



THE LOCAL CONSERVATION STATUS OF THE REGIONALLY RAREST BIRD SPECIES IN THE STATE OF RIO DE JANEIRO, SOUTHEASTERN BRAZIL

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Abstract: We reviewed the local current status and summarized the suspected causes of rarity, and presumed major threats to the 84 rarest bird species in the state of Rio de Janeiro, southeastern Brazil. We have focused on the bird species that have not been recently recorded or have fewer than 10 records in the last five decades in the state of Rio de Janeiro. Of these, 24 species are considered globally threatened or near threatened, and at least about 30 species are actually common or abundant elsewhere in their distribution. More than half of these species are forest birds inhabiting mainly lowland forests, but less than one-fifth of these species are endemic to the Atlantic Forest. The trophic guilds with the highest numbers of species were omnivores and insectivores. The main habitats used by the rarest bird species were wetlands, lowland forest canopy, secondary forest canopy and secondary forest edge. Bird species using two or more habitats were more represented among rare species than those using only a single habitat. Nine species were considered locally extinct, 11 probably Extinct, 27 Critically Endangered and 13 considered Data Deficient in Rio de Janeiro which are of increased conservation concern in the region. Although included among the rarest birds found in the state of Rio de Janeiro, 24 species were not classified as locally threatened because they are naturally rare migrants or vagrants in the region, without evidence of significant population size reduction in the state in recent decades. Fifteen species had their conservation status considered threatened in the state for the first time. Forty-four species had their local conservation status uplisted, while only five species were downlisted. The major causes of rarity and threats to these species in the region are habitat loss and hunting/trapping, but nearly one-third of them have unknown causes of rarity.

Keywords: Atlantic Forest, conservation status, extinction, forest birds, species rarity, threatened species.



Crax blumenbachii
Red-billed Curassow



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INTRODUCTION

Rare species are those localized within restricted geographical areas or habitats or thinly scattered over a more extensive range (IUCN 2012). Rarity is an aspect of population status rather than an assessment of extinction risk, although the vast majority of threatened species are rare species. However, rare (and unusual) species may comprise the majority of species in most ecosystems (Kunin & Gaston 1997).

A classification scheme to assess rarity has been proposed based on three different parameters - population size, geographic range and habitat requirements (Rabinowitz et al. 1986). Only species with a large population size, a wide geographic range, and a broad range of habitats could be considered common species, while all other species would be considered rare.

Although there are many causes of species rarity, they can be grouped into two categories - intrinsic (or natural) and extrinsic (or anthropogenic) factors (Flather & Sieg 2007). Intrinsic factors associated with rare species include low reproductive rates, long generation time, large area requirements and high ecological specialization (McKinney 1997; Purvis et al. 2000). Habitat loss, pollution, hunting and introduction of exotic species are the most important extrinsic factors leading to species rarity (IUCN 2012).

Although many rare species are not threatened with extinction, most species with low population densities have a higher risk of extinction (Brown & Lomolino 2006). Identifying how a rare species is threatened with extinction may not be an easy task. The intensity of adverse pressures on a species, size and trends of population decline, and the extent of range have been utilized as criteria to assign each species to a category of extinction risk by BirdLife International, which is responsible for providing the assessments to the IUCN Red List (IUCN 2012).

Among birds, 2,193 globally threatened species have been recognized. One hundred and thirty bird species have been considered Extinct and four species classified as Extinct in the Wild (IUCN 2014). Although threatened birds have been widely studied throughout the world, local extinctions have rarely been documented, especially in species-rich tropical regions (Willis 1974, 1979; Leck 1979; Kattan et al. 1994; Aleixo & Viellard 1995; Christiansen & Pitter 1997; Ribon et al. 2003).

The state of Rio de Janeiro, located in southeastern Brazil, is a region with one of the highest densities of threatened bird species in the world (BirdLife

International 2012). Since the 1980s, the increased activity of birdwatching and ornithological field studies have expanded the knowledge of the historically well known avian community of the state including the description of new species and the rediscovery of other species after a long time without detections in the wild (Snow 1980; Pacheco 1988a; Gonzaga 1988; Pacheco & Fonseca 2001).

Increasing knowledge of the birds of the state of Rio de Janeiro has allowed recognition of the rarest and most threatened species living in the state, where 82 threatened bird species have been recognized (Alves et al. 2000). Among the rarest, 20 species are probably locally extinct and two are Critically Endangered. Atlantic forest fragmentation, hunting and trapping have been the major threats to the birds of Rio de Janeiro. Lowland forest birds have a higher risk of extinction in the state, due to the strong anthropogenic pressure experienced by this habitat.

Our main goal in this paper is to summarize the current local conservation status, the causes of rarity, and the major threats to the rarest bird species in the state of Rio de Janeiro. Thus, we expect to contribute to the understanding of local processes that may have global consequences to the conservation status of many bird species.

MATERIALS AND METHODS

This study is a comprehensive review of the local conservation status of each bird species based on the specialized literature and some unpublished recent records. We have focused on the bird species known to occur in the state of Rio de Janeiro, southeastern Brazil, that have not been recently recorded or have fewer than 10 records in the last five decades in the state. Bird species known in the state based on old specimens generically attributed to "Rio de Janeiro" (with no specified locality) were not considered in this study. Seabirds, shorebirds, nearctic migrants, species that are recently expanding their range and restricted-range species were also not included here. Taxonomy and systematics follow CBRO (2014). According to the literature (Moojen et al. 1941; Schubart et al. 1965; Sick 1997), we defined the following trophic guilds: frugivores/granivores, nectarivores, omnivores, insectivores, and carnivores. Habitat preferences for each bird species were defined following the literature (Parker et al. 1996; Sick 1997). We followed Parker et al. (1996) and Brooks et al. (1999) to define endemic Atlantic Forest species. Conservation

status of the species at global, national and state levels adopted in the literature followed IUCN (2014), Machado et al. (2008), and Alves et al. (2000), respectively.

The species threat classification system adopted here was based on a simplified scoring criteria following Bergallo et al. (2000). However, we have defined as locally Extinct those species which have not been found in the state of Rio de Janeiro and surrounding areas in the last 150 years to reduce the risk of “Romeo error” (see Collar 1998). Following Scheffers et al. (2011), most species thought to have disappeared or that have not been seen for extended periods of time were rediscovered after less than 150 years since their last record. We defined as Probably Extinct those species which have not been found in recent decades in the state, but that can still be found in one of the neighboring states (São Paulo, Minas Gerais and Espírito Santo). Species that had an observed, estimated, inferred or suspected significant population size reduction in the state in the last five decades, based on published data, collected specimens and our experience of over 20 years studying birds in the region, were considered Critically Endangered species.

Museum acronyms used here are: AMNH (American Museum of Natural History, New York), BMNH (Natural History Museum, Tring), FMNH (Field Museum of Natural History, Chicago), IZH (Institut für Zoologie, Universität Halle), LACMNH (Natural History Museum of Los Angeles County, Los Angeles), LivCM (Liverpool Museum, Liverpool), MCZ (Museum of Comparative Zoology, Harvard University, Cambridge), MHNN (Muséum d’Histoire Naturelle de Neuchâtel, Neuchâtel), MN (Museu Nacional do Rio de Janeiro, Rio de Janeiro), MNHN (Muséum National d’Histoire Naturelle Zoologie, Paris), MPEG (Museu Paraense Emílio Goeldi, Belém), MWNH (Museum Wiesbaden, Wiesbaden), MZUSP (Museu de Zoologia da Universidade de São Paulo, São Paulo), NRM (Naturhistoriska Riksmuseet, Stockholm), SMF (Naturmuseum Senckenberg, Frankfurt), UFRJ (Universidade Federal do Rio de Janeiro, Rio de Janeiro); UMZC (Museum of Zoology, Cambridge University), ZISP (Zoologisches Institut, Russian Academy of Sciences, St. Petersburg), ZMB (Museum für Naturkunde der Humboldt-Universität zu Berlin), ZMUC (Zoologisk Museum, Københavns Universitet, Københavns), and ZSM (Zoologische Staatssammlung, München).

RESULTS

In this study, we recognized 84 bird species (covering 35 families) that have not been recently recorded or have

been scarcely recorded in the state of Rio de Janeiro in the last five decades (Table 1). They are here considered the rarest bird species in the state of Rio de Janeiro. Museum specimens of 50 (59.5%) of these species have been collected in the state. However, specimens of 19 of these 50 species are only generically attributed to Rio de Janeiro.

Lowland forest omnivore and insectivore species were predominant among the rarest birds. We identified 46 forest species (54.7%), of which at least 35 (76% of the forest species) are typical inhabitants of lowland forests. Only 13 species (15.4%) are endemic to the Atlantic Forest. Omnivores were the trophic guild with the highest number of species ($n = 35$; 41.6%), followed by insectivores ($n = 18$; 21.4%). Separately carnivores ($n = 15$; 17.8%), and frugivores ($n = 12$; 14.2%) represented nearly one-fifth of the species, while nectarivores were poorly represented ($n = 4$; 4.7%) (Table 1).

Most of these rarest species used two or more habitats ($n = 50$; 59.5%) than those using only a single habitat ($n = 34$; 40.4%). Wetlands ($n = 25$; 29.7%), lowland forest canopy ($n = 20$; 23.8%), secondary forest canopy ($n = 18$; 21.4%) and secondary forest edge ($n = 18$; 21.4%) were the habitats most used by the bird species considered in this study. Montane ($n = 6$; 7.1%) and flooded forests ($n = 3$; 3.5%) were less used habitats. Only eight species (9.5%) inhabited open areas, such as grasslands (Table 1).

According to the literature, 24 species (28.5%) included in our study have been considered globally threatened or near threatened, although 12 of these species have not been included among the threatened species in Brazil. Only 15 species (17.8%) are included among the threatened birds in Brazil. Forty-four species (52.3%) were considered either Probably Extinct (16 species), Critically Endangered (2 species), Endangered (8 species), Vulnerable (6 species) or not sufficiently known (12 species) in the state of Rio de Janeiro according to the literature (Table 1).

In our study, we have classified the rarest species in the state of Rio de Janeiro into five categories to local level: Extinct, Probably Extinct, Critically Endangered, Naturally Rare Migrant or Vagrant, and Data Deficient species (Table 2). Nine species were considered Locally Extinct. Omnivores ($n = 16$; 34%), insectivores ($n = 11$; 23.4%) and frugivores/granivores ($n = 9$; 19.1%), were predominant among the 47 Extinct, Probably Extinct and Critically Endangered species. Lowland forest birds using canopy ($n = 18$; 38.2%) and midstory ($n = 13$; 27.6%) are also well represented among locally Extinct, Probably Extinct and Critically Endangered birds

Table 1. The locally rarest bird species in the state of Rio de Janeiro, their trophic guilds, habitat preference, conservation status according to the literature and specimens from Rio de Janeiro.

