centre of the study site (Fig. 1).

Although small and degraded, the patch of *campinarana* we surveyed still harbours many species of conservation concern (Table 1, Guilherme & Santos 2013). In general, patches of WSV in Amazonia are fragile and sensitive to anthropogenic activities, being both threatened and poorly represented within the protected area system (Adeney *et al*. 2016, Fine & Bruna 2016). Despite an increase in studies of these ecosystems in recent years, many remain largely unknown scientifically (Adeney *et al*. 2016, Fine & Bruna 2016). We recommend that the environmental authorities in Brazil aim to restore the environmental integrity of the site, and consider the possibility of incorporating our study area into a conservation unit.

Acknowledgements

We thank Francislaine Paulino for inviting us to monitor avifauna along the Porto Velho–Rio Branco powerline. CEPEMAR (Serviços de Consultoria em Meio Ambiente Ltda.) provided financial and logistical support. We also thank the team responsible for the ornithological collection of the Museu Paraense Emílio Goeldi, Belém, especially its curator, Dr Alexandre Aleixo, as well as Maria de Fátima Cunha Lima, Romina Batista and Sidnei de Melo Dantas for their support during this study. Paul Sweet of the American Museum of Natural History, New York, kindly photographed the holotype of *C. f. fuscatior*. Dr Evandro Ferreira (INPA) identified the two palm species in the study area via photographs. EG is grateful to CNPq for its support via project no. 474592/2010-3 (2010-2012). Specimen collection was authorised by the Chico Mendes Biodiversity Conservation Institute (ICMBio) of the Brazilian Ministry of the Environment, via SISBIO license no. 23269-1.

References

Aleixo, A. & Poletto, F. 2007. Birds of an open vegetation enclave in southern Brazilian Amazonia. *Wilson J. Orn*. 119: 610–630.

Aleixo, A., Poletto, F., Lima, M. F. C., Castro, M., Portes, E. & Miranda, L. S. 2011. Notes on the vertebrates of northern Pará, Brazil: a forgotten part of the Guianan Region, II. Avifauna. *Bol. Mus. Para. Emílio Goeldi, Ciênc. Nat*. 6: 11–65.

Alvarez-Alonso, J. & Whitney, B. M. 2001. A new *Zimmerius* tyrannulet (Aves: Tyrannidae) from white sand forests of northern Amazonian Peru. *Wilson Bull*. 113: 1–9.

Alvarez-Alonso, J. & Whitney, B. M. 2003. Eight new bird species for Peru and other distributional records from white-sand forests of the northern Peruvian Amazon, with implications for biogeography of northern South America. *Condor* 105: 552–566.

Alvarez-Alonso, J., Metz, M. R. & Fine, P. V. A. 2013. Habitat specialization by birds in western Amazonian white-sand forests. *Biotropica* 45: 365–372.

ISSN-2513-9894 (Online)

