

Ethnoornithology and Bird Conservation in Afro-descendant Communities in the Brazilian Caatinga

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Abstract This paper investigates relationships between birds and the inhabitants of Afro-descendant communities in the Caatinga of northeastern Brazil, paying particular attention to conservation. Near the Refúgio de Vida Silvestre da Serra do Giz wildlife reserve, we interviewed 55 residents using semi-structured forms combined with free interviews and informal conversations. Residents reported 121 species in 43 families and 21 orders. They recounted what they knew about nesting, reproductive and social behaviors, diet, and bird conservation. The lack of reporting on several species of birds known from the Serra do Giz was probably because those birds are absent due to hunting and habitat destruction. This study demonstrates the importance of conducting ethnobiological studies for bird conservation and to record local traditional knowledge.

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Introduction

Brazilian Afro-descendant rural communities, called *quilombos*, formed when escaped enslaved people or formerly enslaved people gathered on lands that were either donated, inherited, received as payment for services, purchased, or simply occupied before and after slavery was abolished. Regulation of such lands began in 2003, including the identification, delimitation, and titling of land. *Quilombo* territories have faced challenges from collective resistance; conflicts with other communities and political organizations; and most of all, a history of oppression (Castilho 2011). When enslaved Africans fled, they searched for freedom and dignity, maintaining the culture and lifestyle they were torn away from when they were enslaved. The exploitation of enslaved Africans and erasure of their cultures were typical of the racist European practice at that time. These practices denied enslaved peoples' rights that were guaranteed to people of European descent. The lack of those rights, especially of land ownership, even today results in conflicts when lands occupied by the *quilombos* are designated for protection. This is

because the irregular (according to Brazilian law) establishment of traditional communities (both indigenous and *quilombos*) becomes complicated when the government establishes types of conservation units that prohibit human presence as a condition for their establishment (Chacpe 2014).

Ramos (2019), a popular educator and resident of a *quilombo*, recalls that in the African tradition the spoken word has power. Today, oral traditions and interactions are important for the construction, maintenance, and perpetuation of traditional knowledge and social relationships. Colonization in the Americas included the dehumanization of Indigenous and African peoples by the dominant white European culture that withheld respect for their traditional knowledge. This “civilizing” transformation was carried out by erasing the knowledge of those peoples of their origins and customs, which distanced them from their spiritual and physical relationships with land and their ecological belief systems (Lugones 2019). Here, one goal is to recognize traditional knowledge in *quilombo* communities.



Conservation biology tends to not address communities that live in conservation areas, often viewing them as potential sources of conflict with conservation, especially under the assumption that local communities are incapable of developing rational use of their natural resources (Diegues 2000). However, local communities are often the repository of considerable knowledge pertaining to the local ecosystem that can strengthen and inform conservation sciences (Sayago and Bursztyn 2006). Traditional communities often have strong ties to their natural resources because they depend on them, and their relationship often figures largely in the symbolism they use when describing their community, jobs, resources, and resource management and even influences how their knowledge is taught to subsequent generations (Colchester 2000).

Ethnoornithological studies are being carried out around the world in recognition of contributions of traditional knowledge as tools for conservation (Alves et al. 2013; Barman et al. 2020; Lima et al. 2014). In Brazil, the first studies including ethnoornithological information were carried out when early colonizers began noting bird names and stories told to them by Indigenous peoples (Farias and Alves 2007). Around 1985, Jensen was the first to apply scientific methods to ethnoornithology in Brazil. Jensen (1985) found similarities between the bird classification systems of four groups of Indigenous peoples of the Amazon and the Linnean system of classification. Early ethnoornithology in northeastern Brazil began with observations and collections of 52 species in Pernambuco (Forbes 1881). Other ethnoornithological studies followed in northeastern Brazil, with themes such as ethnotaxonomy, ecology, conservation, hunting, illegal trade, bird omens, zotherapy, bird use (food, religion, pets), and beliefs and perceptions about birds (Alves et al. 2013; Araujo et al. 2005; Barbosa et al. 2010; Bezerra et al. 2013; Farias and Alves 2007; Galvagne-Loss et al. 2013, 2014).

In Brazil, there are still few studies that examine traditional knowledge about birds of *Quilombo* communities, of which a few focused on northeastern Brazil. Diniz et al. (2012) examined local ecological and taxonomical knowledge, habits, and customs of a *Quilombo* community in Pernambuco focusing on local bird community structure. Others examined ethnozoological knowledge overall, including the avifauna. Costa-Neto (2000) examined reproduction,

social interactions, ecology, medicinal use, and hunting activities of a *Quilombo* community in Bahia. In that same community, Moura and Marques (2008) studied zotherapy based on local fauna and identified therapeutics prepared using local birds. This study aims to build on this scholarship by further documenting *quilombola* bird knowledge.