Species	Guild	Habitat	Conservation status			Specimens from RJ
			Global ¹	Brazil ²	RJ ³	
Tinamidae						
Yellow-legged Tinamou <i>Crypturellus noctivagus</i> Fo	o	lff, sff	NT	Vu	PEx	ZMB (Cantagalo) and ZMUC (Aldeia da Pedra, now Itaocara)
Variegated Tinamou <i>Crypturellus variegatus</i> Fo	o	lff			CE	
Red-winged Tinamou <i>Rhynchotus rufescens</i>	o	grs		En	DD	
Anhimidae						
Horned Screamer <i>Anhima cornuta</i>	o	wet				
Anatidae						
Black-necked Swan <i>Cygnus melancoryphus</i>	o	wet				
Comb Duck <i>Sarkidiornis sylvicola</i>	o	wet			En	MN (Campos dos Goitacazes), NMW (Sepetiba)
Yellow-billed Teal <i>Anas flavirostris</i>	o	wet				
Silver Teal <i>Anas versicolor</i>	o	wet				
Red Shoveler <i>Anas platalea</i>	o	wet				MN (Campos dos Goitacazes)
Rosy-billed Pochard <i>Netta peposaca</i>	o	wet				
Cracidae						
Black-fronted Piping-Guan <i>Aburria jacutinga</i> Fo ^o	o	lfc, mfc	En	En	PEx	MN (Angra dos Reis), MNHN (Angra dos Reis), NRM ("Rio de Janeiro"), ZMUC ("Rio de Janeiro") and ZSM ("Rio de Janeiro")
Red-billed Curassow <i>Crax blumenbachii</i> Fo ^o	o	lff	En	En	PEx	ZSM ("Rio de Janeiro").
Phoenicopteridae						
Chilean Flamingo <i>Phoenicopterus chilensis</i>	o	wet	NT			
Ciconiidae						
Jabiru <i>Jabiru mycteria</i>	c	wet			DD	
Ardeidae						
Fasciated Tiger-Heron <i>Tigrisoma fasciatum</i> Fo	c	wet			PEx	
Threskiornithidae						
Scarlet Ibis <i>Eudocimus ruber</i>	c	wet			CE	MN (Guaratiba) and ZMB ("Rio de Janeiro")
White-faced Ibis <i>Plegadis chihi</i>	o	wet				MN (Maricá)
Green Ibis <i>Mesembrinibis cayennensis</i>	o	ffe, wet			DD	
Bare-faced Ibis <i>Phimosus infuscatus</i>	o	wet				
Plumbeous Ibis <i>Theristicus caerulescens</i>	c	wet				Specimen ? (Porto Real) (see species account)
Accipitridae						
Double-toothed Kite <i>Harpagus bidentatus</i> Fo	i	lfc, lfe, mfc, mfe			DD	Specimen ? ("Rio de Janeiro") (see species account)
Gray-bellied Hawk <i>Accipiter poliogaster</i> Fo	c	lfc, sfc	NT		Vu	ZMB (Cantagalo)
Black-collared Hawk <i>Busarellus nigricollis</i>	c	wet			Vu	
Rufous Crab Hawk <i>Buteogallus aequinoctialis</i>	c	ffc, ffe, wet	NT			
Variable Hawk <i>Geranoaetus polyosoma</i>	c	sfc, sfe				
Crested Eagle <i>Morphnus guianensis</i> Fo	c	lfc	NT		PEx	
Harpy Eagle <i>Harpia harpyja</i> Fo	c	lfc	NT		En	MN (Itaperuna) and ZMB (Cantagalo)
Rallidae						
Paint-billed Crake <i>Neocrex erythrops</i>	o	wet				UFRJ (Ilha do Governador)
Spotted Rail <i>Pardirallus maculatus</i>	o	wet				
Azure Gallinule <i>Porphyrio flavirostris</i>	o	wet				Specimen ? ("Rio de Janeiro") (see species account)
Red-fronted Coot <i>Fulica rufifrons</i>	o	wet				MN (Magé)
White-winged Coot <i>Fulica leucoptera</i>	o	wet				MN ("Rio de Janeiro")

Species	Guild	Habitat	Conservation status			Specimens from RJ
			Global ¹	Brazil ²	RJ ³	
Charadriidae						
Pied Lapwing <i>Vanellus cayanus</i> Tawny-throated Dotterel <i>Oreopholus ruficollis</i>	o o	grs, wet grs				
Columbidae Purple-winged Ground-Dove <i>Claravis geoffroyi</i> Fo ^e	f	lfu, mfu, lfm, mfm	CE	CE	En	IZH (Nova Friburgo), MN (Nova Friburgo, Guapimirm and "Rio de Janeiro"), MWNH (Nova Friburgo), MZUSP (Itatiaia and Teresópolis) and ZMB (Cantagalo)
Scaled Pigeon <i>Patagioenas speciosa</i> Fo	f	lfc, sfc, lfe, sfe			Vu	MN ("Rio de Janeiro"), ZMB ("Rio de Janeiro")
Violaceous Quail-Dove <i>Geotrygon violacea</i> Fo	f	lff, mff, sff			DD	IZH (Nova Friburgo) and ZMB (Cantagalo)
Cuculidae						
Ash-colored Cuckoo <i>Micrococcyx cinereus</i>	i	sfc, sfe				MN (Maricá)
Pheasant Cuckoo <i>Dromococcyx phasianellus</i> Fo	i	lfu, sfu			DD	
Pavonine Cuckoo <i>Dromococcyx pavoninus</i> Fo	i	lfu, sfu			PEX	ZMB (Cantagalo)
Rufous-vented Ground-Cuckoo <i>Neomorphus geoffroyi</i> Fo	i	lff	Vu	CE	PEX	ZMB (Cantagalo)
Strigidae						
Spectacled Owl <i>Pulsatrix perspicillata</i> Fo	c	lfc, sfc				
Great Horned Owl <i>Bubo virginianus</i>	c	sfc, sfe				
Caprimulgidae						
Sickle-winged Nighthjar <i>Hydropsalis anomala</i>	i	wet	NT			Specimen ? (Nova Friburgo) (see species account)
Trochilidae						
Ruby-topaz Hummingbird <i>Chrysolampis mosquitus</i>	n	sfc, sfe			DD	Specimen ? (Porto Real)
Black-bellied Thorntail <i>Discosura langsdorffi</i> Fo	n	sfc, sfe		Vu	DD	AMNH ("Rio de Janeiro"), BMNH (Nova Friburgo), FMNH ("Rio de Janeiro"), LivCM ("Rio de Janeiro"), SMF ("Rio de Janeiro"), UMZC ("Rio de Janeiro"), ZMB (Cantagalo) and ZMUC ("Rio de Janeiro")
Racket-tailed Coquette <i>Discosura longicaudus</i> Fo	n	sfc, sfe				
Gilded Hummingbird <i>Hylocharis chrysurus</i> Fo	n	sfu, sfm, sfe				
Alcedinidae						
Green-and-rufous Kingfisher <i>Chloroceryle inda</i> Fo	c	ffm, ffu			DD	
Bucconidae						
Rusty-breasted Nunlet <i>Nonnula rubecula</i> Fo	i	lfu, lfm			DD	ZMB (Cantagalo) and ZMUC (Nova Friburgo)
White-fronted Nunbird <i>Monasa morphoeus</i> Fo	i	lfc, lfm			PEX	NMW (near Rio de Janeiro)
Swallow-winged Pffubird <i>Chelidoptera tenebrosa</i> Fo	i	lfe, sfe			En	NMW (Sepetiba), USNM ("Rio de Janeiro") and ZMUC ("between Cantagalo and Aldeia da Pedra, now Itaocara")
Picidae						
Golden-green Woodpecker <i>Piculus polyzonus</i> * Fo	o	lfc, sfc		Vu	PEX	ZMB (Cantagalo)
Falconidae						
Red-throated Caracara <i>Ibycter americanus</i> Fo	o	lfc, lfe, sfc, sfe				
Chimango Caracara <i>Milvago chimango</i>	o	sfc, sfe, grs				
Cryptic Forest-Falcon <i>Micrastur mintoni</i>	c	lfc, lfm				NMW ("Rio de Janeiro")
Orange-breasted Falcon <i>Falco deiroleucus</i>	c	lfc, sfc	NT		PEX	NMBE (Teresópolis) and ZMB (Cantagalo)
Psittacidae						
Blue-and-yellow Macaw <i>Ara ararauna</i> Fo	f	lfc, sfc			PEX	NMW ("Rio de Janeiro")
Red-and-green Macaw <i>Ara chloropterus</i> Fo	f	lfc			PEX	
Vinaceous Parrot <i>Amazona vinacea</i> Fo	f	mfc, mfe, sfc, sfe	En	Vu	Vu	ZMUC (Nova Friburgo)
Thamnophilidae						
Band-tailed Antwren <i>Myrmotherula urosticta</i> Fo ^e	i	lfu, lfm	Vu	Vu	Vu	BMNH ("Rio de Janeiro") and ZMB ("Rio de Janeiro")

Species	Guild	Habitat	Conservation status			Specimens from RJ
			Global ¹	Brazil ²	RJ ³	
Rio de Janeiro Antwren <i>Myrmotherula fluminensis</i> Fo ^e	i	sfu	CE		DD	MPEG (Magé) (Type-specimen)
Cinereous Antshrike <i>Thamnomanes caesius</i> Fo	i	lfu, lfm				AMNH ("Rio de Janeiro"), LACMNH (Cachoeiras de Macacu), MZUSP ("Rio de Janeiro"), and ZMUC (Aldeia da Pedra, now Itaocara)
Plumbeous Antvireo <i>Dysithamnus plumbeus</i> Fo ^e	o	lfu, lfm	Vu		En	MHNN ("Rio de Janeiro")
Dendrocolaptidae						
Bffu-throated Woodcreeper <i>Xiphorhynchus guttatus</i> Fo	i	lfc, lfm			DD	NMW (near Rio de Janeiro)
Straight-billed Woodcreeper <i>Dendroplex picus</i> Fo	i	lfm, sfm			Vu	
Furnariidae						
Striated Softtail <i>Thripophaga macroura</i> Fo ^e	i	lfc, lfm	Vu	Vu	En	ZMUC (Aldeia da Pedra, now Itaocara)
Pipridae						
Wied's Tyrant-Manakin <i>Neopelma aurifrons</i> Fo ^e	f	lfm, lfu	Vu		En	
Blue-backed Manakin <i>Chiroxiphia pareola</i> Fo	f	lfm, lfu				BMNH (Nova Friburgo), NRM ("Rio de Janeiro")
Cotingidae						
White-winged Cotinga <i>Xipholena atropurpurea</i> Fo ^e	f	lfc	En	En	En	MCZ ("Rio de Janeiro")
Banded Cotinga <i>Cotinga maculata</i> Fo ^e	f	lfc	En	En	PEX	Specimen ? ("Rio de Janeiro") (see species account)
Pipritidae						
Wing-barred Piprites <i>Piprites chloris</i> Fo	o	lfc, lfm				
Platyrrhynchidae						
Kinglet Calyptura <i>Calyptura cristata</i> Fo ^e	o	mfc(?), mfe(?)	CE	CE	PEn	AMNH ("Rio de Janeiro"), BMNH (Nova Friburgo), MCZ ("Rio de Janeiro"), MNHN ("Rio de Janeiro"), NMW ("Rio de Janeiro"), ZMB (Cantagalo) and ZMUC (Nova Friburgo)
Tachuridae						
Many-colored Rush Tyrant <i>Tachuris rubrigastra</i>	i	wet				
Rhynchocyclidae						
Southern Bristle-Tyrant <i>Phylloscartes eximius</i> Fo ^e	o	lfu, lfm	NT		PEn	AMNH (Itatiaia), IZH (Nova Friburgo) and ZMUC (Nova Friburgo)
Tyrannidae						
Strange-tailed Tyrant <i>Alectrurus risora</i>	i	grs	Vu			
Hirundinidae						
Chilean Swallow <i>Tachycineta leucopyga</i>	i	sfe, grs				MN (Cabo Frio)
Turdidae						
Cocoa Thrush <i>Turdus fumigatus</i> Fo	o	lfu, lfm				NRM ("Rio de Janeiro")
Icteridae						
Variable Oriole <i>Icterus pyrrhopterus</i> Fo	o	sfc, sfe				Specimen ? ("Rio de Janeiro") (see species account)
Bay-winged Cowbird <i>Agelaioides badius</i>	o	sfe, grs				MN (Represa Rio Grande)
Thraupidae						
Silver-breasted Tanager <i>Tangara cyanomelas</i> * Fo ^e	o	lfc, sfc	?	?	PEX	Specimen ? ("Rio de Janeiro") (see species account)
Black-faced Tanager <i>Schistochlamys melanapis</i>	o	sfc, sfe			PEX	Specimen ? ("Rio de Janeiro") (see species account)
Plumbeous Seedeater <i>Sporophila plumbea</i>	f	sfe, grs				
Great-billed Seed-Finch <i>Sporophila maximiliani</i>	f	sfe, grs	Vu	CE	PEX	Specimen ? ("Rio de Janeiro") (see species account)

Abbreviation Fo after the species name means "forest species" and Fo^e means "endemic Atlantic forest species". Trophic guilds: frugivore/granivore (f); nectarivore (n); omnivore (o); insectivore (i); carnivore (c). Habitats: montane forest canopy (mfc); montane forest midstory (mfm); montane forest understory (mfu); montane forest floor (mff); montane forest edge (mfe); lowland forest canopy (lfc); lowland forest midstory (lfm); lowland forest understory (lfu); lowland forest floor (lff); lowland forest edge (lfe); flooded forest canopy (ffc); flooded forest midstory (ffm); flooded forest understory (ffu); flooded forest edge (ffe); secondary forest canopy (sfc); secondary forest midstory (sfm); secondary forest understory (sfu); secondary forest floor (sff); secondary forest edge (sfe); grasslands (grs); wetlands (wet). Conservation status according to the literature: NT – Near threatened; Pen – Probably Endangered; Vu – Vulnerable; En – Endangered; CE – Critically Endangered; PEX – Probably Extinct; DD – Data Deficient.

¹ IUCN (2014); ² Machado et al. (2008); ³ Alves et al. (2000); * Specific status not adopted in the threatened species lists.