Anderson, A. B. 1981. White-sand vegetation of Brazilian Amazonia. *Biotropica* 13: 199–210.
BirdLife International. 2017. *Clytoctantes atrogularis*. IUCN Red List of threatened species 2017. http://dx.doi.org/10.2305/IUCN.UK.2017-1.RLTS.T22701364A110785170.en (accessed 2 March 2018).
Bóçon, R. 1999. Avifauna do Parque Estadual de Corumbiara, Rondônia, Brasil. Pp. 329–333 *in* Fang, T., Montenegro, J. & Bodmer, R. E. (eds.) *Manejo y conservacion de fauna silvestre en America Latina*. Instituto de Ecologia, La Paz.
Borges, S. H. 2004. Species poor but distinct: bird assemblages in white sand vegetation in Jaú National Park, Amazonian Brazil. *Ibis* 146: 114–124.
Borges, S. H., Cohn-Haft, M., Carvalhaes, A. M. P., Henriques, L. M. P., Pacheco, J. F. & Whittaker. A. 2001. Birds of Jaú National Park, Brazilian Amazon: species check-list, biogeography and conservation. *Orn. Neotrop*. 12: 109–140.
Borges, S. H., Whittaker, A. & Almeida, R. A. 2014. Bird diversity in the Serra do Aracá region, north-western Brazilian Amazon: preliminary checklist with considerations on biogeography and conservation. *Zoologia* 31: 343–360.
Borges, S. H., Cornelius, C., Ribas, C. C., Almeida, R., Guilherme, E., Aleixo, A., Dantas, S., Santos, M. P. D. & Moreira, M. 2016a. What is the avifauna of Amazonian white-sand vegetation? *Bird Conserv. Intern*. 26: 192–204.
Borges, S. H., Cornelius, C., Moreira, M, Ribas, C. C., Cohn-Haft, M., Capurucho, J. M. G., Vargas, C. & Almeida, R. 2016b. Bird communities in Amazonian white-sand vegetation patches: effects of landscape structure and biogeographic context. *Biotropica* 48: 121–131.
Boss, R. L. & Silva, J. M. C. 2015. Core and transient species in an Amazonian savanna bird assemblage. *Rev. Bras. Orn*. 22: 374–382.
Cândido, J. F. 2001. Alterações ambientais antrópicas sobre a avifauna na Amazônia: o caso de Rondônia. Pp. 159–177 *in* Albuquerque, J. L. B., Candido, J. F., Straube, F. C. & Roos, A. (orgs.) *Ornitologia e conservação: da ciência as estratégias*. Tubarão, SC: Ed. UNISUL.
Capurucho, J. C., Cornelius, C., Borges, S. H., Cohn-Haft, M., Aleixo, A., Metzger, J. P. & Ribas, C. 2013. Combining phylogeography and landscape genetics of *Xenopipo atronitens* (Aves: Pipridae), a white sand campinas specialist, to understand Pleistocene landscape evolution in Amazonia. *Biol. J. Linn. Soc*. 110: 60–76.
Chapman, F. M. 1926. Descriptions of new birds from Bolivia, Peru, Ecuador, and Brazil. *Amer. Mus. Novit*. 231: 1–7.
Clark, P. U., Dyke, A. S., Shakun, J. D., Carlson, A. E., Clark, J., Wohlfarth, B., Mitrovica, J. X., Hostetler, S. W. & McCabe, A. M. 2009. The last glacial maximum. *Science* 325: 710–714.