To better understand how people of the *quilombos* interacted with their local bird species, we asked participants about bird biology, conservation, and sociocultural importance of birds in northeastern Brazil. Additionally, we asked: 1) To what do the *quilombolas* attribute the loss of bird species? 2) Is knowledge of the *quilombolas* useful for developing effective conservation strategies?

Methods

Quilombola communities from the state of Pernambuco included in this study are Leitão da Carapuça in the municipality of Afogados da Ingazeira and Brejo de Dentro in the municipality of Carnaíba. Both are near the Refúgio de Vida Silvestre da Serra do Giz State Conservation Unit (310 ha, hereafter “reserve”) The region is predominantly semiarid savanna (Santos et al. 2006; Veloso et al. 1991; Figure 1).

We collected information using semi-structured questionnaires, free-form interviews, and conversations (Huntington 2000). One member of each participating household was questioned, who self-identified as the most knowledgeable about the local fauna. Questionnaires included the socio-demographic profile of the participant and information about birds including their natural history (reproduction, diet, migratory, sociality), aesthetics, cultural significance, uses, species that remain and those that have been lost, and their conservation.

Participants freely consented to the interviews. Bird species were identified during the interview by comparisons with animals and samples, photographs taken during the study, a photographic guide that was prepared for this study, and with help from specialists familiar with the local avifauna and their vernacular names (Alves and Rosa 2006).

Qualitative information was analyzed by the individual-based unity model, and included all information provided by the participant (Marques 1991). Information provided by the participants was compared with information available in the scientific literature of the region (Silvano and Jørgensen 2008). Twenty-five men and 30 women were interviewed,

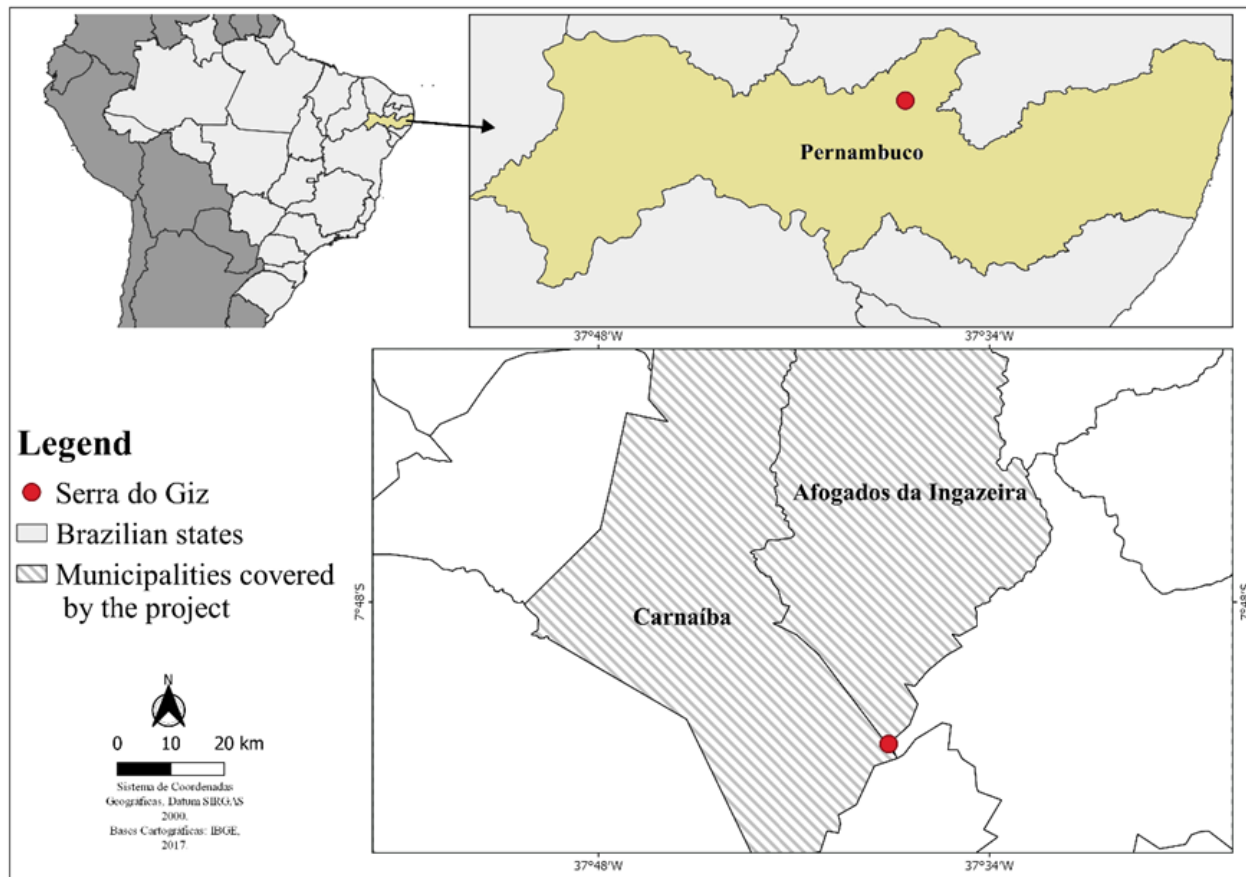


Figure 1 Location of the Refúgio da Vida Silvestre Serra do Giz, where we conducted the study.

with 32 in Leitão da Carapuça, and 23 in Brejo de Dentro. All participants, except one, were farmers. Socio-demographic profiles of the participants are provided in Table 1.