Table 2. Local conservation status of the rarest bird species in the state of Rio de Janeiro.

Extinct: <i>Crax blumenbachii</i> *, <i>Morphnus guianensis</i> , <i>Neomorhphus geoffroyi</i> , <i>Monasa morphoeus</i> , <i>Micrastur mintoni</i> , <i>Ara ararauna</i> , <i>Ara chloropterus</i> , <i>Cotinga maculata</i> , <i>Sporophila maximiliani</i>
Probably Extinct: <i>Crypturellus noctivagus</i> , <i>Rhynchotus rufescens</i> , <i>Aburria jacutinga</i> , <i>Dromococcyx phasianellus</i> , <i>Dromococcyx pavoninus</i> , <i>Pulsatrix perspicillata</i> , <i>Chelidoptera tenebrosa</i> , <i>Piculus polyzonus</i> , <i>Ibycter americanus</i> , <i>Chiroxiphia pareola</i> , <i>Tangara cyanomelas</i>
Critically Endangered: <i>Crypturellus variegatus</i> , <i>Anhima cornuta</i> , <i>Sarkidiornis sylvicola</i> , <i>Jabiru mycteria</i> , <i>Eudocimus ruber</i> , <i>Accipiter poliogaster</i> , <i>Busarellus nigricollis</i> , <i>Buteogallus aequinoctialis</i> , <i>Harpia harpyja</i> , <i>Claravis geoffroyi</i> , <i>Patagioenas speciosa</i> , <i>Discosura langsdorffi</i> , <i>Discosura longicauda</i> , <i>Falco deiroleucus</i> , <i>Amazona vinacea</i> , <i>Myrmotherula urosticta</i> , <i>Thamnomanes caesius</i> , <i>Dysithamnus plumbeus</i> , <i>Xiphorhynchus guttatus</i> , <i>Dendroplex picus</i> , <i>Thripophaga macroura</i> , <i>Neopelma aurifrons</i> , <i>Xipholena atropurpurea</i> , <i>Calyptura cristata</i> , <i>Phylloscartes eximius</i> , <i>Turdus fumigatus</i> , <i>Sporophila plumbea</i>
Naturally Rare Migrant or Vagrant: <i>Cygnus melancoryphus</i> , <i>Anas flavirostris</i> , <i>Anas versicolor</i> , <i>Anas platalea</i> , <i>Netta peposaca</i> , <i>Phoenicopterus chilensis</i> , <i>Plegadis chihi</i> , <i>Mesembrinibis cayennensis</i> , <i>Phimosus infuscatus</i> , <i>Theristicus caerulescens</i> , <i>Geranoaetus polyosoma</i> , <i>Porphyrio flavirostris</i> , <i>Fulica ruffifrons</i> , <i>Fulica leucoptera</i> , <i>Vanellus cayanus</i> , <i>Oreopholus ruficollis</i> , <i>Micrococcyx cinereus</i> , <i>Chrysolampis mosquitos</i> , <i>Hylocharys chrysurus</i> , <i>Milvago chimango</i> , <i>Tachurus rubrigastra</i> , <i>Alectrurus risora</i> , <i>Tachycineta leucopyga</i> , <i>Agelaioides badius</i>
Data Deficient: <i>Tigrisoma fasciatum</i> , <i>Harpagus bidentatus</i> , <i>Neocrex erythrops</i> , <i>Pardirallus maculatus</i> , <i>Geotrygon violacea</i> , <i>Bubo virginianus</i> , <i>Hydropsalis anomala</i> , <i>Chloroceryle inda</i> , <i>Nonnulla rubecula</i> , <i>Myrmotherula fluminensis</i> , <i>Piprites chloris</i> , <i>Icterus pyrrhopterus</i> , <i>Schistochlamys melanopis</i>
*A reintroduction program has been attempted in the Reserva Ecológica de Guapiçu.

Table 3. Number of species in each trophic guild and type of habitat by local conservation status of the rarest birds in the state of Rio de Janeiro.

Ecological attributes	Extinct	PExtinct	CEnd	Migr/Vagr	Data Deficient
Trophic guilds					
Frugivores/granivores	4	1	6	0	1
Nectarivores	0	0	2	2	0
Omnivores	1	6	7	16	5
Insectivores	2	3	5	3	5
Carnivores	2	1	7	2	3
Habitats					
Montane forest canopy		1	2		1
Montane forest midstory			1		
Montane forest understory			1		
Montane forest floor					1
Montane forest edge			2		1
Lowland forest canopy	6	5	7		2
Lowland forest midstory	2		10		2
Lowland forest understory		3	7		1
Lowland forest floor					
Lowland forest edge					
Flooded forest canopy			1		
Flooded forest midstory					1
Flooded forest understory					1
Flooded forest edge			1	1	
Secondary forest canopy		4	6	4	3
Secondary forest midstory			1	1	
Secondary forest understory		2			1
Secondary forest floor		1			1
Secondary forest edge	1	2	5	7	3
Grassland	1	1	1	4	1
Wetland			6	16	4

(Table 3). Thirteen endemic Atlantic forest birds were considered locally Extinct (2 species), Probably Extinct (three species) or Critically Endangered (eight species). Among the Naturally Rare Migrant or Vagrants in the state of Rio de Janeiro, the majority were omnivorous species (66.6%) inhabiting wetlands (62.5%). Thirteen birds were considered insufficiently known in Rio de Janeiro, so classified as Data Deficient species.

Forty-eight species had their local conservation

status changed in the list of threatened species in the state of Rio de Janeiro (Table 4). Fifteen species had their conservation status included for the first time as threatened species in the state. Forty-four species had their local conservation status uplisted, while only five species were downlisted (*Tigrisoma fasciatum*, *Mesembrinibis cayennensis*, *Falco deiroleucus*, *Chrysolampis mosquitos*, *Schistochlamys melanopis*), with two of these species (*Tigrisoma fasciatum*,

Table 4. The rarest bird species in the state of Rio de Janeiro for which the local conservation status has been changed in the present study.

Species	Alves et al. (2000)	This study
<i>Rhynchotus rufescens</i>	Data Deficient	Probably Extinct
<i>Sarkidiornis sylvicola</i>	Endangered	Critically Endangered
<i>Anhima cornuta</i>	Not included	Critically Endangered
<i>Crax blumenbachii</i>	Probably Extinct	Extinct
<i>Jabiru mycteria</i>	Data Deficient	Critically Endangered
<i>Tigrisoma fasciatum</i>	Probably Extinct	Data Deficient
<i>Mesembrinibis cayennensis</i>	Data Deficient	Naturally Rare Migrant or Vagrant
<i>Accipiter poliogaster</i>	Vulnerable	Critically Endangered
<i>Busarellus nigricollis</i>	Vulnerable	Critically Endangered
<i>Buteogallus aequinoctialis</i>	Not included	Critically Endangered
<i>Morphnus guianensis</i>	Probably Extinct	Extinct
<i>Harpia harpyja</i>	Endangered	Critically Endangered
<i>Claravis geoffroyi</i>	Endangered	Critically Endangered
<i>Patagioenas speciosa</i>	Vulnerable	Critically Endangered
<i>Dromococcyx phasianellus</i>	Data Deficient	Probably Extinct
<i>Neomorphus geoffroyi</i>	Probably Extinct	Extinct
<i>Pulsatrix perspicillata</i>	Not included	Probably Extinct
<i>Bubo virginianus</i>	Not included	Data Deficient
<i>Hydropsalis anomala</i>	Not included	Data Deficient
<i>Chrysolampis mosquitus</i>	Data Deficient	Naturally Rare Migrant or Vagrant
<i>Discosura langsdorffi</i>	Data Deficient	Critically Endangered
<i>Discosura longicaudus</i>	Not included	Critically Endangered
<i>Monasa morphoeus</i>	Probably Extinct	Extinct

Species	Alves et al. (2000)	This study
<i>Chelidoptera tenebrosa</i>	Endangered	Probably Extinct
<i>Ibycter americanus</i>	Not included	Probably Extinct
<i>Micrastur mintoni</i>	Not included	Extinct
<i>Falco deiroleucus</i>	Probably Extinct	Critically Endangered
<i>Ara ararauna</i>	Probably Extinct	Extinct
<i>Ara chloropterus</i>	Probably Extinct	Extinct
<i>Amazona vinacea</i>	Vulnerable	Critically Endangered
<i>Myrmotherula urosticta</i>	Vulnerable	Critically Endangered
<i>Thamnomanes caesius</i>	Not included	Critically Endangered
<i>Dysithamnus plumbeus</i>	Endangered	Critically Endangered
<i>Xiphorhynchus guttatus</i>	Data Deficient	Critically Endangered
<i>Dendroplex picus</i>	Vulnerable	Critically Endangered
<i>Thripophaga macroura</i>	Endangered	Critically Endangered
<i>Neopelma aurifrons</i>	Endangered	Critically Endangered
<i>Chiroxiphia pareola</i>	Not included	Probably Extinct
<i>Xipholena atropurpurea</i>	Endangered	Critically Endangered
<i>Cotinga maculata</i>	Probably Extinct	Extinct
<i>Piprites chloris</i>	Not included	Data Deficient
<i>Calyptura cristata</i>	Probably Endangered	Critically Endangered
<i>Phylloscartes eximius</i>	Probably Endangered	Critically Endangered
<i>Turdus fumigatus</i>	Not included	Critically Endangered
<i>Icterus pyrrhopterus</i>	Not included	Data Deficient
<i>Schistochlamys melanopis</i>	Probably Extinct	Data Deficient
<i>Sporophila plumbea</i>	Not included	Critically Endangered
<i>Sporophila maximiliani</i>	Probably Extinct	Extinct

Falco deiroleucus) recently rediscovered after being considered a Probably Extinct species in Rio de Janeiro (see *Species Accounts*).

Although the major causes of local rarity of 23 species (27.3%) are unknown, 15 species (17.8%) are rare in the state because they are near the edge of their distribution and also suffer habitat loss. The combination of habitat loss and hunting/trapping is also an important factor leading to the local rarity of 13 species (15.4%), including larger birds like cracids and raptors (Table 5).

Species Accounts

Yellow-legged Tinamou (*Crypturellus noctivagus*): Jaós (or Juós) were recorded in Campos dos Goitacazes in the 18th and 19th centuries (Reys 1997; Papavero & Teixeira 2000). Typical of primary lowland forests of eastern Brazil, Yellow-legged Tinamou was first recorded in Rio de Janeiro in 1815 by Wied-Neuwied (1832-1833).

The type-specimen (AMNH 6740 cf. Greenway 1973) of *Tinamus noctivagus* Wied, 1820 was obtained in the lower Itabapoana River. The original locality “Fazenda von Muribecca” refers to a large farm of the “Companhia de Jesus” based in southern Espírito Santo, but “also comprising part of the current state of Rio de Janeiro” (Conde 2009). In 1817, Spix & Martius (1823-1831) reported *T. noctivagus* in the current municipality of Rio de Janeiro (forests to the west of Rua do Riachuelo), more precisely on the slope near the house of Consul Langsdorff. Also in the 19th century, Peter W. Lund collected one specimen near Aldeia da Pedra (currently Itaocara) (Krabbe 2007) and Carl Euler found the species in Cantagalo in the central region of the state (Euler 1867; Cabanis 1874). From the 20th century, the species was reported in Campos dos Goitacazes and Macabu River in 1941 (Moojen 1942). In 1988, a hunter asserted having hunted *jaós* until the 1970s at Fazenda Conde,

Table 5. Possible causes of local rarity for the rarest bird species in the state of Rio de Janeiro.