Cohn-Haft, M., Pacheco, A. M. F., Bechtoldt, C. L., Torres, M. F. N. M., Fernandes, A. M., Sardelli, C. H. & Macêdo, I. T. 2007. Inventário ornitológico. Pp. 145–178 *in* Rapp Py-Daniel, L., Deus, C. P., Henriques, A. L., Pimpão, D. M. & Ribeiro, O. M. (orgs.) *Biodiversidade do médio Madeira: bases científicas para propostas de conservação*. Instituto Nacional de Pesquisas da Amazônia, Manaus.
Cohn-Haft, M., Santos-Junior, M. A., Fernandes, A. M. & Ribas, C. C. 2013. A new species of *Cyanocorax* jay from savannas of the central Amazon. Pp. 306–310 *in* del Hoyo, J., Elliott, A., Sargatal, J. & Christie, D. A. (eds.) *Handbook of the birds of the world*, spec. vol. Lynx Edicions, Barcelona.
Costa, T. V. V., Piacentini, V. Q., Oliveira, D., Schunck, F., Whitney, B. M., Rego, M. A., Rubio, T. C., Oliveira, F., Freitas, B., Del-Rio, G., Seeholzer, G., Harvey, M. G., Terrill, R. S., Correa, A. G., Arantes, F. & Silveira, L. F. 2017. New records of the enigmatic *Clytoctantes atrogularis* (Thamnophilidae) in Amazonian Brazil, with remarks on plumage, natural history, and distribution. *Wilson J. Orn*. 129: 1–12.
Daly, D. C., Silveira, M., Medeiros, H., Castro, W. & Obermuller, F. A. 2016. The white-sand vegetation of Acre, Brazil. *Biotropica* 48: 81–89.
Demarchi, L. O., Scudeller, V. V., Moura, L. C., Dias-Terceiro, R. G., Lopes, A., Wittmann, F. K. & Piedade, M. T. F. 2018. Floristic composition, structure and soil-vegetation relations in three white-sand soil patches in central Amazonia. *Acta Amazonica* 48: 46–56.
Dornas, T., Ramos, L., Pinheiro, R. T. & Barbosa, M. O. 2012. Importantes e inéditos registros de aves para o ecótono Amazônia/Cerrado no centro norte do Estado do Tocantins: implicações biogeográficas e extensão de distribuição geográfica de aves amazônicas. *Ararajuba* 20: 119–127.
Duivenvoorden, J. F., Duque, A., Cavelier, J., Garcia, A., Grandez, C., Macia, M. J., Romerosaltos, H., Sanchez, M. & Valencia, R. 2005. Density and diversity of plants in relation to soil nutrient reserves in well-drained upland forests in the north-western Amazon basin. *Biol. Skr*. 55: 25–35.
Dunning, J. B. 2008. *Handbook of avian body masses*. Second edn. CRC Press, New York.
Fearnside, P. M. 2017. Deforestation of the Brazilian Amazon. Pp. 1–33 *in* Schugart, H. (ed.) *Oxford research encyclopedia of environmental science*. Oxford Univ. Press, New York.
Fernandes, A. M. 2013. Fine-scale endemism of Amazonian birds in a threatened landscape. *Biodiver. & Conserv*. 22: 2683–2694.
Fernandes, L. C., Silva, R. B. & Guimarães, S. C. P. 2010. *Zoneamento socioeconômico e ecológico do Estado de Rondônia: vinte e um anos de zoneamento socioeconômico e ecológico do estado de Rondônia. Planejamento para*