Ethnoornithological Information as Reported by the *Quilombolas*

Participants identified 120 species (43 families, 21 orders). Families most often cited were tanagers (*Thraupidae*), doves and pigeons (*Columbidae*), tyrant flycatchers (*Tyrannidae*), typical antbirds (*Thamnophilidae*), tinamous (*Tinamidae*), and blackbirds (*Icteridae*) (Table 2).

Most participants (82%) knew a bird was nesting by its behavior, which may include having observed them carrying nesting material and duet singing. Participants (78%) said birds tended to not re-use a nest, but rather build each nest in a new location. Some stated that the Pileated Finch (*Lanio pileatus*) and Southern Rough-winged Swallow (*Stelgidopteryx ruficollis*) defend their nests when a person

approached. Participants indicated two unidentifiable species: a hummingbird that nests on spiny branches for protection, and another, probably a flycatcher, that nests close to bee or wasp nests. Several (73%) stated that breeding occurred during the rainy season (January to June), when resources were abundant (Poulin et al. 1992), as is typical in the Caatinga (Hau et al. 2004).

Most participants (91%) said 14 species migrate (seasonal movement to and away from an area) (Rappole 1995; Stotz et al. 1996; Table 2). When resources become scarce as summer begins, the birds leave. Participants (45%) said that during the rainy season, the Eared Dove (*Zenaida auriculata*) travels in search of water and food, returning when beans (*Phaseolus vulgaris*) and Croton (*Croton blanchetianus*) (Euphorbiaceae) ripen. Euphorbiaceae (common in northeastern Brazil) are among the most important food plants for the dove (Antas 1987). The Lined Seedeater (*Sporophila lineola*) migrates during the dry season and may go as far as the llanos of Venezuela

Table 1 Socio-demographic parameters of residents of the community surrounding Serra do Giz.

Characteristics	Category	Age Group	Participants (%)
Age	Men	20-30	2 (3.6)
		31-40	7 (12.8)
		41-50	5 (9.1)
		51-60	6 (10.9)
		61-70	1 (1.8)
		71-80	2 (3.6)
		81-92	2 (3.6)
	Women	20-30	4 (7.3)
		31-40	7 (12.8)
		41-50	6 (10.9)
		51-60	6 (10.9)
		61-70	1 (1.8)
		71-80	4 (7.3)
		81-86	2 (3.6)
Marital status	Married		35 (63.7)
	Single		12 (21.8)
	Widow(er)s		8 (14.5)
Schooling	Never studied		3 (5.4)
	Functionally illiterate		9 (16.4)
	Incomplete elementary and middle school		27 (49.1)
	Complete elementary and middle school		2 (3.6)
	Incomplete high school		9 (16.4)
	Complete high school		4 (7.3)
Length of residence	Mobral		1 (1.8)
	< 05 years		5 (9.1)
	05 – 10 years		5 (9.1)
	> 10 years		45 (81.8)
Monthly income	< Minimum salary (~US\$200)		46 (83.6)
	> Minimum salary		9 (16.4)

(Silva 1995). Only one person said that the Plain-breasted Ground Dove (*Columbina minuta*) is apparently nomadic. Nomadic species simply move around and stay where they find food (Winkler et al. 2016).

Most participants recognized territoriality in the Great Kiskadee (*Pitangus sulphuratus*) and the Southern Lapwing (*Vanellus chilensis*). They consider the Great Kiskadee to be aggressive because it attacks other birds when defending its nest and will even chase much larger birds (Marchini and Ferraz 2014). The Southern Lapwing was said to often attack animals, including people, if they get too close to a nest (Costa 2002).

Most participants (73%) said birds sing more in the early morning (after 05:00 h), and they suggested that they do so when the day is still cool (Andrade 1997; Nishida et al. 2012). A quarter of participants

said mornings and afternoons provided the same opportunity for hearing birds, and 2% said the afternoon was best. All said that early mornings and late afternoons were the best time to observe birds.