<p>Habitat loss and hunting/trapping: <i>Crypturellus noctivagus</i>, <i>Crypturellus variegatus</i>, <i>Sarkidiornis sylvicola</i>, <i>Aburria jacutinga</i>, <i>Crax blumenbachii</i>, <i>Eudocimus ruber</i>, <i>Morphnus guianensis</i>, <i>Harpia harpyja</i>, <i>Claravis geoffroyi</i>, <i>Patagioenas speciosa</i>, <i>Ibycter americanus</i>, <i>Ara ararauna</i>, <i>Ara chloropterus</i></p> <p>Habitat loss: <i>Anhima cornuta</i>, <i>Jabiru mycteria</i>, <i>Busarellus nigricollis</i>, <i>Buteogallus aequinoctialis</i>, <i>Dromococcyx phasianellus</i>, <i>Dromococcyx pavoninus</i>, <i>Pulsatrix perspicillata</i></p> <p>Hunting/trapping: <i>Rhynchotus rufescens</i>, <i>Amazona vinacea</i>, <i>Sporophila plumbea</i>, <i>Sporophila maximiliani</i></p> <p>Accidental or occasional occurrence during migration or vagrancy: <i>Cygnus melancoryphus</i>, <i>Anas flavirostris</i>, <i>Anas versicolor</i>, <i>Anas platatea</i>, <i>Netta peposaca</i>, <i>Phoenicopterus chilensis</i>, <i>Plegadis chihi</i>, <i>Theristicus caerulescens</i>, <i>Geranoaetus polyosoma</i>, <i>Porphyrio flavirostris</i>, <i>Fulica ruffifrons</i>, <i>Fulica leucoptera</i>, <i>Oreopholus ruficollis</i>, <i>Hylocharis chrysura</i>, <i>Milvago chimango</i>, <i>Tachuris rubrigastra</i>, <i>Alectrurus risora</i>, <i>Tachycineta leucopyga</i>, <i>Agelaioides badius</i></p> <p>Edge of range: <i>Piculus polyzonus</i>, <i>Xiphorhynchus guttatus</i>, <i>Dendroplex picus</i></p> <p>Edge of range and habitat loss: <i>Neomorphus geoffroyi</i>, <i>Hydropsalis anomala</i>, <i>Monasa morphoeus</i>, <i>Chelidoptera tenebrosa</i>, <i>Micrastur mintoni</i>, <i>Myrmotherula urosticta</i>, <i>Thamnomanes caesius</i>, <i>Dysithamnus plumbeus</i>, <i>Thripophaga macroura</i>, <i>Neopelma aurifrons</i>, <i>Chiroxiphia pareola</i>, <i>Xipholena atropurpurea</i>, <i>Cotinga maculata</i>, <i>Turdus fumigatus</i>, <i>Tangara cyanomelas</i></p> <p>Unknown: <i>Tigrisoma fasciatum</i>, <i>Mesembrinibis cayennensis</i>, <i>Phimosus infuscatus</i>, <i>Harpagus bidentatus</i>, <i>Accipiter poliogaster</i>, <i>Neocrex erythrops</i>, <i>Pardirallus maculatus</i>, <i>Vanellus cayanus</i>, <i>Geotrygon violacea</i>, <i>Micrococcyx cinereus</i>, <i>Bubo virginianus</i>, <i>Chrysolampis mosquitus</i>, <i>Discosura langsdorffi</i>, <i>Discosura longicaudus</i>, <i>Chloroceryle inda</i>, <i>Nonnulla rubecula</i>, <i>Falco deiroleucus</i>, <i>Myrmotherula fluminensis</i>, <i>Piprites chloris</i>, <i>Calyptura cristata</i>, <i>Phylloscartes eximius</i>, <i>Icterus pyrrhopterus</i>, <i>Schistochlamys melanopis</i>.</p>
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municipality of Miracema, northern state of Rio de Janeiro (JFP), near the border with Espírito Santo, where it was found in Cachoeiro de Itapemirim in 1997 (JFP & C. Bauer pers. obs.). It is a possibly Extinct species in the state (Alves et al. 2000), although it can be found in the forested coast of the state of São Paulo (Tomotami 2009).

Variegated Tinamou (*Crypturellus variegatus*): Nowadays, this tinamou is found only in Reserva Biológica União in the state of Rio de Janeiro (Pacheco et al. 2010; Mallet-Rodrigues 2012b). The species was more widely distributed through lowland forests from the northern state to the foothills of Serra dos Órgãos in the past (Sick 1997; Mallet-Rodrigues et al. 2007). Moojen (1942) reports “chorões” *Crypturellus variegatus variegatus* in secondary forests of Lagoa Limpa, Campos dos Goitacazes. Aguirre & Aldrighi (1983) cites its presence in the “foot of the Friburgo mountains, municipality of Cachoeiras de Macacu”. In 1986, a hunter from Sossego in the lowlands of Parque Estadual do Desengano reported the local presence of “chororão”, which was presumed to be *C. variegatus* by JFP. Variegated Tinamou is a Critically Endangered species in the state of Rio de Janeiro (Alves et al. 2000).

Red-winged Tinamou (*Rhynchotus rufescens*): Widely distributed throughout open habitats, the species was known from the grasslands of the high plateau of the Itatiaia massif in the state of Rio de Janeiro until the late 19th century and early 20th century (Ule 1896; Miranda-Ribeiro 1905; Luederwaldt 1909; Holt 1928; Barth 1957) and lowlands near the Paraíba do

Sul River in the southern region of the state until the late 1980s (R. Pineschi pers. comm. to JFP). The species has not been recorded recently in the region. The status of this species has been considered unknown in the state (Alves et al. 2000), but it is Probably Extinct. Possibly the species will reoccupy the state coming from Central Brazil.

Horned Screamer (*Anhima cornuta*): According to Pacheco (2011), the Horned Screamer was listed for the state of Rio de Janeiro based only on vague and questionable references. A specimen housed in the ornithological collections of the Museu Nacional may have been obtained in the vicinity of the Baía de Guanabara (Pacheco 2011). Recently, an individual was photographed in the municipality of Três Rios, in the mid-Paraíba do Sul River valley (Medeiros 2014). This is the first documented record of this species in Rio de Janeiro and evidence of a possible recolonization of the region.

Black-necked Swan (*Cygnus melancoryphus*): A single bird recorded in Lagoa de Maricá in the 1980s is the first report of this southern species in the state (Nacinovic et al. 1989). One winter record from Resende Wetland has been recently reported (Honkala & Niiranen 2010). The state of Rio de Janeiro is the northern limit of the species range. These two records suggest that the Black-necked Swan is a very rare austral migrant species in the state.

Comb Duck (*Sarkidiornis sylvicola*): Since one specimen was collected by Johann Natterer in Sepetiba

in the early 19th century (Pelzeln 1868–1871) the species has been only occasionally found in the state. Reports are from Jacarepaguá (Coimbra Filho & Magnanini 1962), Campos dos Goitacazes (Aguirre & Aldrighi 1983; Moojen 1942), Guaratiba (Pacheco 1988b), Resende wetland (Pacheco et al. 1997b) and Quissamã (Tavares & Siciliano 2013). The Comb Duck was classified as an Endangered species in the state of Rio de Janeiro (Alves et al. 2000), but it can be considered Critically Endangered due to habitat loss and hunting.

Yellow-billed Teal (*Anas flavirostris*): Common in southern Brazil, the species was reported at Lagoa de Maricá in September 1990 (Nacinovic 1991b). This is the only record of the species in the state. Although the species is established in the city of São Paulo, it was first recorded in 1991 (Willis & Oniki 2003). It is a very rare southern migrant species in the state of Rio de Janeiro.

Silver Teal (*Anas versicolor*): This southern species was only recorded in the state of Rio de Janeiro from Lagoa de Guarapina, Maricá (Nacinovic 1991a). Silver Teal has been regularly found in Cubatão, the northern coast of São Paulo (Silva e Silva & Olmos 2007). It is a very rare austral migrant in the state of Rio de Janeiro (Image 1).

Red Shoveler (*Anas platalea*): Known from only three localities in the state - Campos dos Goitacazes (Moojen 1942; Schneider & Sick 1962), Piraí (Pacheco et al. 1997b) and Jacarepaguá (Maciel 2009). It is a rare

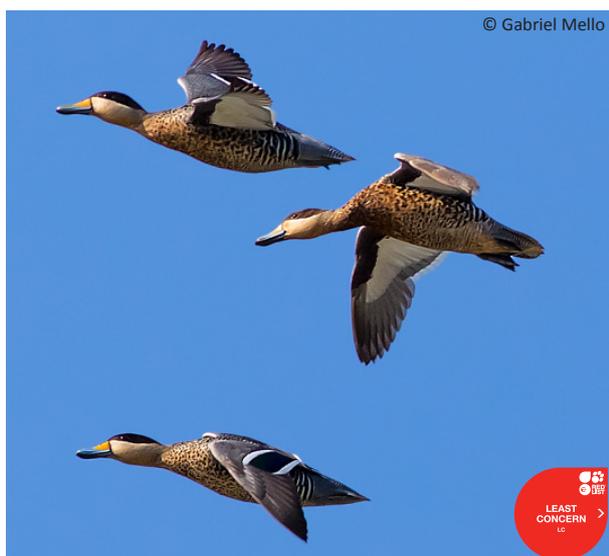


Image 1. The Silver Teal (*Anas versicolor*) is a very rare austral migrant in the state of Rio de Janeiro.

austral migrant in the state of Rio de Janeiro.

Rosy-billed Pochard (*Netta peposaca*): This other southern anatid is also a scarcely recorded species in the State of Rio de Janeiro. It is known in Lagoa Feia, Campos dos Goitacazes (Rocha 1978), Angra dos Reis (Pacheco et al. 1997a), Ilha de Guaratiba (Maciel 2009) and Parque Nacional da Restinga de Jurubatiba, Quissamã (Tavares & Siciliano 2013). The Rosy-billed Pochard is also a rare austral migrant in the state of Rio de Janeiro (Image 2).

Black-fronted Piping-Guan (*Aburria jacutinga*): In the past, this endemic Atlantic Forest species was found in humid forests around the state. Probably Extinct in the state (Alves et al. 2000), the species has been recently reported on the northern coast of the state of São Paulo (Ubatuba), near the border with Rio de Janeiro (Alves 2012; Santos 2013; Souza 2013). It is believed to have been extirpated from the state of Rio de Janeiro through a combination of threats including hunting and deforestation. ‘Jacutingas’ have been referred to Campos dos Goitacazes in the 18th and 19th centuries (Reys 1997; Papavero & Teixeira 2000). The species was recorded in São Fidélis (Wied-Neuwied 1820–1821), “Rio de Janeiro” (Spix 1824–1825), Magé (Spix & Martius 1823–1831), Vassouras (Saint-Hilaire 1830); Serra dos Órgãos (Gardner 1846; Goeldi 1894–1900; Sick 1997), Cantagalo (Ihering 1900), Itatiaia (Miranda-Ribeiro 1905; 1923; Pinto 1954; Barth 1957), Angra dos Reis (Sick 1969; Collar et al. 1992), Paraty (Sick & Teixeira 1979) and Desengano (Galetti et al. 1997). Hunters in Tinguá and Desengano knew the species in the 1980s. In 2003, a hunter from Tinguá said he saw and killed the last bird, exactly in 1980 (JFP). A reintroduction program of the species is being planned in the Reserva Ecológica de Guapiaçu (REGUA) (Pimentel & Olmos 2011).

Red-billed Curassow (*Crax blumenbachii*): Endemic to the Atlantic Forest of eastern Brazil (southern Bahia to Rio de Janeiro), it is an Endangered species mainly due to hunting and habitat loss (Silveira 2008a). Old records are mainly from the Campos dos Goitacazes (Reys 1997), São Fidélis (Wied 1820–1821), “Rio de Janeiro” (Spix 1824–1825; Léry 1941; Hellmayr & Conover 1942), Magé (Spix & Martius 1823–1831), Cachoeiras de Macacu (Pacheco 2013), and “forests of Paraíba river” [= Paraíba do Sul river] (Euler 1868). Although the Red-billed Curassow has been considered a Probably Extinct species in the state of Rio de Janeiro (Alves et al. 2000), a reintroduction program has been attempted in the Reserva Ecológica de Guapiaçu (REGUA) (Bernardo et



Image 2. The Rosy-billed Pochard (*Netta peposaca*) is an austral migrant scarcely recorded in the state of Rio de Janeiro.

al. 2011a,b,c; Bernardo 2012). The type-specimens of *Crax blumenbachii* (female) and *Crax rubrirostris* (male) were collected in the Province of Rio de Janeiro by J. B. von Spix in 1817 (for a more precise original location see Pacheco 2013) and described in the same publication (Spix 1824–1825) (Image 3).

Chilean Flamingo (*Phoenicopterus chilensis*): After an old record from Baía da Guanabara (Pacheco 1996), this southern migrant has recently been found in the same locality (Serpa et al. 2008). It has also been found in Baía de Sepetiba (Serpa op. cit.), Arraial do Cabo (Madeira 2014; Marques 2015; Pimenta 2015) and inland in wetlands in the municipality of Cachoeiras de Macacu (Pimentel & Olmos 2011). Chilean Flamingo has also been recently recorded at some localities in the interior of the state of São Paulo (Medolago & Ubaid 2011) (Image 4).



Image 3. Although its reintroduction has been attempted, the Red-billed Curassow (*Crax blumenbachii*) is a species considered extinct in the state of Rio de Janeiro.