ISSN-2513-9894 (Online)

o desenvolvimento sustentável e proteção ambiental. Secretaria de Estado do Desenvolvimento Ambiental, Governo do Estado de Rondônia, Porto Velho.
Ferreira, L. V., Chaves, P. P., Cunha, D. C., Rosario, A. S. & Parolin, P. 2013. A extração ilegal de areia como causa do desaparecimento de campinas e campinarana no Estado do Pará, Brasil. *Pesquisas Botânica* 64: 157–173.
Fine, P. V. A. & Bruna, E. M. 2016. Neotropical white-sand forests: origins, ecology and conservation of a unique rain forest environment. *Biotropica* 48: 5–6.
Fine, P. V. A. & Kembel, S. W. 2011. Phylogenetic community structure and phylogenetic turnover across space and edaphic gradients in western Amazonian tree communities. *Ecography* 34: 552–565.
Fine, P. V. A., García-Villacorta, R., Pitman, N. C. A., Mesones, I. & Kembel, S. W. 2010. A floristic study of the white-sand forests of Peru. *Ann. Miss. Bot. Gard*. 97: 283–305.
Fine, P. V. A., Zapata, F., Daly, D. C., Mesones, I., Misiewicz, T. M., Cooper, H. F. & Barbosa, C. E. A. 2012. The importance of environmental heterogeneity and spatial distance in generating phylogeographic structure in edaphic specialist and generalist tree species of *Protium* (Burseraceae) across the Amazon Basin. *J. Biogeogr*. 40: 646–661.
Frasier, C. C. 2016. The mass, metabolism and length explanation can simultaneously calculate an animal's mass and metabolic rate from its characteristic length. *PeerJ Preprints* 4: e2182v1 (https://doi.org/10.7287/peerj.preprints.2182v1).
Guilherme, E. 2009. Avifauna do estado do Acre: composição, distribuição geográfica e conservação. Ph.D. thesis. Museu Paraense Emílio Goeldi, Univ. Federal do Pará, Belém.
Guilherme, E. 2012. Birds of the Brazilian state of Acre: diversity, zoogeography, and conservation. *Rev. Bras. Orn*. 20: 393–442.
Guilherme, E. 2016. *Aves do Acre*. Ed. Edufac, Rio Branco. http://www.ufac.br/editora/avesdoacre.
Guilherme, E. & Borges, S. H. 2011. Ornithological records from a campina/campinarana enclave on the upper Juruá River, Acre, Brazil. *Wilson J. Orn*. 123: 24–32.
Guilherme, E. & Santos, G. S. 2013. A new locality and habitat type for Rondônia Bushbird *Clytoctantes atrogularis*. *Bull. Brit. Orn. Cl*. 133: 68–71.
Gyldenstolpe, N. 1945. A contribution to the ornithology of northern Bolivia. *Kungl. Svenska Vet. Handl*. 23: 1–301.
Haugaasen, T. & Peres, C. A. 2006. Floristic, edaphic and structural characteristics of flooded and unflooded forests in the lower Rio Purús region of central Amazonia, Brazil. *Acta Amazonica* 36: 25–36.
Hellmayr, C. E. 1910. The birds of the Rio Madeira. *Novit. Zool*. 17: 257–428.
Hilty, S. L. 2011. Family Thraupidae (tanagers). Pp. 46–329 *in* del Hoyo, J., Elliott, A. & Christie, D. A. (eds.) *Handbook of the birds of the world*, vol. 16. Lynx Edicions, Barcelona.
del Hoyo, J. & Collar, N. J. 2016. *The HBW and BirdLife International illustrated checklist of the birds of the world*, vol. 2. Lynx Edicions, Barcelona.
Hudson, L. N., Isaac, N. J. B. & Reuman, D. C. 2013. The relationship between body mass and field metabolic rate among individual birds and mammals. *J. Anim. Ecol*. 82: 1009–1020.
Isler, M. L., Isler, P. R. & Whitney, B. M. 1997. Biogeography and systematics of the *Thamnophilus punctatus* (Thamnophilidae) complex. Pp. 355–381 *in* Remsen, J. V. (ed.) *Studies in Neotropical ornithology honoring Ted Parker*. *Orn. Monogr*. 48.
Isler, M. L., Isler, P. R. & Whitney, B. M. 2007. Species limits in antbirds (Thamnophilidae): the Warbling Antbird (*Hypocnemis cantator*) complex. *Auk* 124: 11–28.
Kirwan, G. M. & Shirihai, H. 2007. Notes on open-country birds in the Brazilian states of Rondônia and Pará. *Cotinga* 29: 178–180.
Kress W. J., Heyer, W. R., Acevedo, P., Coddington, J., Cole, D., Erwin T. L., Meggers, B. J., Pogue, M., Thorington, R. W., Vari, R. P., Weitzman, M. J. & Weitzman, S. H. 1998. Amazonian biodiversity: assessing conservation priorities with taxonomic data. *Biodiver. Conserv*. 7: 1577–1587.
Lanyon, S. M., Stotz, D. F. & Willard, D. E. 1990. *Clytoctantes atrogularis*, a new species of antbird from western Brazil. *Wilson Bull*. 102: 571–580.
Lanyon, W. E. 1973. Range and affinity of the Pale-bellied Mourner (*Rhytipterna immunda*). *Auk* 90: 672–674.
Matos, M. V., D'Horta, F. M., Borges, S. H., Latrubesse, E., Cornelius, C., Cohn-Haft, M. & Ribas. C. C. 2016. Comparative phylogeography of two bird species, *Tachyphonus phoenicius* (Thraupidae) and *Polytmus theresiae* (Trochilidae), specialized in Amazonian white-sand vegetation. *Biotropica* 48: 110–121.
Mittermeier, R. A., Mittermeier, C. G., Brooks, T. M., Pilgrim, J. D., Konstant, W. R., Fonseca, G. A. B. & Kormos, C. 2003. Wilderness and biodiversity conservation. *Proc. Natl. Acad. Sci. USA* 100: 10309–10313.
Mustin, K., Carvalho, W. D., Hilário, R. R., Costa-Neto, S. V., Silva, C. R., Vasconcelos, I. M., Castro, I. J., Eilers, V., Kauano, E. E., Mendes-Junior, R. N. G., Funi, C., Fearnside, P. M., Silva, J. M. C., Euler, A. M. C. & Toledo, J. J. 2017. Biodiversity, threats and conservation challenges in the Cerrado of Amapá, an Amazonian savanna. *Nature Conserv*. 22: 107–127.
Naumburg, E. M. B. 1930. The birds of Matto Grosso, Brazil. *Bull. Amer. Mus. Nat. Hist*. 40: 1–431.
Olmos, F., Silveira, L. F. & Benedicto, G. A. 2011. A contribution to the ornithology of Rondônia, southwest of the Brazilian Amazon. *Rev. Bras. Orn*. 19: 200–229.