The most difficult birds to see were the Small-billed Tinamou (*Crypturellus parvirostris*) and the White-tipped Dove (*Leptotila verreauxi*). Tinamous are always hard to see because they are well camouflaged and only their songs are heard. The dove is seldom observed, but when startled it flies away, making considerable noise while flapping its wings (Lima 2004).

Many participants remarked about birds imitating others, including the Turquoise-fronted Parrot (*Amazona aestiva*), the Blue-winged Macaw (*Primolius maracana*), the White-naped Jay (*Cyanocorax cyanopogon*), the Variable Oriole (*Icterus pyrrhopterus*), the Ultramarine Grosbeak (*Cyanoloxia brissonii*), the White-



Table 2 List of bird species recorded during the interviews in the *quilombola* communities near the Serra do Giz reserve.

Scientific Name	Common Name in Serra do Giz	Nesting	Diet
Tinamiformes			
Tinamidae			
<i>Crypturellus noctivagus zabele</i> ^{1,2}	Zabelé	On the ground	Grass and legume seeds
<i>Crypturellus parvirostris</i> ^{3,4,6}	Lambú-de-capoeira, lambú-do-pé-vermelho	On the ground	Grass and legume seeds
<i>Crypturellus tataupa</i> ^{3,4,6}	Lambú-do-pé-roxo	On the ground	Euphorbiaceae, Anacardiaceae, Burseraceae and Poaceae seeds
<i>Rhynchotus rufescens catingae</i> ¹	Perdiz	On the ground	
Nothura boraquirá ⁶	Codorniz	On the ground	
<i>Nothura maculosa</i> ⁶	Codorna	On the ground	
Anseriformes			
Anatidae			
<i>Dendrocygna viduata</i>	Marreco		
Galliformes			
Cracidae			
<i>Penelope superciliosa alagoensis</i> ²	Jacupemba		Fruits (Rhamnaceae, Bignoniaceae, Myrtaceae), seeds (Poaceae), liana flower
<i>Penelope jacucaca</i> ^{1,2,3,6}	Jacu		Fruits (Rhamnaceae, Bignoniaceae, Myrtaceae), seeds (Poaceae), liana flower
Podicipediformes			
Podicipedidae			
<i>Tachybaptus dominicus</i> ⁷	Mergulhão		Insects
Columbiformes			
Columbidae			
<i>Patagioenas picazuro</i> ^{3,7}	Asa-branca		Grass seed
<i>Columbina minuta</i> ^{3,4,6,7}	Rolinha-cafofa		Seeds
<i>Columbina talpacoti</i> ^{3,4,6}	Rolinha-roxa, rolinha-caldo-de-feijão, rolinha-vermelha	Branches and grass	Poaceae, Fabaceae, Euphorbiaceae and Convolvulaceae seeds and insects
<i>Columbina squammata</i> ^{3,4,6}	Rolinha-fogo-pagô, rolinha-cascavel	Stalks of grass and cotton	Euphorbiaceae and Fabaceae seeds
<i>Columbina picui</i> ^{3,6}	Rolinha-branca	On the ground	Fabaceae, Euphorbiaceae, Convolvulaceae, Anacardiaceae, Burseraceae and Poaceae seeds
<i>Claris pretiosa</i> ^{3,4,6,7}	Rolinha-azul	On the ground	Fabaceae and Euphorbiaceae seeds and Cactaceae fruits
<i>Leptotila verreauxi</i> ^{3,4,5,6,7}	Juriti		
<i>Zenaida auriculata</i> ^{3,7}	Ribaçã, rebaçã, arribaçã	On the ground	

¹Endemic to the Caatinga

²Threatened with extinction

³Forms flocks

⁴In pairs

⁵Solitary

⁶Attract attention for appearance or song

⁷Migratory

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Scientific Name	Common Name in Serra do Giz	Nesting	Diet
Cuculiformes			
Cuculidae			
<i>Guira guira</i>	Anum-branco	Twigs, thorns, pieces of fabric and green eggs. Twigs	Insects, strawberries, snakes, and ticks
<i>Crotophaga ani</i>	Anum-preto, anum-de-enxurrada		Insects, strawberries, snakes, and ticks
<i>Tapera naevia</i>	Peitica		
<i>Playa cayana</i>	Alma-de-gato		
<i>Coccyzus melacoryphus</i>	Papa-lagarta, lagartão		Caterpillar
Caprimulgiformes			
Caprimulgidae			
<i>Nyctipolus hiruandinaceus</i> ^{1,4,5}	Bacurau	On the ground and under rock	Insects
<i>Nyctidromus albicollis</i> ^{4,5}	Bacurau	On the ground and under rocks	Insects
<i>Hydropsalis torquata</i> ^{4,5}	Bacurau-rabo-de-tesoura	On the ground and under rocks	
Nyctibiidae			
<i>Nyctibius griseus</i>	Mãe-da-lua		Insects
Apodiformes			
Trochilidae			
<i>Phaethornis ruber</i>	Beija-flor	Plant fibers, animal fur/hair (cattle, goats, and sheep)	Cactaceae fruits
<i>Chlorostilbon lucidus</i>	Beija-flor	Wool, grass, cotton, and animal hair (cattle, goats, and sheep)	Cactaceae fruits
<i>Eupetomena macroura</i>	Beija-flor-rabo-de-tesoura, tesourão, bizungá, bizungão	Wool, grass, cotton, and animal hair (cattle, goats, and sheep)	Cactaceae fruits
Gruiformes			
Rallidae			
<i>Aramides cajaneus</i> ³	Saracura, siricora, três-coco, patangu		Seeds
<i>Gallinula galeata</i> ⁷	Galinha-d'água		Insects, tadpoles, and frogs
<i>Phorphyrio martinica</i> ⁷	Galinha-d'água		Insects, tadpoles, and frogs
Aramidae			
<i>Aramus guarauna</i>	Carão		
Charadriiformes			
Charadriidae			
<i>Vanellus chilensis</i>	Tetê, quero-quero	On the ground	
Jacaniidae			
<i>Jacana jacana</i>	Jaçaná		