Jabiru (*Jabiru mycteria*): The largest flying bird of Brazil, the Jabiru is the rarest of the Brazilian storks in the state of Rio de Janeiro. “Tayúyú” was reported in Campos dos Goitacazes in the 18th and 19th centuries (Reys 1997; Carneiro da Silva 1907). Recently the species has been recorded in Itatiaia (Barth 1957; Pacheco & Parrini 2000; Honkala & Niiranen 2010), Lagoa de Marapendi (Magnanini & Coimbra Filho 1964) and Santa Cruz (Magnanini & Coimbra Filho 1964; Schubart et al. 1965; Sick & Pabst 1968). Inhabitants of the Lagoa Feia reported the presence of the species in the region in the 1980s and 1990s (JFP, N. Crud, pers. comm.). A bird was seen flying near Ilha do Fundão (Baía de Guanabara) on 30 July 1993 (José Fernando Pacheco pers. obs.). Some vagrant individuals have been found only occasionally in eastern Brazil.

Fasciated Tiger-Heron (*Tigrisoma fasciatum*): Inhabiting forest rivers and streams, this uncommon species has been known in the state for a long time only from Campos dos Goitacazes (Eisenmann 1965; Pacheco & Whitney 1997). Formerly classified as Probably Extinct in the state of Rio de Janeiro (Alves et al. 2000), the species has recently been found in Angra dos Reis (Blanco 2013) and Paraty (Damasceno 2015; Loreto 2015), a southern region of the state. Its conservation status is unknown in the state.

Scarlet Ibis (*Eudocimus ruber*): Initially reported for Rio de Janeiro by Francisco Soares in the late 16th century (Soares 1966). A specimen was sent from “Rio” by F.A. Gomes to the Berlin Museum (Stresemann 1950). Another specimen was collected in 1985 in Guaratiba (JFP pers. obs.). The species inhabited the mangroves of the Baía de Guanabara (Sick & Pabst 1968; João Moojen pers. comm. to JFP), Lagoa da Tijuca (Sick 1997), mouth of the Macaé river (João Moojen pers. comm. to JFP)



Image 4. After an old record from the mid-twentieth century, the Chilean Flamingo (*Phoenicopterus chilensis*), a southern migrant species, has recently been found in the state of Rio de Janeiro.

and Guaratiba (José Fernando Pacheco pers. obs. 1985; Sick 1997). Some recent reports indicate a very rare presence of vagrant individuals in the region (Maciel 2009). Scarlet Ibis populations on the coast of São Paulo (including the neighboring Ubatuba), Paraná and Santa Catarina reinforce the expectation of recolonization of the coast of Rio de Janeiro. Scarlet Ibis has been considered a Critically Endangered species in the state of Rio de Janeiro (Alves et al. 2000).

White-faced Ibis (*Plegadis chihi*): A single bird was seen in Barra da Tijuca on 12 August 1968 (H. Sick in litt. to JFP). One vagrant male was collected in May 1993 at the mouth of the Mombuca River, Maricá (Nacinovic 1993). It was recently recorded (and photographed) in Paraty (Luciano Lima pers. comm. to JFP) (Image 5).

Green Ibis (*Mesembrinibis cayennensis*): This is a rare vagrant species in the state. First reported for the state of Rio de Janeiro from Itabapoana River (Wied-Neuwied 1832-1833). Also recorded in Lagoa de Juturnaíba, Silva Jardim, on 28 June 1987 (José Fernando Pacheco pers. obs.), and Vale das Taquaras, Nova Friburgo, on 06 September 2009 (Pacheco et al. 2014). Recently, the birds were photographed in Resende in August 2013 (Santos 2013, Diniz Filho 2015) and Itatiaia in July 2014

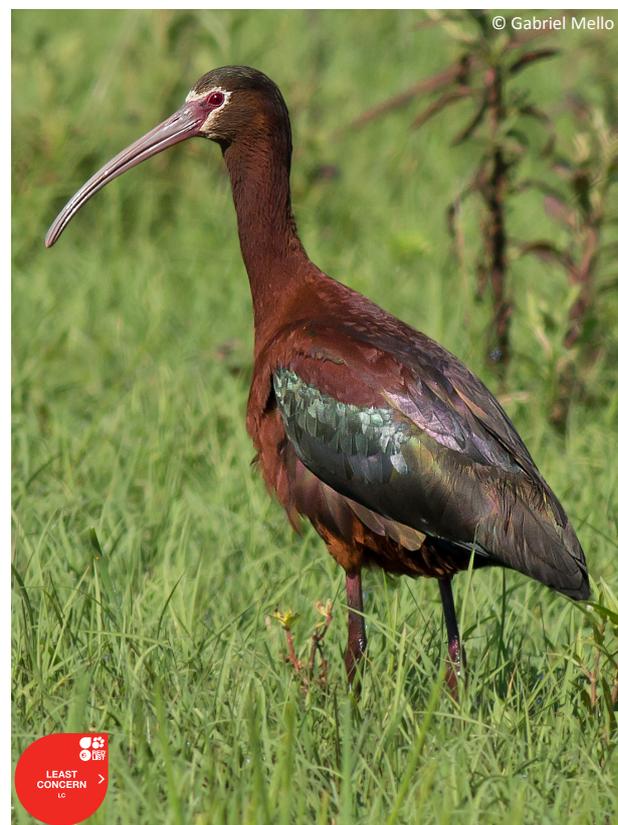


Image 5. The White-faced Ibis (*Plegadis chihi*) is a rare southern migrant in the state of Rio de Janeiro.



Image 6. Rare vagrant individuals of Bare-faced Ibis (*Phimosus infuscatus*) have been recorded in the state of Rio de Janeiro.

(Osaki 2014).

Bare-faced Ibis (*Phimosus infuscatus*): Rare vagrant birds reported for Curral de Ubatuba, Lagoa Feia region (Wied-Neuwied 1820–1821), Lagoa de Marapendi (Magnanini & Coimbra Filho 1964) and São Gonçalo (Nacinovic 1993). “Rio de Janeiro” was reported by Burmeister (1855–1856). The species is expanding its range in the upper Paraíba do Sul River Valley (Gomes et al. 2012) (Image 6).

Plumbeous Ibis (*Theristicus caerulescens*): Known by a single old specimen from Porto Real (Boucard & Berlepsch 1892). Since then the species has not been found in the state of Rio de Janeiro (Image 7).

Double-toothed Kite (*Harpagus bidentatus*): This species very rare in southern and southeastern Brazil and is known in the state of Rio de Janeiro based on an old record for Cantagalo (Ihering 1900) (although no specimen has been found in the Euler collections from Cantagalo in Berlin Museum, according to Sylke Frahnert in litt. to FMR) and one specimen from “Rio de Janeiro” examined by Charles E. Hellmayr (Hellmayr & Conover 1949). Records from Serra dos Órgãos and Corcovado (Goeldi 1894–1900) and Jardim Botânico do Rio de Janeiro (Ruschi 1982) may be erroneous (possibly Rufous-thighed Kite *Harpagus diodon*). Unknown status in the state of Rio de Janeiro.

Gray-bellied Hawk (*Accipiter poliogaster*): This rare hawk was first recorded for the state based on an old specimen collected in Cantagalo (Cabanis 1874). Another



Image 7. The Plumbeous Ibis (*Theristicus caerulescens*) is known by a single old supposed specimen in the state of Rio de Janeiro.

old specimen labeled “Rio de Janeiro” (Hellmayr & Conover 1949) and a sighting report for Itatiaia (Mitchell 1957) are other records of the species in the state of Rio de Janeiro. Recently, the birds were seen in the Parque Estadual do Desengano in April 1987 (Pacheco 1992), Paraty (Remold 2001), and Nova Friburgo (February 2009) (Pacheco et al. 2014). It is considered a Vulnerable species (Alves et al. 2000), but it may be a Critically Endangered species in the state.

Black-collared Hawk (*Busarellus nigricollis*): Currently rare in the state, the species was reported to Quissamã (Wied-Neuwied 1820–1821), Nova Friburgo (Burmeister 1855–1856), and Cantagalo (Ihering 1900). Recently, it has been recorded in Ilha do Fundão (Maciel 2009) and Reserva Ecológica Guapiaçu (Mello 2012). A specimen flying over Lagoa Feia, Campos dos Goitacazes, was recorded on 16 November 1990 (José Fernando Pacheco pers. obs.). Classified as a Vulnerable species in the state of Rio de Janeiro (Alves et al. 2000), it is possibly a Critically Endangered species in the state.

Rufous Crab Hawk (*Buteogallus aequinoctialis*): Typical of mangroves, the Rufous Crab Hawk is found along the coast of Brazil (Amapá to Paraná). However, currently it is rare in southeastern Brazil due to habitat loss and degradation. The species has been reported from Cabo Frio and Arraial do Cabo (Guimarães 2001). Ectoparasites were reported from two individuals from the city of Rio de Janeiro between August and September 2006 (Gredilha et al. 2008), but the photographs of the

autopsied specimen were lost (L.P. Fedullo in litt. to JFP 15 November 2007). Rufous Crab Hawk is a Critically Endangered species in the state of Rio de Janeiro (Alves et al. 2000).

Variable Hawk (*Geranoaetus polyosoma*): Very rare southern vagrant. Only known from one sight record from Ilha de Cabo Frio, Arraial do Cabo (Pacheco 2004).

Crested Eagle (*Morphnus guianensis*): Formerly widely distributed throughout the forested regions of Brazil, nowadays the species is extremely rare in the Atlantic Forest (Albuquerque 1979). Hermann Burmeister recorded a bird in Cantagalo in April 1851 (Burmeister 1853, 1855–1856). The Crested Eagle has been reported in the “vicinity of Rio de Janeiro” (Hellmayr & Conover 1949). Classified as a Probably Extinct species in the state of Rio de Janeiro (Alves et al. 2000). The complete lack of documentation over 150 years in the state, coupled with the tendency of this species to be rare in eastern Brazil (Albuquerque 1979), lead us to conclude that it is certainly Extinct in the region.

Harpy Eagle (*Harpia harpyja*): The most powerful raptor in Brazil is now very rare in the Atlantic Forest region (Pacheco et al. 2003). The species was reported for Cantagalo in the 19th century (Cabanis 1874). One specimen was collected in Itaperuna on 06 September 1943 (Aguirre & Aldrich 1983). More recently, the species has been reported for Itatiaia (Barth 1957; Gouvêa 1985; Marigo 2002) and Serra dos Órgãos (Mallet-Rodrigues et al. 2007). Although it is considered an Endangered species (Alves et al. 2000), the Harpy Eagle should be classified as a Critically Endangered species in the state of Rio de Janeiro.

Paint-billed Crake (*Neocrex erythrops*): Only known in the state from one individual found dead at Jardim Guanabara, Ilha do Governador (Mallet-Rodrigues 2003). However, *N. erythrops* may be an overlooked species in the region. Paint-billed Crake is poorly known from southeastern Brazil (Silveira et al. 2009, Simon et al. 2007) with records also in the central coast of São Paulo (Olmos & Silva e Silva 2001; Silva e Silva & Olmos 2007) and Pau Gigante (=Ibiraçu), Espírito Santo (Pinto 1964).

Spotted Rail (*Pardirallus maculatus*): The species is known in the state of Rio de Janeiro by one specimen collected near the Muriaé River (Pinto 1964) and another

specimen from Itatiaia (Pacheco & Parrini 2000). The Spotted Rail was also reported in Guaratiba (Ventura 1985), where JFP also recorded it in the 1980s. It may be an overlooked species in the state.

Azure Gallinule (*Porphyrio flavirostris*): A specimen from “Rio de Janeiro” was possibly collected in the late 19th century (Sick & Pabst 1968). Also reported for Itatiaia (Barth 1957). The alleged specimen from Itatiaia was not located in the collection of the Museu do Parque Nacional de Itatiaia (R. Parrini pers. comm. to JFP 16 January 2001). The records closest to Rio de Janeiro are those of Lagoa Santa, state of Minas Gerais (Reinhardt 1870) and Floresta Nacional (Flona) de Ipanema, state of São Paulo (Czaban 2012).

Red-fronted Coot (*Fulica rufifrons*): Very rare austral migrant species in the state. One specimen was collected in 1993 at Fazenda Santa Inês, municipality of Magé (Nacinovic 1994), the only locality where the species was recorded in the state of Rio de Janeiro. Red-fronted Coot has also been recorded in the state of São Paulo in Iguape and São Sebastião during winter (Willis & Oniki 1993).