ISSN-2513-9894 (Online)

Pessenda, L. C. R., Boulet, R., Aravena, R., Rosolen, V., Gouveia, S. E. M., Ribeiro, A. S. & Lamotte, M. 2001. Origin and dynamics of soil organic matter and vegetation change during the Holocene in a forest-savanna transition zone, Brazilian Amazon region. *Holocene* 11: 250–254.

Piacentini, V. Q., Aleixo, A., Agne, C. E., Maurício, G N., Pacheco, J. F., Bravo, G. A., Brito, G. R. R., Naka, L. N., Olmos, F., Posso, S., Silveira, L. F., Betini, G. S., Carrano, E., Franz, I., Lees, A. C., Lima, L. M., Pioli, D., Schunck, F., Amaral, F. R., Bencke, G. A., Cohn-Haft, M., Figueiredo, L. F. A., Straube, F. C. & Cesari, E. 2015. Annotated checklist of the birds of Brazil by the Brazilian Ornithological Records Committee / Lista comentada das aves do Brasil pelo Comitê Brasileiro de Registros Ornitológicos. *Rev. Bras. Orn*. 23: 91–298.

Piontekowski, V. J., Matricardi, E. A. T., Pedlowski, M. A. & Fernandes, L. C. 2014. Deforestation assessment in the state of Rondônia between 2001 and 2011. *Braz. J. Forestry & Environ*. 21: 297–306.

Poletto, F. & Aleixo, A. 2005. Implicações biogeográficas de novos registros ornitológicos em um enclave de vegetação de campina no sudoeste da Amazônia brasileira. *Rev. Bras. Zool*. 22: 1196–1200.

Proctor, N. S. & Lynch, P. J. 1993. *Manual of ornithology: avian structure and function*. Yale Univ. Press, New Haven, CT.

Ridgely, R. S. & Tudor, G. 1994. *The birds of South America*, vol. 1. Univ. of Texas Press, Austin.

Sanaiotti, T. & Cintra, R. 2001. Breeding and migration birds in an Amazonian savanna. *Stud. Neotrop. Fauna Environ*. 36: 23–32.

Sanaiotti, T. M., Bridgewater, S. & Rattes, J. A. 1997. A floristic study of the savanna vegetation of the state of Amapá, Brazil, and suggestions for its conservation. *Bol. Mus. Para. Emílio Goeldi, Sér. Bot*. 13: 1–27.

Santos, M. P. D., Silva, G. K. & Reis, A. L. 2011. Birds of the Igarapé Lourdes Indigenous Territory, Jí-Paraná, Rondônia, Brazil. *Rev. Bras. Orn*. 19: 230–243.

Scholes, E. 2004. Pale-bellied Mourner *Rhytipterna immunda*. P. 427 *in* del Hoyo, J., Elliott, A. & Christie, D. A. (eds.) *Handbook of the birds of the world*, vol. 9. Lynx Edicions, Barcelona.

Schuchmann, K.-L. 1999. Green-tailed Goldenthroat *Polytmus theresiae*. Pp. 591–592 *in* del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 5. Lynx Edicions, Barcelona.

Schulenberg, T. S., Stotz, D. F., Lane, D. F., O'Neill, J. P. & Parker, T. A. 2007. *Birds of Peru*. Princeton Univ. Press.

Serrão, E. A. S., Nepstad, D. & Walker, R. 1996. Upland agricultural and forestry development in the Amazon: sustainability, criticality and resilience. *Ecol. Economics* 18: 3–13.

Sick, H. 1997. *Ornitologia brasileira*. Ed. Nova Fronteira, Rio de Janeiro.

Silva, J. M. C., Oren, D. C., Roma, J. C. & Henriques, L. M. P. 1997. Composition and distribution patterns of the avifauna of an Amazonian upland savanna, Amapá, Brazil. Pp. 743–762 *in* Remsen, J. V. (ed.) *Studies in Neotropical ornithology honoring Ted Parker*. *Orn. Monogr*. 48.

Silva, J. M. C., Rylands, A. & Fonseca, G. A. 2005. O destino das áreas de endemismo da Amazônia. *Megadiversidade* 1: 124–131.

ter Steege, H., Pitman, N., Sabatier, D., Castellanos, H., van der Hout, P., Daly, D. C., Silveira, M., Phillips, O., Vasquez, R., van Andel, T., Duivenvoorden, J., Adalardo de Oliveira, A., Ek, R., Lilwah, R., Thomas, R., van Essen, J., Baider, C., Maas, P., Mori, S., Terborgh, J., Nunez Vargas, P., Mogollon, H. & Morawetz, W. 2003. A spatial model of tree α-diversity and -density for the Amazon. *Biodiver. Conserv*. 12: 2255–2277.

Stotz, D. F., Fitzpatrick, J. W., Parker, T. A. & Moskovits, D. K. 1996. *Neotropical birds: ecology and conservation*. Univ. of Chicago Press.

Stotz, D. F., Lanyon, S. M., Schulenberg, T. S., Willard, D. E., Peterson, A. T. & Fitzpatrick, J. W. 1997. An avifaunal survey of two tropical forest localities on the middle rio Jiparaná, Rondônia, Brazil. Pp. 763–781 *in* Remsen, J. V. (ed.) *Studies in Neotropical ornithology honoring Ted Parker*. *Orn. Monogr*. 48.

Terborgh, J. & Andresen, E. 1998. The composition of Amazonian forests: patterns at local and regional scale. *J. Trop. Ecol*. 14: 645–664.

Tobias, J. A. & Seddon, N. 2007. Nine bird species new to Bolivia and notes on other significant records. *Bull. Brit. Orn. Cl*. 127: 49–84.