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Scientific Name	Common Name in Serra do Giz	Nesting	Diet
Pelecaniformes			
Ardeidae			
<i>Ardea alba</i> ⁷	Garça		
<i>Bubulcus ibis</i> ⁷	Garça		
Cathartiformes			
Cathartidae			
<i>Sarcorampus papa</i> ²	Urubu-rei	Rock cavities	Chicken and rooster
<i>Coragyps atratus</i>	Urubu-de-cabeça-preta	Rock cavities	Dead animals
<i>Cathartes aura</i>	Urubu-de-cabeça-vermelha	Rock cavities	
<i>Cathartes burrovianus</i>	Urubu-de-cabeça-amarela	Rock cavities	
Accipitriformes			
Accipitridae			
<i>Elianus leucurus</i> ⁵	Gavião-penêra, gavião-peneira		Small rodents and lizards
<i>Buteogallus meridionalis</i> ⁵	Gavião-caboclo		Small rodents and lizards
<i>Rupornis magnirostris</i> ⁵	Gavião-pega-pinto, gavião-ripino, gavião-miúdo, gavião-chama-visita		Pinto, chicken, mouse, and small lizards
Strigiformes			
Tytonidae			
<i>Tyto alba</i>	Rasga-mortalha	On the ground	
Strigidae			
<i>Megascops choliba</i>	Coruja, coruja-boi		Beetle, butterfly, mouse, and small lizards
<i>Glaucidium brasilianum</i>	Caboré, coruja-caboré		Insects
<i>Atena cucularia</i>	Coruja-buraqueira	On the ground	Beetle, butterfly, mouse, and small lizards
Coraciiformes			
Alcedinidae			
<i>Chloroceryle americana</i>	Pescador		
Galbuliformes			
Bucconidae			
<i>Nystalus maculatus</i>	Fura-barreira, cololô, cochilão	Cliffs.	
Galbulidae			
<i>Galbula ruficauda</i>	Pavãozinha-do-mato		
Piciformes			
Picidae			
<i>Dryobates passerinus</i>	Pica-pau, pinica-pau	Tree cavities	
<i>Picus chrysochloros</i>	Pica-pau, pinica-pau	Tree cavities	
<i>Colaptes melanochloros</i>	Pica-pau, pinica-pau, furiba	Tree cavities	

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Scientific Name	Common Name in Serra do Giz	Nesting	Diet
Cariamiformes			
Cariamidae			
<i>Cariama cristata</i>	Sariema, siriema		
Falconiformes			
Falconidae			
<i>Caracara plancus</i>	Carcará		Chickens
<i>Herpetotheres cachinnans</i> ⁶	Cauã, acauã		Small mammals and reptiles
Psittaciformes			
Psittacidae			
<i>Amazona aestiva</i> ^{2,3}	Papagaio	Termite mounds and tree cavities	Poaceae seeds
<i>Forpus xanthopterygius</i> ^{3,6}	Pacu, periquito		Poaceae and Asteraceae seeds and fruits
<i>Eupsittula cactorum</i> ^{2,3,6}	Gangarra, maritaca, griguilim, jandaia	Termite mounds and other nests	Poaceae and Euphorbiaceae, pitomba and guava seeds. In captivity, meat
<i>Primolius maracaná</i> ²	Maracanã	Termite mounds and tree cavities	
Passeriformes			
Thamnophilidae			
<i>Taraba major</i> ⁵	Chorró, chorró-vermelho	Twigs and cotton	
<i>Myrmochilus strigilatus strigilatus</i> ¹	Pinto-do-mato, tem-farinha-ai, farinheiro		
<i>Herpilochmus</i> sp.5	Chorró		
<i>Formicivora grisea</i> ⁵	Chorró		
<i>Formicivora melanogaster bahiae</i> ¹	Gatinha-preta, fura-estrela		
<i>Thamnophilus capistratus</i> ¹	Choca		
Grallariidae			
<i>Hylopezus ochroleucus</i> ^{1,2}	Pompeu		
Furnariidae			
<i>Campylorhynchus trochilirostris</i>			
<i>Furnarius leucopus</i> ⁶	João-de-barro	Clay nest, with two entrances	Insects
<i>Pseudoseisura cristata</i> ^{1,4}	Casaca-de-couro	Branches, barauna thorns, mesquite, bird feathers, cotton, snakeskin, pieces of fabric, plastic, paper, and broom stalk	
<i>Synallaxis hellmayri</i> ¹	João-xique-xique, mará, cajarana	On the ground	
<i>Synallaxis frontalis</i>	Tiotonho, mané-tiotonho, espantaveado		