White-winged Coot (*Fulica leucoptera*): Just like the previous species, the White-winged Coot is a very rare austral migrant in the state. It was first reported in the state of Rio de Janeiro from Pedra de Guaratiba (Pacheco 1988b). One specimen from “Rio de Janeiro” that was collected in July 1987 is housed in the ornithological collections of the Museu Nacional do Rio de Janeiro. The species was also recorded in Campinas, state of São Paulo (Sick 1997).

Pied Lapwing (*Vanellus cayanus*): Widely distributed throughout Brazil, the species has been reported for “Rio de Janeiro” (Sharpe 1896) and Reserva Biológica de Poço das Antas (foodplain of the São João river), municipality of Silva Jardim, on 20 February 2003 (see Pacheco et al. 2010). It is a rare vagrant species in the state.

Tawny-throated Dotterel (*Oreopholus ruficollis*): This southern species has been recorded in the state of Rio de Janeiro only once on the Mambucaba beach, Angra dos Reis, on 22 May 2012 (Maciel & Blanco 2014).

Purple-winged Ground-Dove (*Claravis geoffroyi*): This Atlantic Forest endemic species (Parker et al. 1996) was fairly common at the beginning of the 20th century (Sick 1997). Nowadays, it is a Critically Endangered

species (Straube et al. 2008, IUCN 2014). *Claravis geoffroyi* has not been recently recorded in the state of Rio de Janeiro. The last reports are from the 1980s (Collar et al. 1992; Scott & Brooke 1985). Known from several localities, such as Nova Friburgo (Burmeister 1855–1856), Piraí (Pelzeln 1868–1871), Cantagalo (Cabanis 1874), Macacu River (Goeldi 1894–1900), Teresópolis (Davis 1945; Collar et al. 1992), Parque Nacional do Itatiaia (Pinto 1954; Barth 1957; Collar et al. 1992; Sick 1997), Guapimirim (Collar et al. 1992), and Tinguá (Pacheco & Bauer 1995). The major threat is probably related to habitat loss (humid forests with patches of flowering or seeding bamboo).

Scaled Pigeon (*Patagioenas speciosa*): The species has been reported for the municipality of Rio de Janeiro (Corrêa 1936; Sick 1983), Reserva Biológica de Poço das Antas (Scott & Brooke 1985; Pacheco et al. 2010), Citrolândia, Magé (Gonzaga 1986), Campos dos Goitacazes (Pacheco et al. 1996), Araruama (Guimarães 2001), Guapimirim (Mello 2013) and recently in the Reserva Ecológica Guapiaçu (REGUA) (Dingain 2013; Pacheco et al. 2013). Classified as a Vulnerable species in the state of Rio de Janeiro (Alves et al. 2000), it may be considered Critically Endangered in the region.

Violaceous Quail-Dove (*Geotrygon violacea*): First known in the state by specimens from Cantagalo (Cabanis 1874) and “Rio de Janeiro” (Hellmayr & Conover 1942) both collected in the 19th century. The specimen mentioned by Hellmayr & Conover (1942) may refer to a skin of W. Behn which was deposited in the Berlin Museum, according to the notes of A. Schneider. Recently, the species has been recorded in Xerém (Reserva Biológica do Tinguá) (Sick & Pacheco, unpublished data), Itatiaia region (Pineschi 1990; Pacheco et al. 1997b) and Santa Maria Madalena (Pacheco et al. 1996). Its status is unknown in the state of Rio de Janeiro.

Ash-colored Cuckoo (*Micrococyx cinereus*): Very rare vagrant in the state of Rio de Janeiro. A female was collected in Maricá in June 1989 (Nacinovic et al. 1990).

Pheasant Cuckoo (*Dromococyx phasianellus*): Ihering (1900) cited the species from Cantagalo, but possibly it is the Pavonine Cuckoo (see below). Helmut Sick heard the vocalization of the species in Nova Friburgo in April 1952 (H. Sick pers. comm. to JFP on May 1986). Also reported for Piraí (Pacheco et al. 1997b) and Parque Nacional do Itatiaia (Honkala & Niiranen 2010). There is no recent information on the local population

of this species. It is Probably Extinct in the state of Rio de Janeiro.

Pavonine Cuckoo (*Dromococyx pavoninus*): The Nova Friburgo record of *Dromococyx phasianellus* by Burmeister (1855–1856) was used by Pelzeln (1868–1871) in describing *Dromococyx pavoninus*. One specimen was collected by Carl Euler in Cantagalo in the 19th century (Cabanis 1874). The species is considered Probably Extinct in the state (Alves et al. 2000), but it may still be rediscovered in the state of Rio de Janeiro. The Pavonine Cuckoo has been listed as a Least Concern species in the neighboring state of São Paulo (Silveira et al. 2009).

Rufous-vented Ground-Cuckoo (*Neomorphus geoffroyi*): The subspecies *dulcis* from the lowland forests of eastern Brazil (Minas Gerais to Rio de Janeiro) is a Critically Endangered species (Silveira 2008b). It is known in the state of Rio de Janeiro by only one pair collected in Cantagalo in the 19th century (Cabanis 1874). Considered a Probably Extinct species (Alves et al. 2000), it is certainly Extinct in the state of Rio de Janeiro.

Spectacled Owl (*Pulsatrix perspicillata*): This large owl is widely distributed throughout Brazil, but it has rarely been found in the southeastern and southern regions of the country. The species was reported in Cantagalo by Ihering (1900), although not reported by Euler (1867, 1868) and Cabanis (1874). There is a possibly erroneous report for Itatiaia (Barth 1957). There is a specimen from Nova Friburgo cited by Kelso (1938). A song similar to the vocalization of the Spectacled Owl was heard in Miracema in July 1988 (JFP). It is Probably Extinct in the state of Rio de Janeiro.

Great Horned Owl (*Bubo virginianus*): There are old records for Muribeca (Wied-Neuwied 1830–1831) and Nova Friburgo (Euler 1869). The species was recently recorded in the state of Rio de Janeiro from the Horto Municipal de Santa Maria Madalena on 27 October 1986, Sapucaia on 16 June 1990 (both JFP pers. obs.), Iguaba Grande on 08 January 2006 (Carvalho 2006) and São Francisco de Itabapoana on 02 August 2014 (Marins 2014). Its status is unknown in the region.

Sickle-winged Nightjar (*Hydropsalis anomala*): This globally Near Threatened nightjar (IUCN 2014) has been reported in the state of Rio de Janeiro based on old specimens from Nova Friburgo (Euler 1869; Burmeister 1855–1856; Pacheco 1998b). There is no

recent information on the population of this species in the region, but recent records in Lima Duarte (Miguel 2010) and Aiuruoca (Peixoto 2013), Southern Minas Gerais, suggest that the species may still occur in Rio de Janeiro. It is a Data Deficient species in the state of Rio de Janeiro.

Ruby-topaz Hummingbird (*Chrysolampis mosquitus*): Besides old records from Serra dos Órgãos (Des Murs 1855) and “Rio de Janeiro” (Gould 1849–1861), the species has been reported in Porto Real (Boucard & Berlepsch 1892) and city of Rio de Janeiro (Sick & Pabst 1968; Ruschi 1982). Robert Ridgely recorded the species in Reserva Biológica de Poço das Antas on 03 November 2002 (in litt. to JFP). Recently, one individual was photographed in Itaperuna, northern Rio de Janeiro (Moura et al. 2013). It is a vagrant hummingbird species in the state.

Black-bellied Thorntail (*Discosura langsdorffi*): First reported for “Rio de Janeiro” by Temminck (1821). Known in Fazenda Mandioca (Spix & Martius 1823–1831), Nova Friburgo (Burmeister 1855–1856; Salvin & Hartert 1892), Piraí (Pelzeln 1868–1871), Cantagalo (Cabanis 1874) and Itaipava (Goeldi 1894–1900). Reeves (*apud* Gould 1849–1861) reports “the young birds arrive in July, but the old ones do not make their appearance until September and October, and depart again in November”. The species has also been reported for the city of Rio de Janeiro (Sick 1997; Maciel 2009). Recently a female (or perhaps a young male) was recorded visiting *Hibiscus* flowers in the Corcovado mountain (Parque Nacional da Tijuca) on 04 July 1987, and a male was seen perched in a bush in Horto Florestal (near the Parque Nacional da Tijuca) on 09 May 1992 (José Fernando Pacheco pers. obs.). The Black-bellied Thorntail is a Critically Endangered species in the state.

Racket-tailed Coquette (*Discosura longicaudus*): Reported only for Tinguá (Sick 1997). There is no recent information on its local population. It is a Critically Endangered species in the state of Rio de Janeiro.

Gilded Hummingbird (*Hylocharis chrysura*): Common in southern Brazil and Pantanal, the species has only been vaguely reported in the state of Rio de Janeiro, based on a skin obtained by Charles H. Bescke from Nova Friburgo (Burmeister 1855–1856; Goeldi 1894–1900). The Gilded Hummingbird has not been recently recorded in the state. It is a rare vagrant species in the region (Image 8).



Image 8. The Gilded Hummingbird (*Hylocharis chrysura*) has not been recently recorded in the state of Rio de Janeiro. It is a rare vagrant species to the region.

Green-and-rufous Kingfisher (*Chloroceryle inda*): An uncommon kingfisher species, it has been reported in Cantagalo (Ihering 1900) and Paraty (Pacheco et al. 1997a). A record from Jacarepaguá (Magnanini & Coimbra Filho 1964) was discarded later by the authors (see Pacheco 1988b). Classified as a Data Deficient species in the state of Rio de Janeiro (Alves et al. 2000).

Rusty-breasted Nunlet (*Nonnula rubecula*): Reported in Nova Friburgo (Burmeister 1855–1856; Krabbe 2007), Cantagalo (Cabanis 1874) and recently for Serra da Concórdia, Valença (Pacheco et al. 1997b). The population status is unknown in the state of Rio de Janeiro (Alves et al. 2000).

White-fronted Nunbird (*Monasa morphoeus*): Known to the state of Rio de Janeiro based on specimens collected in the 19th century from “Rio de Janeiro” (Stresemann 1950), Fazenda Mandioca (Spix & Martius 1823–1831), Nova Friburgo (Burmeister 1855–1856) and also reported in Cabo Frio, based on specimens obtained by F. Sellow (Pelzeln 1868–1871). Classified as Probably Extinct in the state (Alves et al. 2000), it is certainly Extinct in the region (Image 9).

Swallow-winged Puffbird (*Chelidoptera tenebrosa*): Specimens were collected at Muribeca (Wied 1820–1821), Cantagalo (Euler 1867) and Sepitiba (Pelzeln 1868–1871). The species was reported in Reserva Biológica de Poço das Antas, municipality of Silva



Image 9. The White-fronted Nunbird (*Monasa morphoeus*) is known to the state of Rio de Janeiro based on specimens collected in the 19th century. It is certainly extinct in the region.

Jardim, in the 1980s (Scott & Brooke 1985), but it has not been recently found in the reserve (Pacheco et al. 2010), at least since April 1988 when two individuals were observed (José Fernando Pacheco pers. obs.). The Swallow-winged Puffbird has not been recently recorded in the state, despite extensive surveys in suitable habitats. It is Probably Extinct in the state of Rio de Janeiro.

Golden-green Woodpecker (*Piculus polyzonus*): A recent taxonomic review proposed to recognize the subspecies *Piculus chrysochloros polyzonus* as a valid phylogenetic species (Del-Rio et al. 2013). Reported in Cantagalo (Cabanis 1874) and, erroneously, Itatiaia (Barth 1957). The species has not been found in the state of Rio de Janeiro in the last three decades. The last known record was made at Raposo, Itaperuna, on 30 September 1989 (JFP pers. obs.). It is a Probably Extinct

species in the state (Alves et al. 2000).

Red-throated Caracara (*Ibycter americanus*): First reported for “Rio de Janeiro” (one female) by Hellmayr & Conover (1949). Two birds were observed flying over the Praia dos Frades, Ilha de Paquetá, in February 1987 (Nacinovic et al. 1993). There is no recent information on the local population of this species, but it is Probably Extinct in the state.

Chimango Caracara (*Milvago chimango*): The Southern vagrant has been rarely recorded in the state of Rio de Janeiro, although it is sometimes found in southern Minas Gerais (Pacheco et al. 2008). Only recorded in Volta do Pião, Sapucaia (Pacheco et al. 1994) and Reserva Ecológica Guapiaçu (Pimentel & Olmos 2011) (Image 10).