Vale, M. M., Cohn-Haft, M., Bergen, S. & Pimm, S. L. 2008. Effects of future infrastructure development on threat status and occurrence of Amazonian birds. *Conserv. Biol*. 22: 1006–1015.

Vicentini, A. 2004. A vegetação ao longo de um gradiente edáfico no Parque Nacional do Jaú. Pp. 117–143 *in* Borges, S. H., Iwanaga, S., Durigan, C. C. & Pinheiro, M. R. (eds.) *Janelas para a biodiversidade no Parque Nacional do Jaú: uma estratégia para o estudo da biodiversidade na Amazônia*. Fundação Vitória Amazônica, WWF & IBAMA, Manaus.

Whitney, B. M. & Alonso, J. A. 2005. A new species of gnatcatcher from white-sand forests of northern Amazonian Peru with revision of the *Polioptila guianensis* complex. *Wilson Bull*. 117: 113–127.

Whitney, B. M., Isler, M. L., Bravo, G. A., Aristizabal, N., Schunck, F., Silveira, L. F. & Piacentini, V. Q. 2013a. A new species of *Epinecrophylla* antwren from the Aripuanã-Machado interfluvium in central Amazonian Brazil with revision of the "stipple-throated antwren" complex. Pp. 263–267 *in* del Hoyo, J., Elliott, A., Sargatal, J. & Christie, D. A. (eds.) *Handbook of the birds of the world*, spec. vol. Lynx Edicions, Barcelona.

ISSN-2513-9894 (Online)

Whitney, B. M., Cohn-Haft, M., Bravo, G. A. & Silveira, L. F. 2013b. A new species of *Herpsilochmus* antwren from the Aripuanã-Machado interfluvium in central Amazonian Brazil. Pp. 277–281 *in* del Hoyo, J., Elliott, A., Sargatal, J. & Christie, D. A. (eds.) *Handbook of the birds of the world*, spec. vol. Lynx Edicions, Barcelona.

Whitney, B. M., Isler, M. L., Bravo, G. A., Aristizabal, N., Schunck, F., Silveira, L. F., Piacentini, V. Q., Cohn-Haft, M. & Rêgo, M. A. 2013c. A new species of antbird in the *Hypocnemis cantator* complex from the Aripuanã-Machado interfluvium in central Amazonian Brazil. Pp. 282–285 *in* del Hoyo, J., Elliott, A., Sargatal, J. & Christie, D. A. (eds.) *Handbook of the birds of the world*, spec. vol. Lynx Edicions, Barcelona.

Whitney, B. M., Schunck, F., Rêgo, M. A. & Silveira, L. F. 2013d. A new species of *Zimmerius* tyrannulet from the upper Madeira-Tapajós interfluvium in central Amazonian Brazil: birds don't always occur where they "should". Pp. 286–291 *in* del Hoyo, J., Elliott, A., Sargatal, J. & Christie, D. A. (eds.) *Handbook of the birds of the world*, spec. vol. Lynx Edicions, Barcelona.

Whittaker, A. 2004. Noteworthy ornithological records from Rondônia, Brazil, including a first country record, comments on austral migration, life history, taxonomy and distribution, with relevant data from neighbouring states, and a first record for Bolivia. *Bull. Brit. Orn. Cl*. 124: 239–271.

Whittaker, A. 2009. Pousada Rio Roosevelt: a provisional avifaunal inventory in south-western Amazonian Brazil, with information on life history, new distributional data and comments on taxonomy. *Cotinga* 31: 23–46.

Wikiaves. 2018. A enciclopédia das aves do Brasil. http://www.wikiaves.com.br/ (accessed 2 March 2018).

Zimmer, J. T. 1938. Studies of Peruvian birds. No. 29. The genera *Myiarchus*, *Mitrephanes* and *Cnemotriccus*. *Amer. Mus. Novit*. 994: 1–32.

Zimmer, K. J. & Isler, M. L. 2003. Family Thamnophilidae (typical antbirds). Pp. 448–681 *in* del Hoyo, J., Elliott, A. & Christie, D. A. (eds.) *Handbook of the birds of the world*, vol. 8. Lynx Edicions, Barcelona.

Address: Laboratório de Ornitologia, Centro de Ciências Biológicas e da Natureza, Universidade Federal do Acre, Campus Universitário BR 364, km 4, Distrito Industrial, CEP 69.920-900 Rio Branco, AC, Brazil.

ISSN-2513-9894 (Online)