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Scientific Name	Common Name in Serra do Giz	Nesting	Diet
Tyrannidae			
<i>Hemitriccus margaritaceiventer</i>	Lelé, ceguinho, ceguinho-de-capoeira		
<i>Todirostrum cinereum</i>	Sibito, ferreirinho, manteiguinha, patinha, coquinho		
<i>Tolmomyias flaviventris</i>	Canário-da-mata		
<i>Elaenia flavogaster</i>	Tontinha, maria-tonta, joana-tonta		
<i>Stigmatura napensis bahiae</i> ¹	Trinta-e-cinco, sibito, papa-mosca		
<i>Fluvicola nengeta</i> ⁶	Lavandeira	Branches, grass, leaves, bird feathers, cotton, animal hair (tail, mane)	Butterfly
<i>Myiarchus tyrannulus</i>	Bem-te-vi-boi, bem-te-vi-pequeno		
<i>Machetornis rixosa</i>	Bem-te-vi-de-remela		
<i>Pitangus sulphuratus</i>	Bem-te-vi		
<i>Empidonomus varius</i>	Bem-te-vi-da-mata		Beans on the farm and insects
<i>Tyrannus melancholicus</i>	Suiriri, marica		
Vireonidae			
<i>Cyclarhis gujanensis</i>	Bico-duro		
Corvidae			
<i>Cyanocorax cyanopogon</i> ^{3,6}	Cancão	Hard to find. The female lays eggs hidden from the male, which may drink the eggs. It can occupy other nests.	Poaceae and Euphorbiaceae seeds, fruits, insects, strawberries, and small birds. In captivity, meat.
Hirundinidae			
<i>Steigodopteryx ruficollis</i>	Andorinha-do-cerrado		
Poliptilidae			
<i>Poliptila plumbea</i>	Sibito, manteiguinha, sibito-magro, tiinha, caga-sebo, gatinha		Fruits
Troglodytidae			
<i>Troglodytes musculus</i>	Garrincha, richinó	On roofs and satellite dishes	
Mimidae			
<i>Mimus saturninus arenaceus</i> ¹	Sabiá-caga-sebo, sebeiro, sabiá-sebeiro		Fruits and insects
Turdidae			
<i>Turdus leucomelas</i>	Sabiá-branco, sabiá-da-mata, sabiá-do-campo, sabiá-bico-de-prata		Pinecone and butterfly
<i>Turdus rufiventris</i> ⁶	Sabiá-laranjeira, sabiá-gonga, sabiá-de-papo-amarelo, sabiá-de-inverno, sabiá-Jamaica	Leaves and pieces of fabric	Pinecone and butterfly
<i>Turdus amaurochalinus</i>	Sabiá-bico-de-osso		