Cryptic Forest-Falcon (*Micrastur mintoni*): Specimens of this recently described species are restricted to southeastern Amazonia and eastern Brazil (Whittaker 2002) and have been confused with the similar Lined Forest-Falcon (*Micrastur gilvicollis*) for a long time (see Pinto 1935; Hellmayr & Conover 1949). An immature bird collected near the city of Rio de Janeiro in August 1857 by Johann Zelebor during the Novara Expedition (1857-1859) is the only specimen known for the state.

Orange-breasted Falcon (*Falco deiroleucus*): Until recently, this species was known in the state based only on old specimens. One female was collected by Carl



Image 10. The Chimango Caracara (*Milvago chimango*) is a southern vagrant rarely recorded in the state of Rio de Janeiro.

Euler in Cantagalo (Cabanis 1874) and another specimen was obtained by Emílio Goeldi in Teresópolis (Mallet-Rodrigues 2009). Classified as a Probably Extinct species in the state of Rio de Janeiro (Alves et al. 2000), recently (11 March 2012) a single bird was photographed in Miracema, northern Rio de Janeiro (Maciel & Blanco 2014). It is a Critically Endangered species in the state.

Blue-and-Yellow Macaw (*Ara ararauna*): First mentioned by Thévet (1557) and Léry (1941), one specimen was collected by Johann Natterer in March 1818 near Rio de Janeiro (Pelzeln 1868–1871). Now the species is Extinct in the state.

Red-and-green Macaw (*Ara chloropterus*): The species is attributed to the state of Rio de Janeiro based on *ará*, cited by Léry (1941). Old mentions to the species are found in Thévet (1557), Reys (1997), Wied-Neuwied (1820–1821), Spix & Martius (1823–1831), Burmeister (1853), Descourtilz (1854–1856) and Mello (1886). Extinct in the state.

Vinaceous Parrot (*Amazona vinacea*): Old reports were from “Morro Queimado, próximo a Rosário” (now Nova Friburgo) (Reinhardt 1870; Ihering 1900; Krabbe 2007). The most recent records are from Valença (JFP apud Collar et al. 1992), Miracema (Pacheco et al. 1996), Itatiaia (Honkala & Niiranen 2010), Nova Friburgo (R. Ouverney pers. comm. to JFP, Pacheco et al. 2014), and Paraíba do Sul (JFP pers. obs. 2012). The species is considered globally Endangered (IUCN 2014), but it is classified as Vulnerable in the state of Rio de Janeiro (Alves et al. 2000). We recognize it as a Critically Endangered species in the state.

Band-tailed Antwren (*Myrmotherula urosticta*): Considered globally Vulnerable, this Atlantic Forest endemic species is restricted to the lowland forests of eastern Brazil (Bahia to Rio de Janeiro) (IUCN 2014). Rarely recorded in the state of Rio de Janeiro (northern region), it has been reported for the Parque Estadual do Desengano and Reserva Biológica União (Pacheco et al. 1992; Whitney & Pacheco 1995; Pacheco et al. 2010). Two “incredible” records of the species in Gávea (near the Parque Nacional da Tijuca) in the metropolitan area of Rio de Janeiro, in April and October 1989 (JFP), were not mentioned by Whitney & Pacheco (1995). There are skins from “Rio de Janeiro” in BMNH and ZMB (N.J. Collar in litt. to JFP). The species has also been found in fragmented and moderately disturbed forests, but its population is rapidly declining in the state.

Rio de Janeiro Antwren (*Myrmotherula fluminensis*): Known only from the type-specimen from Santo Aleixo, municipality of Magé (Gonzaga 1988). The species has been suspiciously reported to the Reserva Ecológica Guapiaçu (Knapp 1997). The population status of this species is unknown.

Cinereous Antshrike (*Thamnomanes caesius*): First reported for the state of Rio de Janeiro from “Macahé” [= Macaé de Cima, Nova Friburgo] (Ihering & Ihering 1907). The species has also been cited from Aldeia da Pedra [=Itaocara] (Krabbe 2007), municipality of Rio de Janeiro (Ruschi 1982; Sick 1997), Reserva Biológica de Poço das Antas (Scott & Brooke 1985); Parque Estadual do Desengano (Pacheco et al. 1996), Reserva Biológica União (Pacheco et al. 2010) and Cachoeiras de Macacu (Mallet-Rodrigues et al. 2007). The species has not been recorded at the Parque Nacional da Tijuca since 1989 and Reserva Biológica União since the 1990’s (JFP). Recently, Cinereous Antshrike has been found only in Guapimirim (Mallet-Rodrigues & Noronha 2003) and Reserva Ecológica Guapiaçu (Pimentel & Olmos 2011). However, the species has not been found at both sites in the last few years. Classified here as a Critically Endangered species in the state of Rio de Janeiro, it was not included in the list of threatened species in the state (Alves et al. 2000).

Plumbeous Antvireo (*Dysithamnus plumbeus*): Atlantic Forest endemic species restricted to lowland forests of eastern Brazil (Bahia to Rio de Janeiro). The species is listed as Vulnerable globally (IUCN 2014), but Endangered in the state of Rio de Janeiro (Alves et al. 2000). One old specimen was reported for “Rio de Janeiro” (Cory & Hellmayr 1924). During the 1980s and 1990s the species was recorded in Raposo (municipality of Itaperuna), northern Rio de Janeiro (R. Parrini & JFP apud Collar et al. 1992; Pacheco 1999), but it has not been found recently. We classify it as a Critically Endangered species in the state.

Buff-throated Woodcreeper (*Xiphorhynchus guttatus*): Besides old reports from “Rio de Janeiro” (Spix 1824–1825; Pelzeln 1868–1871; Cory & Hellmayr 1925), the species has been suspiciously cited in the Serra do Tinguá (Scott & Brooke 1985). It is a Critically Endangered species in the state.

Straight-billed Woodcreeper (*Dendroplex picus*): This woodcreeper is known only from Barra de Itabapoana, near the border with the state of Espírito

Santo (Pacheco & Bauer 1997), where it is fairly common in mangroves near Vitória. A recent record (April 2014) in the southern Espírito Santo testifies to the occurrence of the species near the border with the state of Rio de Janeiro (Pacheco 2014). The Straight-billed Woodcreeper is a Critically Endangered species in the state of Rio de Janeiro.

Striated Softtail (*Thripophaga macroura*): Atlantic Forest endemic species restricted to lowland and submontane forests of eastern Brazil (Bahia to Rio de Janeiro), it was reported for Aldeia da Pedra (now Itaocara) (Collar et al. 1992; Krabbe 2007), Itaperuna (JFP), and Parque Estadual do Desengano (Collar et al. 1992). Listed as an Endangered species in the state of Rio de Janeiro (Alves et al. 2000). We classify it as a Critically Endangered species in the state.

Wied's Tyrant-Manakin (*Neopelma aurifrons*): Endemic to the lowland forests of eastern Brazil (Bahia to Rio de Janeiro), the species is known for the state of Rio de Janeiro only from Anil, Cachoeiras de Macacu, but there is one possible historical record from Cantagalo by Carl Euler (Whitney et al. 1995; Pacheco 1995). Although it was not included among the threatened bird species in the state by Alves et al. (2000), we classify it as Critically Endangered.

Blue-backed Manakin (*Chiroxiphia pareola*): In eastern Brazil, this manakin has not been recently recorded in the southern portion of its range. The species was reported for the state of Rio de Janeiro based on an old specimen from Nova Friburgo (Sclater 1888; Ihering 1900) and two males (attributable to L. Westin) from "Rio de Janeiro" (Gyldenstolpe 1951). A green *Chiroxiphia* without the prolonged central rectrices, with a frontal crest, resembling an *Antilophia* manakin, and emitting calls distinct from those of *Chiroxiphia caudata*, was recorded on the slopes of Parque Estadual do Desengano in April 1987 and tentatively identified as *Chiroxiphia pareola* (JFP). Probably Extinct in the state.

White-winged Cotinga (*Xipholena atropurpurea*): Although typical of lowland forests, this Atlantic Forest endemic species was reported for Nova Friburgo (mountainous region of the central state of Rio de Janeiro) during the 19th century (Burmeister 1855–1856; Ihering 1900). The species was reported in the Parque Estadual do Desengano (Collar et al. 1992), although it has not been recorded since 1986 in the region. Critically Endangered in the state of Rio de Janeiro.

Banded Cotinga (*Cotinga maculata*): Formerly reported for Campos dos Goitacazes (Descortilz 1854–1856), Nova Friburgo (Burmeister 1855–1856; Ihering 1900) and Cantagalo (Ihering 1900). An old specimen from "Rio de Janeiro" is the only reference of this Atlantic Forest endemic species in the region (Hellmayr 1929). Extinct in the state.

Wing-barred Piprites (*Piprites chloris*): Only recently the species has been documented in the state of Rio de Janeiro from Reserva Ecológica de Guapiaçu, municipality of Cachoeiras de Macacu (Pimentel 2009). Regional status unknown.

Kinglet Calyptura (*Calyptura cristata*): Enigmatic bird species known from several specimens collected in Nova Friburgo (Burmeister 1855–1856; Sclater 1888; Hellmayr 1929; Krabbe 2007) and Cantagalo (Cabanis 1874). Sighted in Guapimirim in October 1996 (Pacheco & Fonseca 2000, 2001), it was no longer seen after that. A complete review of recent reports of the species can be found in Lambert & Kirwan (2010). Classified as Probably Endangered in the state of Rio de Janeiro (Alves et al. 2000), it is certainly a Critically Endangered species.

Many-colored Rush Tyrant (*Tachuris rubrigastra*): Reported only in Pedra de Guaratiba (Pacheco 1988b; Pacheco & Gonzaga 1994) and Cabo Frio (Pacheco & Gonzaga 1994). It is a migrant species in the state (Image 11).



Image 11. The Many-colored Rush Tyrant (*Tachuris rubrigastra*) is a rare southern migrant species in the state of Rio de Janeiro.

Southern Bristle-Tyrant (*Phylloscartes eximius*): Old records are from Nova Friburgo (Burmeister 1855–1856; Pelzel 1873; Cory & Hellmayr 1927; Krabbe 2007) and Cantagalo (Ihering 1900). The latest report from Itatiaia was in the middle 20th century (Holt 1928; Barth 1957). The Southern Bristle-Tyrant was securely recorded in Sumidouro and Parque Estadual do Desengano in the 1980s (José Fernando Pacheco). The species has recently been found in some localities in southern Minas Gerais. Critically Endangered in the state (Alves et al. 2000), it is an Atlantic Forest endemic species (Parker et al. 1996).

Strange-tailed Tyrant (*Alectrurus risora*): This rare species has been reported in the state of Rio de Janeiro only in the Ilha de Jaguanum, Mangaratiba, between July and August 1974 (Pacheco & Gonzaga 1994). It is probably a vagrant species in the state.

Chilean Swallow (*Tachycineta leucopyga*): The Southern migrant swallow reported for the Rio de Janeiro from Resende (Pacheco et al. 1997b) and Quissamã (Tavares 2008; Rennó 2009), this species has also been recorded in Cabo Frio (three specimens collected on 31 July 1968) (JFP) and recently within the city of Rio de Janeiro (Bessa 2014).

Cocoa Thrush (*Turdus fumigatus*): Found in eastern Brazil from Pernambuco to Rio de Janeiro, this thrush has been reported in the region of Paraíba do Sul River (Burmeister 1855–1856). Two old specimens labeled “Rio de Janeiro” are housed in NRM from L. Westin collections (Gyldenstolpe 1951) (Table 1). A supposed escaped captive bird was seen in October 1956 (H. Sick in litt. to JFP 31 May 1986) around the Parque Nacional da Tijuca. In the 1980s two birds, possibly escaped from captivity, were observed in the same region. The species has recently been found in two forest reserves at Cachoeiro de Itapemirim, southern Espírito Santo (August 1997, José Fernando Pacheco and C. Bauer). Critically Endangered in the state of Rio de Janeiro.

Variable Oriole (*Icterus pyrrhopterus*): Known for Nova Friburgo (Burmeister 1855–1856), São Fidélis (Mangelsdorff 1892) and Cantagalo (Ihering 1900). An old specimen labeled “Rio de Janeiro” is known (Sclater 1883; Hellmayr 1937). Single birds have been recorded near Reserva Biológica União (JFP, July 1990) and Parque Estadual do Desengano (C.E. Carvalho). Recently (23 April 2010) one individual was found in the municipality of Três Rios, in the mid-Paraíba do Sul River (FMR and Rafael Bessa pers. obs.). Its status is unknown in the

region. The species may be recolonizing the state of Rio de Janeiro from the northwest.