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Scientific Name	Common Name in Serra do Giz	Nesting	Diet
Estrilidae			
<i>Estrilda astrild</i> ³	Bico-de-lacre		
Passeridae			
<i>Passer domesticus</i>	Pardal	Bird feathers	Seeds
Fringillidae			
<i>Euphonia chlorotica</i>	Vim-vim	Branches, grass, grass roots and cotton. Nest made in a catholic coconut tree.	Fabaceae seeds and Loranthaceae herbs
<i>Spinus yarrellii</i> ^{2,3,4,6,7}	Pintassilgo		Poaceae seeds and fruits
Passerellidae			
<i>Zonotrichia capensis</i>	Salta-caminho, Jesus-meu-deus, tico-tico, chiquin		Poaceae seeds
Icteridae			
<i>Icterus pyrrhopterus</i> ⁶	Xexéu-de-bananeira, péga	Banana plant fibers	Banana, mango, cashew, pinecone, baby bees in hives and Arecaceae fruits
<i>Icterus jamaicensis</i> ^{1,6}	Chofréu, concriz	Pieces of fabric, little strings, and fiber	Cactaceae fruits, pulp and seed of guava, pinecone, and banana
<i>Molothrus bonariensis</i>	Passarinho-preto		Poaceae seeds
<i>Gnorimopsar chopi</i>	Craúna, graúna		Seeds
<i>Chrysomus ruficapillus</i>	Papa-arroz, acorda-nêgo		Fabaceae, Euphorbiaceae and Convolvulaceae seeds, Cactaceae, cashew and pinecone fruits
Cardinalidae			
<i>Cyanoloxia brissonii</i> ⁶	Azulão, azulão-de-urtiga, azulão-de-favela		Seeds
Thraupidae			
<i>Paroaria dominicana</i> ^{1,3,4,6}	Galo-de-campina, cabeça-vermelha	Branches, grass, grass roots and cotton	
<i>Compsothraupis loricata</i> ¹	Sanguede-de-boi, passarinho-da-mata		
<i>Tachyphonus rufus</i>	Sabino		Fruits
<i>Thraupis sayaca</i>	Sanhaçu, sanhaçu-azul		Fruits
<i>Tangara cayana</i>	Sanhaçu-de-macaco, sanhaçu-de-golabeira		
<i>Sicalis luteola</i>	Mané-magro, canário-vagabundo, canário-fuleiro, canário-pirrita		
<i>Sicalis flaveola</i> ^{4,6}	Canário-da-terra		Seeds
<i>Volatinia jacarina</i> ⁷	Nêgo-tiziu, tiziu, pássaro-de-aração		Poaceae seeds
<i>Sporophila lineola</i> ^{6,7}	Bigodinho		
<i>Sporophila angolensis</i>	Curio		
<i>Sporophila nigricollis</i> ⁶	Papa-capim		
<i>Sporophila albogularis</i> ^{3,4,6}	Golinha	Twigs, cotton, grass roots, pieces of fabric and nylon thread	Poaceae seeds and fruits
<i>Coryphospingus pileatus</i> ^{3,6}	Maria-fita, cravina, tico-tico-da-caatinga		Fruits



throated Seedeater (*Sporophila albogularis*), and the Rufous Bellied Thrush (*Turdus rufiventris*). All these species are known to imitate other bird species (Lima 2004; Sick 1997).

Use and Factors that Led to the Disappearance of the Birds

Most interviewees in the *quilombos* believed that hunters caught birds for their song, beauty, and intelligence; and so, the best singing birds and birds that talk (and presumably are smart) tend to be the most captured (songbirds and parrots) (Franco et al. 2012). Having pets was the main reason reported for capturing birds and we observed that this was common in rural communities throughout Brazil during this project. Birds are often captured for the pet trade as well (Alves et al. 2010). Thus, most participants stated that illegal hunting (for the pet trade or for food) was the main cause of bird declines, and which causes concern among the *quilombolas* because they recognize the ecological importance of the species, and that continued hunting can cause their demise.

Many participants knew of some species that were much more common in the past, nine of which are also threatened or endangered according to the Red Book of Endangered Brazilian Fauna (ICMBio 2018). Six species seen in the past are almost never seen today by the interviewees. Of these, one regional subspecies, (CR), the Rusty-margined Guan (*Penelope superciliosus alagoensis*), is critically endangered. Two parrots are near threatened (NT): locally, the Turquoise-fronted Parrot (*Amazona aestiva*) and globally, the Blue-winged Macaw (*Primolius maracana*). Three are vulnerable (VU): the White-browed Guan (*Penelope jacucaca*), Yellow-legged Tinamou (*Crypturellus noctivagus*), and Forbe's Blackbird (*Anumara forbesi*). Three other species are seldom seen by the interviewees. Of these, two are NT, the King Vulture (*Sarcorambus papa*) and the White-browed Antpitta (*Hylopezus ochroleucus*), and one is VU, the Yellow-faced Siskin (*Spinus yarrellii*).

Some stated that the Yellow-faced Siskin is only seen in the rainy season, while others said it was last seen about four years ago. Some more common birds that are not threatened are seldom seen. A participant stated that they last saw the Tataupa Tinamou (*Crypturellus tataupa*) eight years ago. They last saw the Chopi Blackbird (*Gnorimopsar chopi*) five years ago during the rainy season. The Saffron Finch (*Sicalis flaveola*) disappeared due to being captured for the pet

trade. On the other hand, other birds they saw in the past, such as the Campo Troupial (*Icterus jamacaii*) and Variable Oriole (*Icterus pyrrhopterus*), were recently seen again. Five interviewees said they thought their return was because the area was fenced in, and hunting was prohibited. Another 26 said that a strong, long, dry period (5–6 years) caused the population decline in those birds due to a lack of food and water. Beginning in 2018, rainfall increased again and so the birds returned.

Participants knew that hunting native birds is illegal, but hunting is not uncommon. Landowners often prohibit hunting. Some hunters avoid hunting in the reserve because they were concerned about being caught by enforcement officials. While hunting is less common than in the past, participants knew that hunting in the reserve continues.

Importance of Birds

Most participants (71%) agreed that birds are important. Importance was classified as aesthetic (59%), ecological (20%), conservationist (15%), and cultural (7%). Participants felt that bird beauty and song brought joy to the Caatinga. Participants knew that birds were important for environmental services including pollination, seed dispersal, and consuming insects like crop pests or ticks on cattle and horses. One participant noted that some birds eat snakes and so help protect people from snake bites. Participants felt that conservation was important simply because birds have the right to freedom and life, just as people do. Participants said that birds were important culturally because birds figure into their belief systems and communities. They also stated that they knew stories that included birds and that they believed that birds are often associated with luck (both good and bad), tragedy, death, when people are arriving, and changing weather.

Conservation Initiatives

The Refúgio de Vida Silvestre Serra do Giz reserve, created in 2019, still has no management plans and there are no reserve rangers or guards that patrol the reserve. That being the case, involvement of the people of the local communities is very important for the protection of the reserve. Today, a single community member is responsible for guiding tourists and researchers within the reserve. Also, local residents observe hunters and outsiders (those not known to the local communities) within the reserve. They often report these infractions to the *Instituto*

Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), the Brazilian natural resources agency, which visited the region once during our study and recovered illegal captive birds in Afogados da Ingazeira and other nearby communities. Most interviewees were concerned about hunting and so they were interested in converting the area into a formal conservation unit to protect local biodiversity. They were also concerned about the preservation of ancient rock wall paintings that made the region archaeologically interesting and attracts tourists.

When we asked the participants in these *quilombos* what actions might be useful for conservation in the refuge, they provided a variety of answers:

- 1) IBAMA, military police, and public prosecutors should coordinate to catch and prosecute poachers (19 citations)
- 2) Hunting and capturing should be expressly forbidden (9 citations)
- 3) A law should be enacted to prohibit bird hunting (9 citations)
- 4) Education programs should teach community members that catching, killing, and illegal wildlife trade which are all detrimental to the existence of birds (3 citations)
- 5) Community members should take responsibility themselves and request that hunters cease their activities (2 citations). Yet, no suggestions were forthcoming about how this action could be carried out, nor how this might result in personal danger in attempting to prohibit hunting.

The following were recommended by one participant each.

- 6) Deforestation should be prohibited.
- 7) Pollution (in general, with no particular mention of kind) should be prohibited.
- 8) State and municipal governments should demand that the federal government install a wildlife unit in a nearby municipality and should take an active part in monitoring the refuge.
- 9) Trees should be planted to attract birds.
- 10) Remote (drone) monitoring should be used.
- 11) Signage should be used around the refuge to state that hunting is prohibited.
- 12) Hunting limits should be created rather than a

complete ban. Nine of the participants had no particular suggestions for protecting birds. Surprisingly, *quilombolas* seldom visit the conservation unit despite its accessibility, while the main visitors come from more urban regions of the municipality or from nearby cities and other states. Interviewees also stated that they seldom visited the area to hunt or for agriculture or logging.

Cultural Transmission of Ethnoornithological Knowledge

Oral transmission of information is important for ethnoornithology as in all traditional ecological knowledge transmission. Vertical transmission of information about birds was reported by 62% of the participants ($n = 34$), with fathers ($n = 24$) reporting more than mothers ($n = 9$) or grandparents ($n = 9$ for each sex). Horizontal transfer was less important as reported by the community (24%, $n = 13$), with people reporting spouses ($n = 2$), siblings ($n = 1$), neighbors ($n = 1$) and other contemporaries ($n = 10$). Oblique transmission (15%, $n = 8$) was usually mentioned by older, non-relatives ($n = 5$) and teachers ($n = 3$). Several ($n = 16$, 29%) reported that they learned about birds at least partly on their own through daily observations of their natural environment. Many of the participants (69%) said that they shared their avian knowledge with others ($n = 38$).

Conclusion

We found that the people of the *Quilombo* communities near the refuge had some knowledge and interest in birds. Most were concerned with bird conservation and thought of a variety of reasonable plans to protect birds. Conservation measures should include the *quilombolas* so that they can help manage and become more knowledgeable about avian communities. Understanding that small communities know about birds and are concerned about their conservation can encourage management to include them, and other local communities, in their actions and strategies, and thereby also validate the local knowledge of these communities.

Declarations

Permissions: This study was carried out under the University of Pernambuco Ethics Committee (CAAE 89888018.2.0000.5207) and registered in the Brazilian Sistema Nacional de Gestão do Patrimônio Genético

e do Conhecimento Tradicional Associado (SisGen) under the registry number A6A6D4D.

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