Bay-winged Cowbird (*Agelaioides badius*): A common species in southern Brazil, it has been reported from the state of Rio de Janeiro based on one specimen (now possibly lost) collected on 03 January 1969 at Represa Rio Grande, Pau da Fome, municipality of Rio de Janeiro (Aguirre & Aldrighi 1987; Pacheco 1988b) (Image 12).

Silver-breasted Tanager (*Tangara cyanomelas*): Species recorded from the state based on two old specimens from “Rio de Janeiro” (Hellmayr 1936; Zimmer 1943). Suspiciously reported in São Conrado, city of Rio de Janeiro (Sick & Pabst 1968). A single individual accompanied by other tanagers was seen in the 1980s in Tinguá (José Fernando Pacheco). This Atlantic Forest endemic species is Probably Extinct in the state (Alves et al. 2000).

Black-faced Tanager (*Schistochlamys melanopis*): Rare in eastern Brazil, Wied-Neuwied (1830–1831) found it in “Parahyba[do Sul] River and Cabo Frio”. There is also another old specimen from the 19th century (Sclater 1856). One bird was sighted in Jacarepaguá, municipality of Rio de Janeiro (Sick & Pabst 1968). No more records of the species are known in the state.



Image 12. The Bay-winged Cowbird (*Agelaioides badius*) is a common species in southern Brazil, but it has been reported from the state of Rio de Janeiro based only on one specimen collected in the late 1960s which is possibly lost.

Plumbeous Seedeater (*Sporophila plumbea*):

This species is more widely distributed in the cerrado of central Brazil. Valued as bird cage, *S. plumbea* has become extremely rare in the state of Rio de Janeiro. This seedeater species was reported for Barra da Tijuca (Sick & Pabst 1968; Teixeira & Nacinovic 1992) and Santa Cruz (Sick & Pabst 1968), both located in the municipality of Rio de Janeiro. Critically Endangered in the state.

Great-billed Seed-Finch (*Sporophila maximiliani*):

Without any record in recent decades, the species is reported for the state only from old specimens from "Rio de Janeiro" (Sharpe 1888; Hellmayr 1938) and Cantagalo (Sneath & Schreiner 1929). Apparently the species was found until the 1950s around Itatiaia (E. Gouvêa apud Sick [1997]). Extinct in the state.

DISCUSSION

Rare birds might be resident species that are elusive and hard to detect, species with naturally low population densities, or they might be threatened species with a declining population. Migratory and vagrant birds are also considered rare when they are recorded far from their normal ranges or wintering territories.

Most species of an ecological community are represented by a few individuals, and most individuals belong to a few species. This is a matter that has been extensively studied (Preston 1948; Harte et al. 1999). Recognizing the mechanisms leading to the rarity of many species has fundamental importance for understanding the ecosystem functionality and to establish conservation measures, because rare species have a greater extinction risk than those that are common (Johnson 1998; Matthies et al. 2004).

Several abiotic and biotic factors may determine the distribution of species. Therefore, species are rare or absent where environmental factors are limiting to their occurrence. However, identifying the factors responsible for the rarity of a species is often a difficult task. About a quarter of the rarest bird species of the state of Rio de Janeiro have unknown causes of local rarity.

Individuals of a species are more sparsely distributed at the margins of their range, regions called "domain of the living dead" (Brown & Lomolino 2006). Consequently, species tend to be rarer at the boundary of their range. Some studies have contradicted the traditional conjecture that peripheral populations have lower viability and lower genetic diversity than central populations (Townes & Daugherty 1994; Lomolino &

Channell 1995; Channel & Lomolino 2000a, 2000b; Channel 2004). Therefore, conservation efforts could be equally valuable on the edges of the distribution range where there is usually a greater risk of extirpation, as in the central populations (Channel 2004). In our study, the high number of locally threatened bird species (including extinct species) with distribution limits in the state of Rio de Janeiro reveals the importance of conservation measures in the "domain of the living dead."

The rarest bird species of the state of Rio de Janeiro may be classified into three basic categories: (1) locally threatened, (2) rare migrants or vagrants, and (3) species whose local conservation status is unknown. Among the threatened species are those that had a significant reduction in local population. They are classified as Extinct, Probably Extinct or Critically Endangered species for the state. Most locally Extinct species have a low probability of recolonization due to scarcity or absence of viable populations in the vicinities of the state. Among the Probably Extinct species are some birds that can still recolonize the state from neighboring regions.

Certain groups of birds in small forest fragments are especially prone to extinction such as ground and canopy frugivores, carnivores, and understory insectivores (Willis 1979; Kattan 1992; Kattan et al. 1994; Goerck 1997; Christiansen & Pitter 1997; Ribon et al. 2003). Most Extinct or Probably Extinct species in the state of Rio de Janeiro are large or medium-sized birds, poorly adapted to survive in fragmented habitats, such as large forest canopy omnivorous, frugivorous and insectivorous birds. Some large carnivores, many frugivores and understory insectivorous passerines are predominant among the Critically Endangered species.

Large frugivores can be locally extirpated due to insufficient supply of fruit in forest fragments. A considerable variety of fresh fruits with large seeds offered throughout different seasons, is essential to large frugivores (Willis 1979). Local Extinction caused by man or extirpation of frugivorous birds that act as large-gape seed dispersers has an important influence in the reduction of the seed size of some keystone palm species (Galetti et al. 2013). Although forest fragments and second-growth habitats have great abundance of fruits, they are mainly small-seeded fruits, hardly exploited by large frugivorous birds (Martin & Karr 1986; Galetti & Pizo 1996). Therefore, large tracts of continuous forest are essential for the conservation frugivorous and large insectivorous birds, which require large territories due to their low population densities (Willis 1979).

Although the threat categories are obtained through reasonably distinct methods in different geographic

scales, a higher number of species has been classified as regionally threatened rather than at national or global levels, as reported by Gärdenfors (2001). In our study, several birds considered locally extinct or threatened have not been included. These include such as *Ibycter americanus*, *Pulsatrix perspicillata*, *Thamnomanes caesius*, *Chiroxiphia pareola*, and *Turdus fumigatus* (Alves et al. 2000). Moreover, two species (*Falco deiroleucus* and *Tigrisoma fasciatum*) considered as locally Extinct have been recently rediscovered in the state (Menezes 2012; Blanco 2013). However, we must be very cautious when classifying a species as extinct, because some birds have been rediscovered after a long time without any record (Pinto 1952; Pacheco 1988a; Cohn-Haft 1993; Whittaker 1995; Pacheco 1998a; Pacheco & Fonseca 2000, 2001; Baudet 2001; Olmos & Pacheco 2003; Buzzetti & Carlos 2005; Prado 2006). In our study, we only admit the local extinction of a species after 150 years of no records. According to Scheffers et al. (2011), most species rediscovered after a long period without a record were found in less than 150 years after the last report.

Some migrant species or vagrant birds are sparsely found in non-breeding or wintering grounds. However, these species can not be considered threatened with extinction in these regions. All the rarest migrant species (not nearctic) or vagrants birds in the state of Rio de Janeiro are not included among the threatened species in Brazil (Machado et al. 2008). The local rarity of these migrant species is possibly related to their displacement dynamic and the local occurrence of suitable habitats. Why vagrant birds appear so far away from their regular ranges is unknown, but there are several possible explanations, such as fluctuations in food supply, habitat fragmentation, storms and dispersal of inexperienced young birds. There is no evidence of local population decline in these naturally rare southern migrants and vagrants in the state of Rio de Janeiro.

Although drainage of wetlands for agricultural development may be an important factor of threat to the aquatic birds, most of the rarest wetland bird species in the state of Rio de Janeiro probably were never common in the region. Among the threatened bird species in the state (according to Alves et al. 2000), 14.5% are wetland birds. In our study, wetland birds were poorly represented among the species classified as locally Extinct, Probably Extinct and Critically Endangered, but accounted for nearly half of the rarest migrants and vagrants in the state.

Museum specimens collected in the past may be a valuable source of information on species abundance in

the past. The local population decline of some currently rare species can be inferred by the existence of many museum specimens collected in the state of Rio de Janeiro. *Aburria jacutinga*, *Claravis geoffroyi*, *Discosura langsdorffi*, and *Calyptura cristata* are especially well represented by specimens from Rio de Janeiro in many ornithological collections, but they are now extremely rare in the region. However, several species have been mentioned from the region based on old specimens generically attributed to "Rio de Janeiro". Although specimens of some of these species may have been actually obtained in the state of Rio de Janeiro, such as *Ortalis araucuan* (Mallet-Rodrigues 2012a), *Trogon collaris* (Fraser 1856), *Attila spadiceus* and *Polioptila lactea* (Hellmayr 1906), many of these records have been questioned for some reasons (Pacheco & Parrini 1998a, 1998b). Many scientific collections were shipped to Europe from Rio de Janeiro, and therefore "Rio de Janeiro" on the specimen labels is the boarding locality and not the collecting locality of these specimens.

The rarest birds of the state of Rio de Janeiro are typical forest species, although most species are not endemic to the Atlantic Forest. However, most of the locally extinct, threatened or less abundant bird species in southeastern Brazil have been considered endemic to the Atlantic Forest (Goerck 1997; Brooks et al. 1999; Aleixo 2001; Ribon et al. 2003). Lowland forest species are predominant among the rarest and threatened birds of Rio de Janeiro, as found in other regions of southeastern Brazil (Ribon et al. 2003; Marini & Garcia 2005; Simon et al. 2007).

Deforestation and fragmentation of the Atlantic forest, hunting and trapping are the main threats to birds in the state of Rio de Janeiro (Alves et al. 2000). The Atlantic forest has lost much of its former area (Fonseca 1985; Myers et al. 2000), and it currently occupies less than 20% of its original distribution in Rio de Janeiro. However, low rates of deforestation have been recorded in recent years (SOS Mata Atlântica/INPE 2012). The high number of locally rare and threatened forest species among the birds of Rio de Janeiro reveals that although the deforestation has been reduced in the state, forest loss is still a major threat to its wild birds. While the montane forests have been well preserved, restinga formations have been largely degraded due to human occupation in the coastal region. Wetlands have also been significantly damaged or lost through drainage, which has threatened several aquatic bird species.

Hunting and trapping are also among the most important factors threatening birds of Rio de Janeiro. Some tinamous, *Aburria jacutinga*, and *Crax*

blumenbachii have been locally extirpated mainly by intensive hunting, while other species in high demand as cage-birds, such as parrots, macaws, seedeaters, tanagers and mockingbirds have been locally extinguished or are rarely found in the region due to intensive trapping pressure.

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Portuguese Abstract: Nós revisamos o status local atual e sumarizamos as possíveis causas de raridade e principais ameaças à conservação das 84 espécies de aves mais raras no estado do Rio de Janeiro, sudeste do Brasil. Nosso foco de estudo foram as espécies de aves que não têm sido recentemente registradas ou possuem menos de 10 registros nas últimas cinco décadas no estado do Rio de Janeiro. Entre elas, 24 espécies são consideradas globalmente ameaçadas ou quase ameaçadas e ao menos 30 espécies são atualmente comuns ou abundantes em outras áreas de sua distribuição. Mais de metade dessas espécies é constituída por aves florestais habitando principalmente florestas de baixada, mas menos que 20% dessas espécies são endêmicas da Floresta Atlântica. As guildas tróficas com maiores números de espécies foram os onívoros e insetívoros. Os principais habitats usados pelas espécies de aves mais raras no estado do Rio de Janeiro foram os alagados, copa das florestas de baixada e a copa e bordas das florestas secundárias. Espécies de aves usando dois ou mais habitats foram mais representadas que aquelas usando somente um único habitat. Nove espécies foram consideradas localmente extintas, 11 provavelmente extintas, 27 criticamente ameaçadas e 13 consideradas deficientes de informações no estado do Rio de Janeiro, às quais são de elevada preocupação para a conservação na região. Embora incluídas entre as aves mais raras encontradas no estado do Rio de Janeiro, 24 espécies não foram classificadas como localmente ameaçadas porque elas são migrantes ou vagantes naturalmente raros na região, sem evidência de significativa redução populacional no estado nas décadas recentes. Quinze espécies tiveram seu status de conservação considerado ameaçado no estado pela primeira vez. Quarenta e quatro espécies tiveram seu status de conservação local elevado em categoria, enquanto somente cinco espécies tiveram seu status de conservação reduzido. As maiores causas de raridade e ameaças a essas espécies na região são perda de habitat e caça/captura, mas aproximadamente 1/3 das espécies tem causas de raridade desconhecidas.

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